 [KEMBALI KE MENU SEBELUMNYA]

DAFTAR ISI

1. Tujuan

2. Alat dan Bahan

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7. Video

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<b style="background-color: white; border: 0px; box-sizing: border-box; color: #444444; font-family: "open sans", arial, helvetica, sans-serif; font-size: 15px; margin: 0px; padding: 0px; text-align: start;">
 SISTEM KEAMANAN OTOMATIS RUANGAN
BRANKAS BANK <o:p></o:p>

 <span

style="font-family: "times" , "times new roman" , serif; font-size: small;">1. Tujuan[Kembali] <ul style="text-align: left;">
Tujuan <ol style="text-align: left;">
Memenuhi syarat untuk Modul 4 Praktikum Mikrokontroller & Mikroprosesor.<o:p></o:p>
Untuk mengurangi kemungkinan terjadi perampokan pada brankas.
Untuk meningkatkan sistem keamanan pada brankas.
 2. Alat <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 115%; mso-ansi-language: EN-US; mso-bidi-font-size: 11.0pt; mso-bidi-language: AR-SA; mso-fareast-font-family: Calibri; mso-fareast-language: EN-US; mso-fareast-theme-font: minor-latin;">dan Bahan[Kembali] <ul style="font-family: times, "times new roman", serif; font-size: medium; text-align: left;"> Alat :<o:p></o:p>

<!--[if !supportLists]-->·   <!--[endif]--><span lang="IN" style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 150%; mso-ansi-language: IN;

mso-bidi-font-size: 11.0pt;">Probes :<o:p></o:p>

-. Jumper<o:p></o:p>

<!--[if !supportLists]-->·   <!--[endif]-->Bahan :<o:p></o:p>

-. Resistor dan Potensiometer<o:p></o:p>

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!supportLists]--><span lang="IN" style="font-family: Symbol; font-size: 12pt; line-height:
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mso-bidi-font-weight: bold; mso-fareast-font-family: Symbol;">·<span style="font-family:
"Times New Roman"; font-size: 7pt; font-stretch: normal; font-variant-east-asian:
normal; font-variant-numeric: normal; line-height:
normal;">   <!--[endif]--><span
lang="IN" style="font-family: "Times New Roman",serif; font-size: 12pt;
line-height: 150%; mso-ansi-language: IN; mso-bidi-font-size: 11.0pt;">Komponen Input
:<span lang="IN" style="font-family: "Times New Roman",serif;
font-size: 12pt; line-height: 150%; mso-ansi-language: IN; mso-bidi-font-size: 11.0pt;
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Roman",serif; font-size: 12pt; line-height: 150%; mso-ansi-language: IN;
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PIR<o:p></o:p>

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-. Sensor Ultrasonik<o:p></o:p>

-. Sensor Touch<o:p></o:p>

<!--[if !supportLists]--><span lang="IN" style="font-family: Symbol; font-size: 12pt; line-height: 150%; mso-ansi-language: IN; mso-bidi-font-family: Symbol; mso-bidi-font-size: 11.0pt; mso-bidi-font-weight: bold; mso-fareast-font-family: Symbol;">·   <!--[endif]-->Komponen Output :<o:p></o:p>

-. Motor Servo<o:p></o:p>

-. LCD<o:p></o:p>

-. Buzzer

   -. LED<o:p></o:p>

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<!--[if !supportLists]--><span lang="IN" style="font-family: Symbol; font-size: 12pt; line-height: 150%; mso-ansi-language: IN; mso-bidi-font-family: Symbol; mso-bidi-font-size: 11.0pt; mso-bidi-font-weight: bold; mso-fareast-font-family: Symbol;">·   <!--[endif]-->Komponen Lainnya :<o:p></o:p>

-. Arduino<o:p></o:p>

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 <h3 style="text-align: left;">3. Dasar Teori [Kembali]</h3>   1. <!--[endif]-->Resistor <p align="justify" class="MsoNormal" style="line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 18pt; text-justify: inter-ideograph;"><span style="font-family:

inherit;">Resistor merupakan komponen penting dan sering dijumpai dalam sirkuit Elektronik. Boleh dikatakan hampir setiap sirkuit Elektronik pasti ada Resistor. Tetapi banyak diantara kita yang bekerja di perusahaan perakitan Elektronik maupun yang menggunakan peralatan Elektronik tersebut tidak mengetahui cara membaca kode warna ataupun kode angka yang ada ditubuh Resistor itu sendiri. Seperti yang dikatakan sebelumnya, nilai Resistor yang berbentuk Axial adalah diwakili oleh Warna-warna yang terdapat di tubuh (body) Resistor itu sendiri dalam bentuk Gelang. Umumnya terdapat 4 Gelang di tubuh Resistor, tetapi ada juga yang 5 Gelang. Gelang warna Emas dan Perak biasanya terletak agak jauh dari gelang warna lainnya sebagai tanda gelang terakhir. Gelang Terakhirnya ini juga merupakan nilai toleransi pada nilai Resistor yang bersangkutan. Tabel dibawah ini adalah warna-warna yang terdapat di Tubuh Resistor:<o:p></o:p> <a
href="https://blogger.googleusercontent.com/img/a/AVvXsEhPvwNptz249RU1Ea8biJXnZm8C6RytwMuRtnBtyuqbAnCpFLQvcbgiyytiyws_9yl1EXWcccdgbPbXGp9znzWrmBHm14cfWWEKyjL0neMY7dK80ZG8ivg9PVTvcUnrFNnghD9Cb5x8aEN9Q8nqeNHzA2J2RZ2dm_beo9h7n0IXmltn86dhynd49sS7ng=s598" style="margin-left: 1em; margin-right: 1em;"><img border="0" data-original-height="598" data-original-width="367" height="320"
src="https://blogger.googleusercontent.com/img/a/AVvXsEhPvwNptz249RU1Ea8biJXnZm8C6RytwMuRtnBtyuqbAnCpFLQvcbgiyytiyws_9yl1EXWcccdgbPbXGp9znzWrmBHm14cfWWEKyjL0neMY7dK80ZG8ivg9PVTvcUnrFNnghD9Cb5x8aEN9Q8nqeNHzA2J2RZ2dm_beo9h7n0IXmltn86dhynd49sS7ng=s320" width="196" /> Tabel Kode Warna ResistorPerhitungan untuk Resistor dengan 4 Gelang warna :<o:p></o:p> <a
href="https://blogger.googleusercontent.com/img/a/AVvXsEi7jtwddWsTwZ6EmYlHV3sKgWeiPjjel-j59VUODlwOjTuSpGD_9QS3e6JIlYTayb5FJ9qIBr99R4gA4ODuehlwN-fMWiMVENnNFTE-qaTn7MOEbwMQ-RWU0dGmp_xSGXuhGn5HpRAFMnSNfOb-IN21wn743FuJvtIaFr9CD

U3MH5kTW8JDdfYofykTwA=s524" style="margin-left: 1em; margin-right: 1em;"> Cara menghitung nilai resistor 4 gelang Masukkan angka langsung dari kode warna Gelang ke-1 (pertama) Masukkan angka langsung dari kode warna Gelang ke-2 Masukkan Jumlah nol dari kode warna Gelang ke-3 atau pangkatkan angka tersebut dengan 10 (10n) Merupakan Toleransi dari nilai Resistor tersebut <o:p></o:p> Contoh:<o:p></o:p> Gelang ke 1: Coklat = 1<o:p></o:p> Gelang ke 2: Hitam = 0<o:p></o:p> Gelang ke 3: Hijau = 5 nol dibelakang angka gelang ke-2; atau kalikan 105<o:p></o:p> <p align="justify" class="MsoNormal" style="line-height: 24px; margin-bottom: 0pt; text-align:

justify; text-justify: inter-ideograph;">Gelang ke 4: Perak = Toleransi 10%<o:p></o:p> Maka nilai Resistor tersebut adalah 10 * 105 = 1.000.000 Ohm atau 1 MOhm dengan toleransi 10%. Perhitungan untuk Resistor dengan 5 Gelang warna :<o:p></o:p> Cara Menghitung Nilai Resistor 5 Gelang Warna <o:p></o:p> Masukkan angka langsung dari kode warna Gelang ke-1 (pertama) <o:p></o:p> Masukkan angka langsung dari kode warna Gelang ke-2<span style="line-height: 24px; mso-fareast-font-family: Calibri; mso-spacerun:

'yes';"><o:p></o:p> Masukkan angka langsung dari kode warna Gelang ke-3<o:p></o:p> Masukkan Jumlah nol dari kode warna Gelang ke-4 atau pangkatkan angka tersebut dengan 10 (10n)<o:p></o:p> Merupakan Toleransi dari nilai Resistor tersebut<o:p></o:p> Contoh:<o:p></o:p> Gelang ke 1: Coklat = 1<o:p></o:p> Gelang ke 2: Hitam = 0<o:p></o:p> Gelang ke 3: Hijau = 5<o:p></o:p> Gelang ke 4: Hijau = 5 nol dibelakang angka gelang ke-2; atau kalikan 105<span style="line-height: 24px; mso-fareast-font-family: Calibri;

mso-spacerun: 'yes';"><o:p></o:p> Gelang ke 5: Perak = Toleransi 10%<o:p></o:p> Maka nilai Resistor tersebut adalah 105 * 105 = 10.500.000 Ohm atau 10,5 MOhm dengan toleransi 10%.<o:p></o:p> Contoh-contoh perhitungan lainnya:<o:p></o:p> Merah, Merah, Merah, Emas → 22 * 10^2 = 2.200 Ohm atau 2,2 Kilo Ohm dengan 5% toleransi<o:p></o:p> Kuning, Ungu, Orange, Perak → 47 * 10^3 = 47.000 Ohm atau 47 Kilo Ohm dengan 10% toleransi<o:p></o:p> Cara menghitung Toleransi:<o:p></o:p> 2.200 Ohm dengan Toleransi 5% =<o:p></o:p> <span style="line-height: 24px; mso-fareast-font-family: Calibri;

mso-spacerun: 'yes';">2200 – 5% = 2.090<o:p></o:p> 2200 + 5% = 2.310<o:p></o:p> ini artinya nilai Resistor tersebut akan berkisar antara 2.090 Ohm ~ 2.310 Ohm<o:p></o:p> 2. <!--[endif]-->Potensiometer Gambar Potensiometer<o:p></o:p> <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;">Potensiometer adalah salah satu jenis Resistor yang Nilai Resistansinya dapat diatur sesuai dengan kebutuhan Rangkaian Elektronika ataupun

kebutuhan pemakainya. Potensiometer merupakan Keluarga Resistor yang tergolong dalam Kategori Variable Resistor. Secara struktur, Potensiometer terdiri dari 3 kaki Terminal dengan sebuah shaft atau tuas yang berfungsi sebagai pengaturnya. Gambar dibawah ini menunjukan Struktur Internal Potensiometer beserta bentuk dan Simbolnya.
Pada dasarnya bagian-bagian penting dalam Komponen Potensiometer adalah:<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;">-. Penyapu atau disebut juga dengan Wiper<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;">-. Element Resistif<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;">-. Terminal<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;">Berdasarkan bentuknya, Potensiometer dapat dibagi menjadi 3 macam, yaitu:<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 21.3pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: -18pt; text-justify: inter-ideograph;">1.   Potensiometer Slider, yaitu Potensiometer yang nilai resistansinya dapat diatur dengan cara menggeserkan Wiper-nya dari kiri ke kanan atau dari bawah ke atas sesuai dengan pemasangannya. Biasanya menggunakan Ibu Jari untuk menggeser wiper-nya.<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 21.3pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: -18pt; text-justify: inter-ideograph;">2.   Potensiometer Rotary, yaitu Potensiometer yang nilai resistansinya dapat diatur dengan cara memutarkan Wiper-nya sepanjang lintasan yang melingkar. Biasanya menggunakan Ibu Jari

untuk memutar wiper tersebut. Oleh karena itu, Potensiometer Rotary sering disebut juga dengan Thumbwheel Potentiometer.<o:p></o:p> <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 21.3pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: -18pt; text-justify: inter-ideograph;">3.   Potensiometer Trimmer, yaitu Potensiometer yang bentuknya kecil dan harus menggunakan alat khusus seperti Obeng (screwdriver) untuk memutarnya. Potensiometer Trimmer ini biasanya dipasangkan di PCB dan jarang dilakukan pengaturannya.<o:p></o:p> <p align="center" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 21.3pt; mso-pagination: widow-orphan; text-align: center; text-autospace: ideograph-numeric; text-indent: -18pt;"> Gambar Jenis-Jenis Potensometer<o:p></o:p> <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;">Sebuah Potensiometer (POT) terdiri dari sebuah elemen resistif yang membentuk jalur (track) dengan terminal di kedua ujungnya. Sedangkan terminal lainnya (biasanya berada di tengah) adalah Penyapu (Wiper) yang dipergunakan untuk menentukan pergerakan pada jalur elemen resistif (Resistive). Pergerakan Penyapu (Wiper) pada Jalur Elemen Resistif inilah yang mengatur naik-turunnya Nilai Resistansi sebuah Potensiometer.<o:p></o:p> <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;">Elemen Resistif pada Potensiometer umumnya terbuat dari bahan campuran Metal (logam) dan Keramik ataupun Bahan Karbon (Carbon). Berdasarkan Track

(jalur) elemen resistif-nya, Potensiometer dapat digolongkan menjadi 2 jenis yaitu Potensiometer Linear (Linear Potentiometer) dan Potensiometer Logaritmik (Logarithmic Potentiometer).<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 17.45pt; text-justify: inter-ideograph;">Dengan kemampuan yang dapat mengubah resistansi atau hambatan, Potensiometer sering digunakan dalam rangkaian atau peralatan Elektronika dengan fungsi-fungsi sebagai berikut:<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 17.45pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;">-. Sebagai pengatur Volume pada berbagai peralatan Audio/Video seperti Amplifier, Tape Mobil, DVD Player.<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 17.45pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;">-. Sebagai Pengatur Tegangan pada Rangkaian Power Supply<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 17.45pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;">-. Sebagai Pembagi Tegangan<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 17.45pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;">-. Aplikasi Switch TRIAC<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 17.45pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;">-. Digunakan sebagai Joystick pada Tranduser<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 17.45pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;">-. Sebagai Pengendali Level Sinyal<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 17.45pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;"> </p><p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left:

36pt; mso-list: l4 level1 lfo1; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: -18pt; text-justify: inter-ideograph;">3. Sensor PIR
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-size: small;"> Sensor PIR (Passive Infrared Receiver) adalah sebuah sensor yang biasa digunakan untuk mendeteksi keberadaan manusia. Aplikasi ini biasa digunakan untuk system alarm pada rumah-rumah atau perkantoran. Sensor PIR adalah sebuah sensor yang menangkap pancaran sinyal inframerah yang
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an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto

!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">dikeluarkan oleh tubuh manusia maupun hewan. Sensor PIR dapat merespon perubahan- perubahan pancaran sinyal inframerah yang dipancarkan oleh tubuh manusia.
<span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">
<span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
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!important;"><span style="cursor:

url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;">   Sensor PIR ini terdapat bagian-bagian yang
mempunyai perannya masing-masing, yaitu Fresnel Lens, IR Filter, Pyroelectric sensor,
amplifier, dan comparator.
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an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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font-weight:
normal;"> </
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">Gambar Bagian PIR Sensor
<span
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">a) Fresnel Lens
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an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),

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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;">   Fresnel Lens untuk memfokuskan sinar terang, tetapi juga karena intensitas cahaya yang relatif konstan di seluruh lebar berkas cahaya
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an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),

url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">b) IR Filter
</sp
an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto

!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;">   IR Filter di modul sensor PIR ini mampu menyaring panjang gelombang sinar infrared pasif antara 8 sampai 14 mikrometer, sehingga panjang gelombang yang dihasilkan dari tubuh manusia yang berkisar antara 9 sampai 10 mikrometer ini saja yang dapat dideteksi oleh sensor. Sehingga Sensor PIR hanya bereaksi pada tubuh manusia saja.
<span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;

font-weight: normal;">
</sp
an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">c) Pyroelectric sensor
</sp
an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:

url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;">   Seperti tubuh manusia yang memiliki suhu tubuh kira-kira 320 C, yang merupakan suhu panas yang khas yang terdapat pada lingkungan. Pancaran sinar inframerah inilah yang kemudian ditangkap oleh Pyroelectric sensor yang merupakan inti dari sensor PIR.
<span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),

url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">
</sp
an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto

!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">d) Amplifier
</sp
an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:

url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;">   Sebuah sirkuit amplifier yang ada menguatkan
arus yang masuk pada material pyroelectric.
</sp
an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">
</sp
an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto

!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">e) Komparator
</sp
an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),

url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
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!important;"><span style="cursor:
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!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;">   Setelah dikuatkan oleh amplifier kemudian arus dibandingkan oleh komparator sehingga menghasilkan output.
</sp
an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),

url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">Berikut ini adalah Karakteristik dari sensor PIR :
</sp
an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto

!important;"><span style="cursor:
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!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">1. Tegangan operasi 4.7 - 5 Volt
</sp
an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
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!important;"><span style="cursor:
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!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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!important;"><span style="cursor:
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!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">2. Arus standby (tanpa beban) 300 µA
</sp
an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto

!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">3. Suhu kerja antara -20 oC - 50 oC
</sp
an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">4. Jangkauan deteksi 5 meter
</sp
an><span style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;"><b
style="cursor: url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto

!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
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url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto
!important;"><span style="cursor:
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.ani"),
url("https://cur.cursors-4u.net/cursors/cur-9/cur815.png"), auto !important;
font-weight: normal;">5. Kecepatan deteksi 0.5
detik </
span> <div class="separator" style="background-color: white; clear:
both; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; text-align:
justify;">
 <div class="separator" style="background-color: white; clear:
both; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; text-align:
justify;"> <span
style="margin-left: 1em; margin-right: 1em;"><span style="font-family: times, "times
new roman", serif; font-size: medium; margin-left: 1em; margin-right: 1em;"><img
border="0" data-original-height="400" data-original-width="767" height="206"
src="https://1.bp.blogspot.com/--q3UQTHLk0M/XdpsRzJvAYI/AAAAAAAABQ0/Zb6jITomUbg
Lk0qEMrTLZcX4MQ0sB-RyQCLcBGAsYHQ/s400/images%2B%25281%2529.png"
style="background-attachment: initial; background-clip: initial; background-image: initial;
background-origin: initial; background-position: initial; background-repeat: initial;
background-size: initial; border: 1px solid rgb(238, 238, 238); box-shadow: rgba(0, 0, 0, 0.1)
1px 1px 5px; padding: 5px;" width="400" /> <div class="separator"
style="clear: both; color: #222222; text-align: center;"><span style="margin-left: 1em;
margin-right: 1em;"><span style="font-family: times, "times new roman", serif;
font-size: medium; margin-left: 1em; margin-right: 1em;">Gambar 3.2a. Grafik Pir terhadap
arah , jarak, dan kecepatan <div class="separator" style="clear: both;
color: #222222; text-align: center;"><span style="font-family: times, "times new
roman", serif; font-size: medium;">
 <div class="separator"
style="clear: both; color: #222222;"><span style="font-family: times, "times new
roman", serif; font-size: medium;">Pada grafik tersebut ; (a) Arah yang berbeda
mengasilkan tegangan yang bermuatan berbeda ; (b) Semakin dekat jarak objek terhadap
sensor PIR, maka semakin besar tegangan output yang dihasilkan ; (c) Semakin cepat objek
bergerak, maka semakin cepat terdeteksi oleh sensor PIR karena infrared yang ditimbulkan
dengan lebih cepat oleh objek semakin mudah dideteksi oleh PIR, namun semakin sedikit
juga waktu yang dibutuhkan karena sudah diluar jangkauan sensor PIR. <div
style="color: #222222;"><span style="font-family: times, "times new roman",
serif; font-size: medium;">
 <div class="separator"
style="clear: both; text-align: justify;"> <p align="justify" class="MsoNormal"
style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt;
mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric;

text-justify: inter-ideograph;"> 4. <!--[endif]-->Sensor Ultrasonik (HC-SR04) <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0.0000pt; margin-left: 0.0000pt; margin-right: 0.0000pt; margin-top: 0.0000pt; margin: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 20.9pt; text-justify: inter-ideograph;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">Sensor ultrasonik adalah sebuah sensor yang berfungsi untuk mengubah besaran fisis (bunyi) menjadi besaran listrik dan sebaliknya. Cara kerja sensor ini didasarkan pada prinsip dari pantulan suatu gelombang suara sehingga dapat dipakai untuk menafsirkan eksistensi (jarak) suatu benda dengan frekuensi tertentu. Disebut sebagai sensor ultrasonik karena sensor ini menggunakan gelombang ultrasonik (bunyi ultrasonik).<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">
<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">Cara Kerja Sensor Ultrasonik:<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;"><o:p></o:p> <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0.0000pt; margin-left: 0.0000pt; margin-right: 0.0000pt; margin-top: 0.0000pt; margin: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 20.9pt; text-justify: inter-ideograph;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">Pada sensor ultrasonik, gelombang ultrasonik dibangkitkan melalui sebuah alat yang disebut dengan piezoelektrik dengan frekuensi tertentu. Piezoelektrik ini akan menghasilkan gelombang ultrasonik (umumnya berfrekuensi 40kHz) ketika sebuah osilator diterapkan pada benda tersebut. Secara umum, alat ini akan menembakkan gelombang ultrasonik menuju suatu area atau suatu target. Setelah gelombang menyentuh permukaan target, maka target akan memantulkan kembali gelombang tersebut. Gelombang pantulan dari target akan ditangkap oleh sensor, kemudian sensor menghitung selisih antara waktu pengiriman gelombang dan waktu gelombang pantul diterima.<o:p></o:p> <div class="separator"

style="clear: both; text-align: center;"> Gambar Cara Kerja Sensor Ultrasonic <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-right: 0pt; margin-top: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">Grafik Sensor :<o:p></o:p> <p align="center" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 0pt; mso-pagination: widow-orphan; text-align: center; text-autospace: ideograph-numeric; text-indent: 0pt;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">Gambar Grafik Respon Sensor Ultrasonic<o:p></o:p> <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-right: 0pt; margin-top: 0pt; mso-char-indent-count: 0.0000;

mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">Berdasarkan grafik di atas dapat disimpulkan bahwa bahwa sensor ultrasonik memiliki kinerja rendah dalam pengukuranpada jarak yang rendah. Kinerja sensor memiliki hasil yang akurat untuk pengukuran jarak jauh.<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;"> <span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">Secara detail, cara kerja sensor ultrasonik adalah sebagai berikut:<o:p></o:p></p><p align="justify" class="MsoNormal" style="line-height: 24px; margin-bottom: 2.6500pt; margin-left: 21.0000pt; margin-right: 0.0000pt; margin-top: 0.0000pt; margin: 0pt 0pt 2.65pt 21pt; mso-char-indent-count: 0.0000; mso-list: l7 level1 lfo6; mso-pagination: widow-orphan; mso-para-margin-left: 0.0000gd; mso-para-margin-right: 0.0000gd; padding: 0pt; text-align: justify; text-indent: -21pt; text-justify: inter-ideograph;">-. Sinyal dipancarkan oleh pemancar ultrasonik dengan frekuensi tertentu dan dengan durasi waktu tertentu. Sinyal tersebut berfrekuensi diatas 20kHz. Untuk mengukur jarak benda (sensor jarak), frekuensi yang umum digunakan adalah 40kHz.<o:p></o:p></p><p align="justify" class="MsoNormal" style="line-height: 24px; margin-bottom: 2.6500pt; margin-left: 21.0000pt; margin-right: 0.0000pt; margin-top: 0.0000pt; margin: 0pt 0pt 2.65pt 21pt; mso-char-indent-count: 0.0000; mso-list: l7 level1 lfo6; mso-pagination: widow-orphan; mso-para-margin-left: 0.0000gd; mso-para-margin-right: 0.0000gd; padding: 0pt; text-align: justify; text-indent: -21pt; text-justify: inter-ideograph;">-. Sinyal yang dipancarkan akan merambat sebagai gelombang bunyi dengan kecepatan sekitar 340 m/s. Ketika menumbuk suatu benda, maka sinyal tersebut akan dipantulkan oleh benda tersebut.<o:p></o:p></p><p align="justify" class="MsoNormal" style="line-height: 24px; margin-bottom: 0.0000pt; margin-left: 20.9000pt; margin-right: 0.0000pt; margin-top: 0.0000pt; margin: 0pt 0pt 0pt 20.9pt; mso-char-indent-count: 0.0000; mso-list: l7 level1 lfo6; mso-pagination: widow-orphan; mso-para-margin-left: 0.0000gd; mso-para-margin-right: 0.0000gd; padding: 0pt; text-align: justify; text-autospace: ideograph-numeric; text-indent: -20.9pt; text-justify: inter-ideograph;">-. Setelah gelombang pantulan sampai di alat penerima, maka sinyal tersebut akan diproses untuk menghitung jarak benda tersebut. Jarak benda dihitung berdasarkan rumus :<span style="line-height: 24px;

mso-fareast-font-family: Calibri; mso-spacerun: 'yes';"><o:p></o:p></p><p align="center" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0.0000pt; margin-left: 0.0000pt; margin-right: 0.0000pt; margin-top: 0.0000pt; margin: 0pt; mso-pagination: widow-orphan; text-align: center; text-autospace: ideograph-numeric; text-indent: 0pt;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">S = 340.t/2<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;"><o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0.0000pt; margin-left: 0.0000pt; margin-right: 0.0000pt; margin-top: 0.0000pt; margin: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 0pt; text-justify: inter-ideograph;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">dimana S merupakan jarak antara sensor ultrasonik dengan benda (bidang pantul), dan t<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;"> <span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">adalah selisih antara waktu pemancaran gelombang oleh transmitter dan waktu ketika<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;"> <span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">gelombang pantul diterima receiver.<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;"><o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;"> 5. <!--[endif]-->Sensor Touch</p><p align="justify" class="MsoNormal" style="line-height: 24px; margin-bottom: 0pt; mso-char-indent-count: 0.0000; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric;

text-indent: 36pt; text-justify: inter-ideograph;">Touch Sensor atau Sensor Sentuh adalah sensor elektronik yang dapat mendeteksi sentuhan. Sensor Sentuh ini pada dasarnya beroperasi sebagai sakelar apabila disentuh, seperti sakelar pada lampu, layar sentuh ponsel dan lain sebagainya. Sensor Sentuh ini dikenal juga sebagai Sensor Taktil (Tactile Sensor). Seiring dengan perkembangan teknologi, sensor sentuh ini semakin banyak digunakan dan telah menggeser peranan sakelar mekanik pada perangkat-perangkat elektronik.<o:p></o:p> <o:p> </o:p><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; letter-spacing: 0pt; line-height: 24px;">Jenis-jenis Sensor Sentuh <p align="justify" class="p" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 0pt; mso-char-indent-count: 0.0000; mso-pagination: widow-orphan; padding: 0pt; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph; vertical-align: baseline;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; letter-spacing: 0pt;">Berdasarkan fungsinya, Sensor Sentuh dapat dibedakan menjadi dua jenis utama yaitu Sensor Kapasitif dan Sensor Resistif. Sensor Kapasitif atau Capacitive Sensor bekerja dengan mengukur kapasitansi sedangkan sensor Resistif bekerja dengan mengukur tekanan yang diberikan pada permukaannya.<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #0053f9; letter-spacing: 0pt; line-height: 24px;"> <h3 align="center" style="background: rgb(255, 255, 255); line-height: 28.08px; margin-bottom: 0pt; margin-left: 0pt; mso-pagination: widow-orphan; padding: 0pt; text-align: center; text-autospace: ideograph-numeric; text-indent: 0pt; vertical-align: baseline;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #0053f9; font-family: inherit; font-size: small; letter-spacing: 0pt; line-height: 24px;"> <img border="0" data-original-height="218" data-original-width="640" height="109" src="https://blogger.googleusercontent.com/img/a/AVvXsEhRfF4lljvzTiMkaKQoEw2sdHyiahyYbjKRc0m-jmPGAI97KviuWIdJPsB31KSc6zMEjII9rezQXHbWU0r4UtP8zek2mdj3ziyhDymWRZepkwtbHk32KptFDANiKZV_hAOVULGBh2c4mnXqzRwkmY44IOy4cnni-GZWSLBpsAK6J

EQGhxFSQ3megVkAgQ=s320" width="320" /> </h3><h3 align="justify" style="background: rgb(255, 255, 255); line-height: 28.08px; margin-bottom: 0pt; margin-left: 21pt; mso-char-indent-count: 0.0000; mso-list: l0 level1 lfo7; mso-pagination: widow-orphan; mso-para-margin-left: 0.0000gd; padding: 0pt; text-align: justify; text-autospace: ideograph-numeric; text-indent: -21pt; text-justify: inter-ideograph; vertical-align: baseline;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; letter-spacing: 0pt; line-height: 24px;">-.Sensor Kapasitif<o:p></o:p></h3><p align="justify" class="p" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 0pt; mso-char-indent-count: 0.0000; mso-pagination: widow-orphan; padding: 0pt; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph; vertical-align: baseline;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; letter-spacing: 0pt;">Berbeda dengan Sensor Resistif yang menggunakan tekanan tertentu untuk merasakan perubahan pada permukaan layar, Sensor Kapasitif memanfaatkan sifat konduktif alami pada tubuh manusia untuk mendeteksi perubahan layar sentuhnya. Layar sentuh sensor kapasitif ini terbuat dari bahan konduktif (biasanya <span class="15" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; letter-spacing: 0pt;">Indium Tin Oxide<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; letter-spacing: 0pt;"> atau disingkat dengan ITO) yang dilapisi oleh kaca tipis dan hanya bisa disentuh oleh jari manusia atau stylus khusus ataupun sarung khusus yang memiliki sifat konduktif.<o:p></o:p></p><p align="justify" class="p" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 0pt; mso-char-indent-count: 0.0000; mso-pagination: widow-orphan; padding: 0pt; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph; vertical-align: baseline;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: inherit; letter-spacing: 0pt;">Pada saat jari menyentuh layar, akan terjadi perubahaan medan listrik pada layar sentuh tersebut dan kemudian di respon oleh processor untuk membaca pergerakan jari tangan tersebut. Jadi perlu diperhatikan bahwa sentuhan kita tidak akan di respon oleh layar sensor kapasitif ini apabila kita menggunakan bahan-bahan non-konduktif sebagai perantara jari tangan dan layar sentuh tersebut.</p><h3 align="justify" style="background: rgb(255, 255, 255); line-height: 28.08px; margin-bottom: 0pt; margin-left: 21pt; mso-char-indent-count: 0.0000; mso-list: l0 level1 lfo7; mso-pagination: widow-orphan; mso-para-margin-left: 0.0000gd; padding: 0pt; text-align: justify; text-autospace: ideograph-numeric; text-indent: -21pt; text-justify: inter-ideograph; vertical-align:

baseline;"><span
style="background-attachment: initial; background-clip: initial; background-image: initial;
background-origin: initial; background-position: initial; background-repeat: initial;
background-size: initial; letter-spacing: 0pt; line-height: 24px;">-.Sensor
Resistif<span style="letter-spacing: 0pt; line-height:
24px;"><o:p></o:p></h3><p align="justify" class="p"
style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left:
0pt; mso-char-indent-count: 0.0000; mso-pagination: widow-orphan; padding: 0pt; text-align:
justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;
vertical-align: baseline;"><span
style="background-attachment: initial; background-clip: initial; background-image: initial;
background-origin: initial; background-position: initial; background-repeat: initial;
background-size: initial; letter-spacing: 0pt;">Tidak seperti sensor sentuh kapasitif, sensor
sentuh resistif ini tidak tergantung pada sifat listrik yang terjadi pada konduktivitas pelat
logam. Sensor Resistif bekerja dengan mengukur tekanan yang diberikan pada
permukaannya. Karena tidak perlu mengukur perbedaan kapasitansi, sensor sentuh resistif
ini dapat beroperasi pada bahan non-konduktif seperti pena, stylus atau jari di dalam sarung
tangan.<o:p></o:p></p><p
align="justify" class="p" style="background: rgb(255, 255, 255); line-height: 24px;
margin-bottom: 0pt; margin-left: 0pt; mso-char-indent-count: 0.0000; mso-pagination:
widow-orphan; padding: 0pt; text-align: justify; text-autospace: ideograph-numeric;
text-indent: 36pt; text-justify: inter-ideograph; vertical-align: baseline;"><span
style="font-family: inherit;"><span style="background-attachment: initial; background-clip:
initial; background-image: initial; background-origin: initial; background-position: initial;
background-repeat: initial; background-size: initial; letter-spacing: 0pt;">Sensor sentuh
resistif terdiri dari dua lapisan konduktif yang dipisahkan oleh jarak atau celah yang sangat
kecil. Dua lapisan konduktif (lapisan atas dan lapisan bawah) ini pada dasarnya terbuat dari
sebuah film. Film-film umumnya dilapisi oleh Indium Tin Oxide yang merupakan konduktor
listrik yang baik dan juga transparan (bening).<span style="letter-spacing:
0pt;"><o:p></o:p></p><p align="justify" class="p" style="background:
rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 0pt;
mso-char-indent-count: 0.0000; mso-pagination: widow-orphan; padding: 0pt; text-align:
justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;
vertical-align: baseline;"><span
style="background-attachment: initial; background-clip: initial; background-image: initial;
background-origin: initial; background-position: initial; background-repeat: initial;
background-size: initial; letter-spacing: 0pt;">Cara kerjanya hampir sama dengan sebuah
sakelar, pada saat film lapisan atas mendapatkan tekanan tertentu baik dengan jari maupun
stylus, maka film lapisan atas akan bersentuhan dengan film lapisan bawah sehingga
menimbulkan aliran listrik pada titik koordinat tertentu layar tersebut dan memberikan signal
ke prosesor untuk melakukan proses selanjutnya.<span
style="background-attachment: initial; background-clip: initial; background-image: initial;
background-origin: initial; background-position: initial; background-repeat: initial;
background-size: initial; letter-spacing: 0pt;"><o:p></o:p></p><p
align="justify" class="p" style="background: rgb(255, 255, 255); line-height: 24px;
margin-bottom: 0pt; margin-left: 0pt; mso-char-indent-count: 0.0000; mso-pagination:

widow-orphan; padding: 0pt; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph; vertical-align: baseline;">

 Grafik Respon Touch
 <p align="justify" class="p" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; padding: 0pt; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph; vertical-align: baseline;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; letter-spacing: 0pt;"> 6. <!--[endif]-->Motor Servo <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-right: 0pt; margin-top: 0pt; mso-char-indent-count: 0.0000; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">Motor servo adalah sebuah perangkat atau aktuator putar (motor) yang dirancang dengan sistem kontrol umpan balik loop tertutup (servo), sehingga dapat di set-up atau di atur untuk menentukan dan memastikan posisi sudut dari poros output motor. motor servo merupakan perangkat yang terdiri dari motor DC, serangkaian gear, rangkaian kontrol dan potensiometer. Serangkaian gear yang melekat pada poros motor DC akan memperlambat putaran poros dan meningkatkan torsi motor servo, sedangkan potensiometer dengan perubahan resistansinya saat motor berputar berfungsi sebagai penentu batas posisi putaran poros motor servo.<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;"><o:p></o:p> <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-right: 0pt; margin-top: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace:

ideograph-numeric; text-justify: inter-ideograph;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">Prinsip kerja motor servo:<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;"><o:p></o:p> <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-right: 0pt; margin-top: 0pt; mso-char-indent-count: 0.0000; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">Motor servo dikendalikan dengan memberikan sinyal modulasi lebar pulsa (Pulse Wide Modulation / PWM) melalui kabel kontrol. Lebar pulsa sinyal kontrol yang diberikan akan menentukan posisi sudut putaran dari poros motor servo. Sebagai contoh, lebar pulsa dengan waktu 1,5 ms (mili detik) akan memutar poros motor servo ke posisi sudut 90º. Bila pulsa lebih pendek dari 1,5 ms maka akan berputar ke arah posisi 0º atau ke kiri (berlawanan dengan arah jarum jam), sedangkan bila pulsa yang diberikan lebih lama dari 1,5 ms maka poros motor servo akan berputar ke arah posisi 180º atau ke kanan (searah jarum jam). Lebih jelasnya perhatikan gambar dibawah ini.<o:p></o:p> <span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">Gambar Pulse Wide Modulation / PWM<o:p></o:p> <p

align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0.0000pt; margin-left: 0.0000pt; margin-right: 0.0000pt; margin-top: 0.0000pt; margin: 0pt; mso-char-indent-count: 0.0000; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">L<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt; line-height: 24px;">ebar pulsa kendali telah diberikan, maka poros motor servo akan bergerak atau berputar ke posisi yang telah diperintahkan, dan berhenti pada posisi tersebut dan akan tetap bertahan pada posisi tersebut. Jika ada kekuatan eksternal yang mencoba memutar atau mengubah posisi tersebut, maka motor servo akan mencoba menahan atau melawan dengan besarnya kekuatan torsi yang dimilikinya (rating torsi servo). Namun motor servo tidak akan mempertahankan posisinya untuk selamanya, sinyal lebar pulsa kendali harus diulang setiap 20 ms (mili detik) untuk menginstruksikan agar posisi poros motor servo tetap bertahan pada posisinya.<o:p></o:p> 7. <!--[endif]-->LCD (1602)
  <br style="user-select: text;" /><span lang="IN" style="font-family: "Times New

Roman", serif; user-select: text;"><br style="user-select: text;" /> <p align="center" class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; line-height: normal; user-select: text;">Gambar 4.LCD<o:p style="user-select: text;"></o:p> <p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; line-height: 11.4pt; text-align: justify; user-select: text;"> <o:p style="user-select: text;"></o:p> <p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; text-align: justify; text-indent: 36pt; user-select: text;">LCD atau Liquid Crystal Display adalah suatu jenis media display (tampilan) yang menggunakan kristal cair (liquid crystal) untuk menghasilkan gambar yang terlihat. Teknologi Liquid Crystal Display (LCD) atau Penampil Kristal Cair sudah banyak digunakan pada produk-produk seperti layar Laptop, layar Ponsel, layar Kalkulator, layar Jam Digital, layar Multimeter, Monitor Komputer, Televisi, layar Game portabel, layar Thermometer Digital dan produk-produk elektronik lainnya.<o:p style="user-select: text;"></o:p> <p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; text-align: justify; text-indent: 36pt; user-select: text;">Teknologi Display LCD ini memungkinkan produk-produk elektronik dibuat menjadi jauh lebih tipis jika dibanding dengan teknologi Tabung Sinar Katoda (Cathode Ray Tube atau CRT). Jika dibandingkan dengan teknologi CRT, LCD juga jauh lebih hemat dalam mengkonsumsi daya karena LCD bekerja berdasarkan prinsip pemblokiran cahaya sedangkan CRT berdasarkan prinsip pemancaran cahaya. Namun LCD membutuhkan lampu backlight (cahaya latar belakang) sebagai cahaya pendukung karena LCD sendiri tidak memancarkan cahaya. Beberapa jenis backlight yang umum digunakan untuk LCD diantaranya adalah backlight CCFL (Cold cathode fluorescent lamps) dan backlight LED (Light-emitting diodes).<br style="user-select: text;" />LCD atau Liquid Crystal Display pada dasarnya terdiri dari dua bagian utama yaitu bagian Backlight (Lampu Latar Belakang) dan bagian Liquid Crystal (Kristal Cair). Seperti

yang disebutkan sebelumnya, LCD tidak memancarkan pencahayaan apapun, LCD hanya merefleksikan dan mentransmisikan cahaya yang melewatinya. Oleh karena itu, LCD memerlukan Backlight atau Cahaya latar belakang untuk sumber cahayanya. Cahaya Backlight tersebut pada umumnya adalah berwarna putih. Sedangkan Kristal Cair (Liquid Crystal) sendiri adalah cairan organik yang berada diantara dua lembar kaca yang memiliki permukaan transparan yang konduktif.<o:p style="user-select: text;"></o:p></p><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; text-align: justify; user-select: text;">Bagian-bagian LCD atau Liquid Crystal Display diantaranya adalah:<o:p style="user-select: text;"></o:p></p><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; margin: 0cm 0cm 3pt; text-align: justify; text-indent: 0cm; user-select: text;">·   Lapisan Terpolarisasi 1 (Polarizing Film 1)<o:p style="user-select: text;"></o:p></p><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; margin: 0cm 0cm 3pt; text-align: justify; text-indent: 0cm; user-select: text;">·   Elektroda Positif (Positive Electrode)<o:p style="user-select: text;"></o:p></p><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; margin: 0cm 0cm 3pt; text-align: justify; text-indent: 0cm; user-select: text;">·<span style="font-family: "Times New Roman"; font-stretch: normal; font-variant-east-asian: normal;

font-variant-numeric: normal; line-height: normal; user-select: text;">   Lapisan Kristal Cair (Liquid Cristal Layer)<o:p style="user-select: text;"></o:p></p><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; margin: 0cm 0cm 3pt; text-align: justify; text-indent: 0cm; user-select: text;">·   Elektroda Negatif (Negative Electrode)<o:p style="user-select: text;"></o:p></p><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; margin: 0cm 0cm 3pt; text-align: justify; text-indent: 0cm; user-select: text;">·   Lapisan Terpolarisasi 2 (Polarizing film 2)<o:p style="user-select: text;"></o:p></p><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; margin: 0cm 0cm 3pt; text-align: justify; text-indent: 0cm; user-select: text;">·   Backlight atau Cermin (Backlight or Mirror)<o:p style="user-select: text;"></o:p></p><p class="MsoNormal" style="background-attachment: initial; background-clip: initial;

background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; text-align: justify; user-select: text;">Dibawah ini adalah gambar struktur dasar sebuah LCD:<o:p style="user-select: text;"></o:p> <p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; text-align: justify; user-select: text;"><br style="user-select: text;" /> <p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; user-select: text;"> <p align="center" class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; line-height: 11.4pt; user-select: text;"><v:shape alt="https://1.bp.blogspot.com/-6suHCtOu-PQ/X8S1rbz5f1I/AAAAAAAADBE/etduySS9fk43sCVAEgMpdFibCiWmAPXtwCLcBGAsYHQ/w400-h175/g15.png" href="https://1.bp.blogspot.com/-6suHCtOu-PQ/X8S1rbz5f1I/AAAAAAAADBE/etduySS9fk43sCVAEgMpdFibCiWmAPXtwCLcBGAsYHQ/s640/g15.png" id="Picture_x0020_10" o:button="t" o:spid="_x0000_i1038" style="height: 131.4pt; user-select: text; visibility: visible; width: 300pt;" type="#_x0000_t75"><v:fill o:detectmouseclick="t" style="user-select: text;"><v:imagedata o:title="g15"

src="file:///C:/Users/RAHMAT~1/AppData/Local/Temp/msohtmlclip1/01/clip_image008.png" style="user-select: text;"></v:imagedata></v:fill></v:shape><o:p style="user-select: text;"></o:p></p><p align="center" class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; line-height: normal; user-select: text;">Gambar 5.Struktur LCD<o:p style="user-select: text;"></o:p></p><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; text-align: justify; text-indent: 36pt; user-select: text;">LCD yang digunakan pada Kalkulator dan Jam Tangan digital pada umumnya menggunakan Cermin untuk memantulkan cahaya alami agar dapat menghasilkan digit yang terlihat di layar. Sedangkan LCD yang lebih modern dan berkekuatan tinggi seperti TV, Laptop dan Ponsel Pintar menggunakan lampu Backlight (Lampu Latar Belakang) untuk menerangi piksel kristal cair. Lampu Backlight tersebut pada umumnya berbentuk persegi panjang atau strip lampu Flourescent atau Light Emitting Diode (LED). Cahaya putih adalah cahaya terdiri dari ratusan cahaya warna yang berbeda. Ratusan warna cahaya tersebut akan terlihat apabila cahaya putih mengalami refleksi atau perubahan arah sinar. Artinya, jika beda sudut refleksi maka berbeda pula warna cahaya yang dihasilkan.<o:p style="user-select: text;"></o:p></p><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; text-align: justify; text-indent: 36pt; user-select: text;">Backlight LCD yang berwarna putih akan memberikan pencahayaan pada Kristal Cair atau Liquid Crystal. Kristal cair tersebut akan menyaring backlight yang diterimanya dan merefleksikannya sesuai dengan sudut yang diinginkan sehingga menghasilkan warna yang dibutuhkan. Sudut Kristal Cair akan berubah apabila diberikan tegangan dengan nilai tertentu. Karena dengan perubahan sudut dan penyaringan cahaya backlight pada kristal cair tersebut, cahaya backlight yang sebelumnya adalah berwarna putih dapat berubah menjadi berbagai warna.<o:p style="user-select: text;"></o:p></p><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; text-align: justify; text-indent: 36pt; user-select: text;"><span lang="EN-US" style="background-color: white; font-family: "Times New

Roman", serif; user-select: text;">Jika ingin menghasilkan warna putih, maka kristal cair akan dibuka selebar-lebarnya sehingga cahaya backlight yang berwarna putih dapat ditampilkan sepenuhnya. Sebaliknya, apabila ingin menampilkan warna hitam, maka kristal cair harus ditutup serapat-rapatnya sehingga tidak adalah cahaya backlight yang dapat menembus. Dan apabila menginginkan warna lainnya, maka diperlukan pengaturan sudut refleksi kristal cair yang bersangkutan.<o:p style="user-select: text;"></o:p></p><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", Times, FreeSerif, serif; text-align: justify; text-indent: 36pt; user-select: text;"></p> <br style="user-select: text;" /> gambar 6. rangkaian interface lcd <br style="user-select: text;" /> Display karakter pada LCD diatur oleh pin EN,RS dan RW: jalur EN dinamakan Enable. Jalur ini digunakan untuk memberitahu LCD bahwa anda

sedang mengirimkan sebuah data. Untuk mengirimkan data ke LCD, maka melalui program EN harus dibuat logika low “0” dan set pada dua jalur kontrol yang lain RS dan RW. Ketika dua jalur yang lain telah siap, set EN dengan logika “1” dan tunggu untuk sejumlah waktu tertentu (sesuai dengan datasheet dari LCD tersebut) dan berikutnya set EN ke logika low “0” lagi. Jalur RS adalah jalur Register Select. Ketika RS berlogika low “0”, data akan dianggap sebagai sebuah perintah atau instruksi khusus (seperti clear screen, posisi kursor dll). Ketika RS berlogika high “1”, data yang dikirim adalah data text yang akan ditampilkan pada display LCD. Sebagai contoh, untuk menampilkan huruf “T” pada layar LCD maka RS harus diset logika high “1”. Jalur RW adalah jalur kontrol Read/ Write. Ketika RW berlogika low (0), maka informasi pada bus data akan dituliskan pada layar LCD. Ketika RW berlogika high ”1”, maka program akan melakukan pembacaan memori dari LCD. Sedangkan pada aplikasi umum pin RW selalu diberi logika low ”0”. Pada akhirnya, bus data terdiri dari 4 atau 8 jalur (bergantung pada mode operasi yang dipilih oleh user). Pada kasus bus data 8 bit, jalur diacukan sebagai DB0 s/d DB7 Beberapa perintah dasar yang harus dipahami adalah inisialisasi LCD Character, <br style="user-select: text;" /> <br style="user-select: text;" /> Function Set Mengatur interface lebar data, jumlah dari baris dan ukuran font karakter <br style="user-select: text;" /> <div style="user-select:

text;"><br style="user-select: text;" /> CATATAN: X : Don’t care DL: Mengatur lebar data DL=1, Lebar data interface 8 bit (DB7 s/d DB0) DL=0, Lebar data interface 4 bit (DB7 s/d DB4) Ketika menggunakan lebar data 4 bit, data harus dikirimkan dua kali N: Pengaktifan baris N=0, 1 baris N=1, 2 baris F: Penentuan ukuran font karakter F=0, 5x7 F=1, 5x8 <br style="user-select: text;" /> <br style="user-select: text;" /> Entry Mode Set Mengatur increment/ decrement dan mode geser <br style="user-select: text;" /> <img border="0" data-original-height="75" data-original-width="711" height="58" src="https://blogger.googleusercontent.com/img/a/AVvXsEgy3kW5SVij9ik5qysQsaI4fxlT_BB

UdRFCm7LFrtl1SiNSDB2IaQtyESM4rtbfZBWiCXIseBaK0vIyMCxYN7HyUeLijZjO88SMgldGSdChd0vsDzxUvnVW7LAAzkaeHLF8jOYsAW-u2WnpeiF1DXWLeLlawoXwpgKnPW27HLoSfyKjBYoSIhDYW5yMVQ=w546-h58" style="border: none; position: relative; user-select: text;" width="546" /> <br style="user-select: text;" /> Catatan: I/D: Increment/ decrement dari alamat DDRAM dengan 1 ketika kode karakter dituliskan ke DDRAM. I/D = “0”, decrement I/D= “1”, increment S: Geser keseluruhan display kekanan dan kekiri S=1, geser kekiri atau kekanan bergantung pada I/D S=0, display tidak bergeser <br style="user-select: text;" /> Display On/ Off Cursor Mengatur status display ON atau OFF, cursor ON/ OFF dan fungsi Cursor Blink <br style="user-select: text;" /> <br style="user-select: text;" /> D : Mengatur display D = 1, Display is ON D = 0, Display is OFF Pada kasus ini data display masih tetap berada di DDRAM, dan dapat ditampilkan kembali secara langsung dengan mengatur D=1. C : Menampilkan kursor <div

style="user-select: text;">C = 1, kursor ditampilkan C = 0, kursor tidak ditampilkan B : Karakter ditunjukkan dengan kursor yang berkedip B=1, kursor blink <br style="user-select: text;" /> Clear Display Perintah ini hapus layar <br style="user-select: text;" /> Geser Kursor dan Display Geser posisi kursor atau display ke kanan atau kekiri tanpa menulis atau baca data display. Fungsi ini digunakan untuk koreksi atau pencarian display Catatan : x = Dont care <br style="user-select: text;" /> <img border="0" data-original-height="166" data-original-width="714" height="125" src="https://blogger.googleusercontent.com/img/a/AVvXsEgDE5x4DpMiHt4UrTiqYPnDooeP458JtGd-R3HhKVsKFsTs18lZh87ODu8Y05WaVCCBr8437F5mF31suRtrfnvSIoKyK2znQ-NiXW4v83yczd2ZncSAvu77klYK_bH_8_tc2yfJwt9jJixiHg-yY7DtNC8-3wtSXj-4PAlwpTqrWfz7d_fqxfu2VgUp-Q=w445-h125" style="border: none; position: relative; user-select: text;"

width="445" /> <br style="user-select: text;" /> POSISI KURSOR Modul LCD terdiri dari sejumlah memory yang digunakan untuk display. Semua teks yang kita tuliskan ke modul LCD adalah disimpan didalam memory ini, dan modul LCD secara berturutan membaca memory ini untuk menampilkan teks ke modul LCD itu sendiri. <br style="user-select: text;" /> Pada peta memori tersebut, daerah yang berwarna biru (00 s/d 0F dan 40 s/d 4F) adalah display yang tampak. Sebagaimanan yang anda lihat, jumlahnya sebanyak 16 karakter per baris dengan dua baris. Angka pada setiap kotak adalah alamat memori yang bersesuaian dengan posisi dari layar. Demikianlah karakter pertama di sudut kiri atas adalah menempati alamah 00h. Posisi karakter berikutnya adalah alamat 01h dan seterusnya. Akan tetapi, karakter pertama dari baris 2 sebagaimana yang ditunjukkan pada peta memori adalah pada alamat 40h. Dimikianlah kita perlu untuk mengirim sebuah perintah ke LCD untuk mangatur letak posisi kursor pada baris dan kolom tertentu. Instruksi Set Posisi Kursor adalah 80h. Untuk ini kita perlu menambahkan alamat lokasi dimana kita berharap untuk menempatkan kursor.Sebagai contoh, kita ingin menampilkan kata ”World” pada baris ke dua pada posisi kolom ke sepuluh. Sesuai peta memori, posisi karakter pada kolom 11 dari baris ke dua, mempunyai alamat 4Ah, sehingga sebelum kita tulis kata ”World” pada LCD, kita harus mengirim instruksi set posisi kursor, dan perintah untuk instruksi ini adalah 80h ditambah dengan alamat 80h+4Ah =0CAh. Sehingga dengan mengirim perintah CAh ke LCD, akan menempatkan kursor pada baris kedua dan kolom ke 11 dari DDRAM. <br style="user-select: text;" /> Set Alamat Memori

DDRAM <br style="user-select: text;" /> Catatan: A : Alamat RAM yang akan dipilih Sehingga alamat RAM LCD adalah 000 0000 S/D 111 1111 b atau 00 s/d 7Fh
 <div class="post-body entry-content" id="post-body-1822102595395902441" style="font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 15.972px; line-height: 1.4; position: relative; width: 570px;">Table display character 2 x 16 <div class="post-body entry-content" id="post-body-1822102595395902441" style="font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 15.972px; line-height: 1.4; position: relative; width: 570px;"> <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;"> 8. <!--[endif]-->Buzzer <o:p></o:p> <img

border="0" data-original-height="361" data-original-width="361" height="200" src="https://blogger.googleusercontent.com/img/a/AVvXsEjwrltdmnjigH7rU-DTU5SxZUz2q3CrJTEq4AzAgvdosCP8hAmlX77Wi6J5tMaYn9H4QYdWHtXmGUbcORwfpmYAk0bRqqY52ztChWYZC3oS2CMHVrKairD5VbUniWe5rs1KuKgvXXDMcpQES6AWe2RTFGpsxVmrtekPcoJwhVKHEnmwlRGPiNu8n8-SOw=w200-h200" width="200" /> <p align="justify" class="MsoNormal" style="line-height: 24px; margin-bottom: 0pt; mso-char-indent-count: 0.0000; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;">Buzzer Listrik adalah sebuah komponen elektronika yang dapat mengubah sinyal listrik menjadi getaran suara. Pada umumnya, Buzzer yang merupakan sebuah perangkat audio ini sering digunakan pada rangkaian anti-maling, Alarm pada Jam Tangan, Bel Rumah, peringatan mundur pada Truk dan perangkat peringatan bahaya lainnya. Jenis Buzzer yang sering ditemukan dan digunakan adalah Buzzer yang berjenis Piezoelectric, hal ini dikarenakan Buzzer Piezoelectric memiliki berbagai kelebihan seperti lebih murah, relatif lebih ringan dan lebih mudah dalam menggabungkannya ke Rangkaian Elektronika lainnya. Buzzer yang termasuk dalam keluarga Transduser ini juga sering disebut dengan Beeper.<o:p></o:p> <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;"> 9. <!--[endif]-->LED <p align="justify" class="p" style="background: rgb(255, 255, 255); line-height: 24px; mso-char-indent-count: 0.0000; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt;">Light Emitting Diode atau yang sering disingkat LED merupakan sebuah komponen elektromagnetik yang dapat memancarkan cahaya monokromatik melalui tegangan maju. LED terbuat dari bahan semi konduktor yang merupakan keluarga dioda. LED dapat memancarkan berbagai warna, tergantung dari bahan semikonduktor yang digunakan. LED juga dapat memancarkan cahaya inframerah yang tak tampat, seperti pada remote TV.<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt;"> <span style="background-attachment: initial; background-clip: initial;

background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt;">Cara kerja dari LED hampir sama dengan keluarga dioda yang memiliki dua kutub, yaitu Kutub Positif (P) dan Kutub Negatif (N). LED hanya akan memancarkan cahaya apabila dialiri tegangan maju (bias foward) dari Anoda ke Katoda. LED sendiri terdiri atas sebuah chip semikonduktor yang didopping, sehingga menciptakan junction antara kutub P dan kutub N. Proses dopping dalam semikonduktor adalah proses untuk menambahkan impurity / ketidakmampuan pada semikonduktr yang murni, sehingga dapat emnghasilkan karakteristik kelistrikan yang diinginkan. <p align="justify" class="16" style="line-height: 24px; margin-bottom: 0pt; margin-left: 36pt; mso-list: l4 level1 lfo1; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: -18pt; text-justify: inter-ideograph;">10. <!--[endif]-->Jumper<o:p></o:p> <p align="justify" class="MsoNormal" style="line-height: 24px; margin-bottom: 0pt; mso-char-indent-count: 0.0000; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;">Jumper adalah suatu istilah kabel yang ber-diameter kecil yang di dalam dunia elektronika digunakan untuk menghubungkan dua titik atau lebih dan dapat juga untuk menghubungkan 2 komponen elektronika. <o:p></o:p> Jenis-jenis jumper :<o:p></o:p> <p align="justify" class="MsoNormal" style="line-height: 24px; margin-bottom: 0pt; margin-left: 21pt; mso-char-indent-count: 0.0000; mso-list: l1 level1 lfo2; mso-pagination: widow-orphan; mso-para-margin-left: 0.0000gd; text-align: justify; text-autospace: ideograph-numeric; text-indent: -21pt; text-justify: inter-ideograph;"><!--[if !supportLists]-->l <!--[endif]-->Male-Male <img border="0" data-original-height="253" data-original-width="254" height="199"

src="https://blogger.googleusercontent.com/img/a/AVvXsEhRz89B_I5EIpk07FHkJ4Msnl8sEbObbJvvsGXPg_r29adq42rMvbATSp6QPu1b1SItLDYGcIh-SHAA7lK7OJ0J5xTZDN3Jh_XUivIxPpkaIQSVKiyKwtIrtjoL3qQK9GyxNjG5ogwTfv-2Ey-eEZjAcF5DxkHVUpVXfqVsa0jn_D3EtP81aHhWsDgwdg=w200-h199" width="200" /> <p align="justify" class="p" style="background: rgb(255, 255, 255); line-height: 24px; mso-char-indent-count: 0.0000; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; color: #222222; letter-spacing: 0pt;">
 <p align="justify" class="MsoNormal" style="line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; mso-para-margin-left: 0.0000gd; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;">Kabel jumper jenis ini digunakan untuk koneksi male to male pada kedua ujung kabelnya.<o:p></o:p> <p align="justify" class="MsoNormal" style="line-height: 24px; margin-bottom: 0pt; margin-left: 21pt; mso-char-indent-count: 0.0000; mso-list: l1 level1 lfo2; mso-pagination: widow-orphan; mso-para-margin-left: 0.0000gd; text-align: justify; text-autospace: ideograph-numeric; text-indent: -21pt; text-justify: inter-ideograph;"><!--[if !supportLists]-->l <!--[endif]-->Male-Female <p align="justify" class="MsoNormal" style="line-height: 24px; margin-bottom: 0pt; margin-left: 21pt; mso-char-indent-count: 0.0000; mso-list: l1 level1 lfo2; mso-pagination: widow-orphan; mso-para-margin-left: 0.0000gd; text-align: justify; text-autospace: ideograph-numeric; text-indent: -21pt; text-justify: inter-ideograph;"> <p align="justify" class="MsoNormal" style="line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; mso-para-margin-left: 0.0000gd; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;">Kabel jumper jenis ini digunakan untuk koneksi male to female dengan salah satu ujung kabel

dikoneksi male dan satu ujungnya lagi dengan koneksi female.<span
style="line-height: 24px; mso-fareast-font-family: SimSun; mso-spacerun:
'yes';"><o:p></o:p> <p align="justify" class="MsoNormal"
style="line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan;
mso-para-margin-left: 0.0000gd; text-align: justify; text-autospace: ideograph-numeric;
text-justify: inter-ideograph;"><span
style="mso-bidi-font-family: 'Times New Roman'; mso-fareast-font-family: SimSun;
text-indent: -21pt;">l <!--[endif]--><span style="line-height: 24px;
mso-fareast-font-family: SimSun; mso-spacerun: 'yes'; text-indent:
-21pt;">Female-Female <p align="center" class="MsoNormal"
style="line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align:
center; text-autospace: ideograph-numeric;"><span style="font-family: inherit; line-height:
24px; mso-fareast-font-family: SimSun; mso-spacerun: 'yes';"> <div
class="separator" style="clear: both; text-align: center;"><span style="font-family: inherit;
line-height: 24px; mso-fareast-font-family: SimSun; mso-spacerun: 'yes';"><a
href="https://blogger.googleusercontent.com/img/a/AVvXsEiu-OsEgSAUjXaqYYc-wgWwED-
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PDbkX6S9D5YeN_FNiPwLabWad2mS0P3vJosKXoGoAiskRoapxIQTstINCfa_LJzRVRa1YQ
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1em;"><img border="0" data-original-height="217" data-original-width="256" height="170"
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DbkX6S9D5YeN_FNiPwLabWad2mS0P3vJosKXoGoAiskRoapxIQTstINCfa_LJzRVRa1YQUl
-zehWHOhvwGw4u_J6fTzChM3IQ=w200-h170" width="200"
/> <p align="justify" class="p"
style="background: rgb(255, 255, 255); line-height: 24px; mso-char-indent-count: 0.0000;
mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric;
text-indent: 36pt; text-justify: inter-ideograph;"><span style="background-attachment:
initial; background-clip: initial; background-image: initial; background-origin: initial;
background-position: initial; background-repeat: initial; background-size: initial; color:
#222222; font-family: inherit; letter-spacing: 0pt;"> <p align="justify"
class="MsoNormal" style="line-height: 24px; margin-bottom: 0pt; mso-pagination:
widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-justify:
inter-ideograph;"><span style="font-family: inherit; line-height: 24px; mso-fareast-font-family:
SimSun; mso-spacerun: 'yes';">Kabel jumper jenis ini digunakan untuk koneksi female to
female pada kedua ujung kabelnya. <p align="justify" class="MsoNormal"
style="line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align:
justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;"><span
style="font-family: inherit; line-height: 24px; mso-fareast-font-family: SimSun; mso-spacerun:
'yes';">11. Transistor <p class="MsoNormal" style="line-height: 24px;
margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace:
ideograph-numeric; text-justify: inter-ideograph;"><span style="font-family: inherit;
line-height: 24px; mso-fareast-font-family: SimSun; mso-spacerun: 'yes';">

                          <p class="MsoNormal" style="background: white; color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: 24px; margin: 15.8pt -0.3pt 0cm 35.45pt; text-align: justify;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", serif; font-size: 12pt; line-height: 24px;">Transistor merupakan alat semikonduktor yang dapat digunakan sebagai penguat sinyal, pemutus atau penyambung sinyal, stabilisasi tegangan, dan fungsi lainnya. Transistor memiliki 3 kaki elektroda, yaitu basis, kolektor, dan emitor. Transistor ini diperumpamakan sebagai saklar, yaitu ketika kaki basis diberi arus, maka arus pada <span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial;">kolektor akan mengalir ke emiter yang disebut dengan kondisi ON. Sedangkan ketika kaki basis tidak diberi arus, maka tidak ada arus mengalir dari kolektor ke emitor <span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial;">yang disebut dengan kondisi OFF. Namun, jika arus yang diberikan pada kaki basis <span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial;">melebihi arus pada kaki kolektor atau arus pada kaki kolektor adalah nol (karena tegangan kaki kolektor sekitar 0,2 - 0,3 V), maka transistor akan mengalami cutoff <span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial;">(saklar tertutup). <o:p></o:p> <p class="MsoNormal"

style="background: white; color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: 24px; margin: 15.35pt 0cm 0cm 35.45pt; text-align: justify;"><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; font-family: "Times New Roman", serif; font-size: 12pt; line-height: 24px;">Transistor adalah sebuah komponen di dalam elektronika yang diciptakan dari bahan-bahan semikonduktor dan memiliki tiga buah kaki. Masing-masing kaki disebut sebagai basis, kolektor, dan emitor.<o:p></o:p></p><p class="MsoListParagraphCxSpFirst" style="background: white; color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: 24px; margin: 0cm 0cm 3pt 71.45pt; text-align: justify; text-indent: -18pt; vertical-align: baseline;">·<span style="font-family: "Times New Roman"; font-size: 7pt; font-stretch: normal; font-variant-east-asian: normal; font-variant-numeric: normal; line-height:
normal;">   Emitor (E) memiliki fungsi untuk menghasilkan elektron atau muatan negatif.<o:p></o:p></p><p class="MsoListParagraphCxSpMiddle" style="background: white; color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: 24px; margin: 0cm 0cm 3pt 71.45pt; text-align: justify; text-indent: -18pt; vertical-align: baseline;">·   Kolektor (C) berperan sebagai saluran bagi muatan negatif untuk keluar dari dalam transistor.<o:p></o:p></p><p class="MsoListParagraphCxSpLast" style="background: white; color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: 24px; margin: 0cm 0cm 3pt 71.45pt; text-align: justify; text-indent: -18pt; vertical-align: baseline;">·<span style="font-family: "Times New Roman"; font-size: 7pt; font-stretch: normal; font-variant-east-asian: normal; font-variant-numeric: normal; line-height:
normal;">   Basis (B) berguna untuk mengatur arah gerak muatan negatif yang keluar dari transistor melalui kolektor.</p><p class="MsoListParagraphCxSpLast" style="background: white; color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: 24px; margin: 0cm 0cm 3pt 71.45pt; text-align: justify; text-indent: -18pt; vertical-align: baseline;">
</p><p class="MsoNormal" style="background: rgb(255, 255, 255); color: #222222; font-family:

Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: normal; margin-bottom: 0cm; text-align: justify;">Jenis Transistor: <p class="MsoNormal" style="background: rgb(255, 255, 255); color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: normal; margin-bottom: 0cm; text-align: justify;">1.   Bipolar Junction Transistor (BJT) <span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial;"> <p class="MsoNormal" style="background: rgb(255, 255, 255); color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: 26px; margin-bottom: 0cm; text-align: justify;">Bi<span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial;"> artinya dua dan Polar asal kata dari polarity yang artinya polaritas, dengan kata lain bipolar junction transistor (BJT) adalah jenis Transistor yang memiliki dua polaritas yaitu hole (lubang) atau elektron sebagai carier (pembawa) untuk menghantarkan arus listrik. Prinsip dasar konstruksinya disusun seperti dari dua buah dioda yang disambungkan pada kutub yang sama yaitu Anoda dengan anoda sehingga menghasilkan transistor jenis NPN atau Katoda dengan katoda yang menjadi transistor jenis PNP.<o:p></o:p> <p class="MsoListParagraphCxSpLast" style="background: rgb(255, 255, 255); color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: normal; margin-bottom: 0.0001pt; text-align: justify;">2.   Unipolar Junction Transistor (UJT) <p class="MsoListParagraphCxSpLast" style="background: rgb(255, 255, 255); color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: normal; margin-bottom: 0cm; text-align: justify;"> <p class="MsoNormal" style="background: rgb(255, 255, 255); color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: 26px; margin-bottom: 0cm; text-align: justify;">Pada transistor UJT hanya satu polaritas saja yang dijadikan carier/pembawa muatan arus listrik, yaitu elektron saja atau hole/lubangnya saja, tergantung dari jenis transistor UJT tersebut. Karena prinsip kerjanya transistor ini berdasarkan dari efek medan listrik, maka transistor UJT lebih dikenal dengan nama FET

(Field Efect Transistor) <span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial;">atau Transistor Efek Medan.<o:p></o:p> <p class="MsoListParagraphCxSpLast" style="background: white; color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: 24px; margin: 0cm 0cm 3pt 71.45pt; text-align: justify; text-indent: -18pt; vertical-align: baseline;">
 <p class="MsoListParagraphCxSpLast" style="background: white; color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: 24px; margin: 0cm 0cm 3pt 71.45pt; text-align: justify; text-indent: -18pt; vertical-align: baseline;">Rumus: <p class="MsoListParagraphCxSpLast" style="background: white; color: #222222; font-family: Arial, Tahoma, Helvetica, FreeSans, sans-serif; font-size: 13.2px; line-height: 24px; margin: 0cm 0cm 3pt 71.45pt; text-align: justify; text-indent: -18pt; vertical-align: baseline;"> <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px;

margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-justify: inter-ideograph;"> 12. <!--[endif]-->Arduino Uno <p align="center" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 18pt; mso-pagination: widow-orphan; text-align: center; text-autospace: ideograph-numeric;">Gambar Arduino Uno<o:p></o:p> <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 18pt; text-justify: inter-ideograph;">Arduino Uno adalah board mikrokontroler berbasis ATmega328 (datasheet). Memiliki 14 pin input dari output digital dimana 6 pin input tersebut dapat digunakan sebagai output PWM dan 6 pin input analog, 16 MHz osilator kristal, koneksi USB, jack power, ICSP header, dan tombol reset. Untuk mendukung mikrokontroler agar dapat digunakan, cukup hanya menghubungkan Board Arduino Uno ke komputer dengan menggunakan kabel USB atau listrik dengan AC yang-ke adaptor-DC atau baterai untuk menjalankannya. Uno berbeda dengan semua board sebelumnya dalam hal koneksi USB-to-serial yaitu menggunakan fitur Atmega8U2 yang diprogram sebagai konverter USB-to-serial berbeda dengan board sebelumnya yang menggunakan chip FTDI driver USB-to-serial.<o:p></o:p> <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 18pt; text-justify: inter-ideograph;">Nama “Uno” berarti satu dalam bahasa Italia, untuk menandai peluncuran Arduino 1.0. Uno dan versi 1.0 akan menjadi versi referensi dari Arduino. Uno adalah yang terbaru dalam serangkaian board USB Arduino, dan sebagai model referensi untuk platform Arduino, untuk perbandingan dengan versi sebelumnya, lihat indeks board Arduino.<span style="line-height:

24px;"><o:p></o:p> <table border="0" cellspacing="0" class="MsoNormalTable" style="border-collapse: collapse; border: none; mso-padding-alt: 0.0000pt 0.0000pt 0.0000pt 0.0000pt;"><tbody><tr><td colspan="2" style="border-bottom: 1.0000pt solid rgb(0,0,0); border-color: rgb(0, 0, 0); border-left: 1.0000pt solid rgb(0,0,0); border-right: 1.0000pt solid rgb(0,0,0); border-style: solid; border-top: 1.0000pt solid rgb(0,0,0); border-width: 1pt; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 356.4pt;" valign="top" width="475"> SPESIFIKASI<o:p></o:p> </td></tr><tr><td colspan="2" style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 356.4pt;" valign="top" width="475"> Arduino Uno<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> Microcontroller<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> ATmega328P<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> Operating Voltage<o:p></o:p> </td><td

style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> 5V<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> Input Voltage (recommended)<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> 7-12V<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> Input Voltage (limit)<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> 6-20V<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"><p align="justify" class="MsoNormal" style="line-height: 24px; margin-bottom: 0pt; margin-top: 5pt;

mso-margin-top-alt: auto; text-align: justify; text-justify: inter-ideograph;">Digital I/O Pins<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> 14 (of which 6 provide PWM output)<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> PWM Digital I/O Pins<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> 6<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> Analog Input Pins<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> 6<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid

rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> DC Current per I/O Pin<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> 20 mA<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> DC Current for 3.3V Pin<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> 50 mA<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> Flash Memory 32 KB<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> (ATmega328P)<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid

rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> SRAM<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> 2 KB (ATmega328P)<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> EEPROM<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> 1 KB (ATmega328P)<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> Clock Speed<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> <span

style="line-height: 24px;">16 MHz<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> LED_BUILTIN<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> 13<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> Length<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"> 68.6 mm<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> Width<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240"><p align="justify" class="MsoNormal"

style="line-height: 24px; margin-bottom: 0pt; margin-top: 5pt; mso-margin-top-alt: auto; text-align: justify; text-justify: inter-ideograph;">53.4 mm<o:p></o:p> </td></tr><tr><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: 1pt solid rgb(0, 0, 0); border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: 1.0000pt solid rgb(0,0,0); mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: 1.0000pt solid rgb(0,0,0); padding: 0pt 5.4pt; width: 176.4pt;" valign="top" width="235"> Weight<o:p></o:p> </td><td style="border-bottom: 1pt solid rgb(0, 0, 0); border-left: none; border-right: 1pt solid rgb(0, 0, 0); border-top: none; mso-border-bottom-alt: 1.0000pt solid rgb(0,0,0); mso-border-left-alt: none; mso-border-right-alt: 1.0000pt solid rgb(0,0,0); mso-border-top-alt: none; padding: 0pt 5.4pt; width: 180pt;" valign="top" width="240">   </td></tr></tbody></table> <p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 36pt; text-justify: inter-ideograph;">Arduino Uno dapat diaktifkan melalui koneksi USB atau dengan catu daya eksternal (otomatis). Daya Eksternal (non-USB) dapat berasal baik dari AC-ke adaptor-DC atau baterai. Adaptor ini dapat dihubungkan dengan menancapkan plug jack pusat-positif ukuran 2.1mm konektor POWER. Ujung kepala dari baterai dapat dimasukkan kedalam Gnd dan Vin pin header dari konektor POWER. Kisaran kebutuhan daya yang disarankan untuk board Uno adalah7 sampai dengan 12 V, jika diberi daya kurang dari 7 V kemungkinan pin 5 V Uno dapat beroperasi tetapi tidak stabil kemudian jika diberi daya lebih dari 12V, regulator tegangan bisa panas dan dapat merusak board Uno.
Pin listrik adalah sebagai berikut:<o:p></o:p> <p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 36pt; mso-list: l2 level1 lfo9; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: -18pt; text-justify: inter-ideograph;"><!--[if !supportLists]-->a) <!--[endif]-->VIN. Tegangan masukan kepada board Arduino ketika itu menggunakan sumber daya eksternal (sebagai pengganti dari 5volt koneksi USB atau sumber daya lainnya).<o:p></o:p> <p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 5pt; margin-left: 36pt; margin-top: 5pt; mso-list: l2 level1 lfo9; mso-margin-bottom-alt: auto; mso-margin-top-alt: auto; text-align: justify; text-indent: -18pt; text-justify: inter-ideograph;"><!--[if !supportLists]-->b) <!--[endif]-->5V. Catu daya digunakan untuk daya mikrokontroler dan komponen

lainnya.<o:p></o:p></p><p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 5pt; margin-left: 36pt; margin-top: 5pt; mso-list: l2 level1 lfo9; mso-margin-bottom-alt: auto; mso-margin-top-alt: auto; text-align: justify; text-indent: -18pt; text-justify: inter-ideograph;"><!--[if !supportLists]-->c) <!--[endif]-->3v3. Sebuah pasokan 3,3volt dihasilkan oleh regulator on-board.<o:p></o:p></p><p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 5pt; margin-left: 36pt; margin-top: 5pt; mso-list: l2 level1 lfo9; mso-margin-bottom-alt: auto; mso-margin-top-alt: auto; text-align: justify; text-indent: -18pt; text-justify: inter-ideograph;"><!--[if !supportLists]-->d) <!--[endif]-->GND. Ground pin.Input dan Output<o:p></o:p></p><p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 5pt; margin-top: 5pt; mso-margin-bottom-alt: auto; mso-margin-top-alt: auto; text-align: justify; text-justify: inter-ideograph;">Masing-masing dari 14 pin digital di Uno dapat digunakan sebagai input atau output, dengan menggunakan fungsi pinMode (), digitalWrite (), dan digitalRead (), beroperasi dengan daya 5 volt. Setiap pin dapat memberikan atau menerima maksimum 40 mA dan memiliki internal pull-up resistor (secara default terputus) dari 20-50 kOhms. Selain itu, beberapa pin memiliki fungsi khusus:<o:p></o:p></p><p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 5pt; margin-left: 36pt; margin-top: 5pt; mso-list: l2 level1 lfo9; mso-margin-bottom-alt: auto; mso-margin-top-alt: auto; text-align: justify; text-indent: -18pt; text-justify: inter-ideograph;"><!--[if !supportLists]-->e) <!--[endif]-->Serial: 0 (RX) dan 1 (TX). Digunakan untuk menerima (RX) dan mengirimkan (TX) TTL data serial. Pin ini dihubungkan ke pin yang berkaitan dengan chip Serial ATmega8U2 USB-to-TTL.<o:p></o:p></p><p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 5pt; margin-left: 36pt; margin-top: 5pt; mso-list: l2 level1 lfo9; mso-margin-bottom-alt: auto; mso-margin-top-alt: auto; text-align: justify; text-indent: -18pt; text-justify: inter-ideograph;"><!--[if !supportLists]-->f) <!--[endif]-->Eksternal menyela: 2 dan 3. Pin ini dapat dikonfigurasi untuk memicu interrupt pada nilai yang rendah, dengan batasan tepi naik atau turun, atau perubahan nilai. Lihat (attachInterrupt) fungsi untuk rincian lebih lanjut.<o:p></o:p></p><p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 5pt; margin-left: 36pt; margin-top: 5pt; mso-list: l2 level1 lfo9; mso-margin-bottom-alt: auto; mso-margin-top-alt: auto; text-align: justify; text-indent: -18pt; text-justify: inter-ideograph;"><!--[if !supportLists]-->g) <!--[endif]-->PWM: 3, 5, 6, 9, 10, dan 11. Menyediakan output PWM 8-bit dengan

fungsi analogWrite ().<o:p></o:p></p><p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 5pt; margin-left: 36pt; margin-top: 5pt; mso-list: l2 level1 lfo9; mso-margin-bottom-alt: auto; mso-margin-top-alt: auto; text-align: justify; text-indent: -18pt; text-justify: inter-ideograph;"><!--[if !supportLists]-->h) <!--[endif]-->SPI: 10 (SS), 11 (Mosi), 12 (MISO), 13 (SCK). Pin ini mendukung komunikasi SPI menggunakan SPI library.<o:p></o:p></p><p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 5pt; margin-left: 36pt; margin-top: 5pt; mso-list: l2 level1 lfo9; mso-margin-bottom-alt: auto; mso-margin-top-alt: auto; text-align: justify; text-indent: -18pt; text-justify: inter-ideograph;"><!--[if !supportLists]-->i) <!--[endif]-->LED: 13. Ada built-in LED terhubung ke pin digital 13. Ketika pin bernilai nilai HIGH, LED on, ketika pin bernilai LOW, LED off.<o:p></o:p></p><p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 5pt; margin-top: 5pt; mso-margin-bottom-alt: auto; mso-margin-top-alt: auto; text-align: justify; text-justify: inter-ideograph;">Arduino Uno memiliki 6 masukan analog, berlabel A0 sampai dengan A5, yang masing-masing menyediakan 10 bit dengan resolusi (yaitu 1024 nilai yang berbeda). Selain itu, beberapa pin memiliki fungsi khusus:<o:p></o:p></p><p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 5pt; margin-left: 36pt; margin-top: 5pt; mso-list: l2 level1 lfo9; mso-margin-bottom-alt: auto; mso-margin-top-alt: auto; text-align: justify; text-indent: -18pt; text-justify: inter-ideograph;"><!--[if !supportLists]-->j) <!--[endif]-->I2C: A4 (SDA) dan A5 (SCL). Dukungan I2C (TWI) komunikasi menggunakan perpustakaan Wire.<o:p></o:p></p><p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 5pt; margin-left: 36pt; margin-top: 5pt; mso-list: l2 level1 lfo9; mso-margin-bottom-alt: auto; mso-margin-top-alt: auto; text-align: justify; text-indent: -18pt; text-justify: inter-ideograph;"><!--[if !supportLists]-->k) <!--[endif]-->Aref. Tegangan referensi (0 sampai 5V saja) untuk input analog. Digunakan dengan fungsi analogReference ().<o:p></o:p></p><p align="justify" class="16" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; margin-left: 36pt; mso-list: l2 level1 lfo9; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: -18pt; text-justify: inter-ideograph;"><!--[if !supportLists]-->l) <!--[endif]-->Reset. Bawa baris ini LOW untuk me-reset mikrokontroler.<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px;

margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 18pt; text-justify: inter-ideograph;">Arduino Uno memiliki sejumlah fasilitas untuk berkomunikasi dengan komputer, Arduino lain, atau mikrokontroler lainnya. Atmega328 menyediakan UART TTL (5V) untuk komunikasi serial, yang tersedia di pin digital 0 (RX) dan 1 (TX). Sebuah Atmega8U2 sebagai saluran komunikasi serial melalui USB dan sebagai port virtual com untuk perangkat lunak pada komputer. Firmware ’8 U2 menggunakan driver USB standar COM, dan tidak ada driver eksternal yang diperlukan. Namun, pada Windows diperlukan, sebuah file inf.<o:p></o:p></p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 18pt; text-justify: inter-ideograph;">Perangkat lunak Arduino terdapat monitor serial yang memungkinkan digunakan memonitor data tekstual sederhana yang akan dikirim komputer dari board Arduino. LED RX dan TX di papan tulis akan berkedip ketika data sedang dikirim melalui chip USB-to-serial dengan koneksi USB ke komputer (tetapi tidak untuk komunikasi serial pada pin 0 dan 1). Sebuah Software Serial library memungkinkan untuk berkomunikasi secara serial pada salah satu pin digital pada board Uno. Atmega328 juga mendukung I2C (TWI) dan komunikasi SPI. Perangkat lunak Arduino termasuk perpustakaan Kawat untuk menyederhanakan penggunaan bus I2C, lihat dokumentasi untuk rincian. Untuk komunikasi SPI, menggunakan perpustakaan SPI</p><p align="justify" class="MsoNormal" style="background: rgb(255, 255, 255); line-height: 24px; margin-bottom: 0pt; mso-pagination: widow-orphan; text-align: justify; text-autospace: ideograph-numeric; text-indent: 18pt; text-justify: inter-ideograph;">
</p> 4. Listing Program [Kembali]
  4.1.<span style="font-family: "Times New Roman"; font-size: 7pt; font-stretch: normal; font-variant-east-asian: normal; font-variant-numeric: normal; font-weight: normal; line-height: normal;">   Master <p

class="MsoNormal" style="line-height: 24px; margin-bottom: 0cm;">//Master<o:p></o:p> #include <LiquidCrystal.h><o:p></o:p> LiquidCrystal lcd(12, 11, 5, 4, 3, 2);<o:p></o:p>   #define echoPin 6 //Echo Pin<o:p></o:p> #define trigPin 7 //Trigger Pin<o:p></o:p>   int swt = 13;<o:p></o:p> int statusspdt;<o:p></o:p>   int pinPIR = 10;   //pin Out PIR<o:p></o:p> int statusPIR; //variabel untuk menampung status sensor<o:p></o:p>   int pinTouch = 9; //pinout touch<o:p></o:p> int statusTOUCH;   //variabel untuk menampung sensor<o:p></o:p> <span style="font-family:

"Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;"> long duration, distance; //waktu untuk kalkulasi jarak <o:p></o:p> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;"> void setup() {<o:p></o:p> // put your setup code here, to run once:<o:p></o:p>   Serial.begin (9600);<o:p></o:p>   lcd.begin(16,2);<o:p></o:p>   pinMode(trigPin, OUTPUT);<o:p></o:p>   pinMode(echoPin, INPUT);<o:p></o:p>   pinMode(pinTouch, INPUT);<o:p></o:p>   pinMode(pinPIR, INPUT);   //pengaturan pin PIR sebagai input<o:p></o:p>   pinMode(swt, INPUT);<o:p></o:p>   delay(500);<o:p></o:p> }<o:p></o:p> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;"> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px;

mso-fareast-language: ZH-CN;">void loop() {<o:p></o:p> // put your main code here, to run repeatedly:<o:p></o:p>   statusPIR = digitalRead(pinPIR);<o:p></o:p>   statusTOUCH = digitalRead(pinTouch); <o:p></o:p>   statusspdt = digitalRead(swt);<o:p></o:p> <o:p></o:p>   digitalWrite(trigPin, LOW);<o:p></o:p>   delay(2);<o:p></o:p>   digitalWrite(trigPin, HIGH);<o:p></o:p>   delay(10);<o:p></o:p>   digitalWrite(trigPin, LOW);<o:p></o:p>   duration = pulseIn(echoPin, HIGH);<o:p></o:p>   //perhitungan untuk dijadikan jarak<o:p></o:p>   distance = (duration/2) / 29.1; //cm<o:p></o:p> <p class="MsoNormal" style="line-height:

24px; margin-bottom: 0cm;">   if (statusPIR == LOW && statusTOUCH == HIGH && distance < 20){<o:p></o:p> //   lhh<o:p></o:p>   Serial.write(1);<o:p></o:p>   lcd.clear();<o:p></o:p>   lcd.clear();<o:p></o:p>   lcd.setCursor(0,0);<o:p></o:p>   lcd.print("Silahkan Masuk");<o:p></o:p>   delay(100);<o:p></o:p>   }<o:p></o:p>   else if (statusPIR == HIGH && statusTOUCH == LOW && distance >= 20){<o:p></o:p> //   hll<o:p></o:p>   Serial.write(2);<o:p></o:p>   lcd.clear();<o:p></o:p>

lcd.setCursor(0,0);<o:p></o:p>   lcd.print("Ada Orang");<o:p></o:p>   lcd.setCursor(0,1);<o:p></o:p>   lcd.print("didalam");<o:p></o:p>   delay(100);<o:p></o:p>   }<o:p></o:p>   else if (statusPIR == LOW && statusTOUCH == LOW && distance >= 20){<o:p></o:p> //   lll<o:p></o:p>   Serial.write(3);<o:p></o:p>   lcd.clear();<o:p></o:p>   lcd.setCursor(0,0);<o:p></o:p>   lcd.print("Tidak Mendeteksi");<o:p></o:p>   delay(100);<o:p></o:p>   }<o:p></o:p>   else if (statusPIR == LOW && statusTOUCH == LOW && distance <20){<o:p></o:p> <span style="font-family: "Times New Roman",serif;

font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">
Serial.write(4);<o:p></o:p></p><p class="MsoNormal" style="line-height: 24px;
margin-bottom: 0cm;"><span style="font-family: "Times New Roman",serif;
font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">
lcd.clear();<o:p></o:p></p><p class="MsoNormal" style="line-height: 24px;
margin-bottom: 0cm;"><span style="font-family: "Times New Roman",serif;
font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">
lcd.setCursor(0,0);<o:p></o:p></p><p class="MsoNormal" style="line-height: 24px;
margin-bottom: 0cm;"><span style="font-family: "Times New Roman",serif;
font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">
lcd.print("PENYUSUP!!!");<o:p></o:p></p><p class="MsoNormal" style="line-height:
24px; margin-bottom: 0cm;"><span style="font-family: "Times New Roman",serif;
font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">
lcd.setCursor(0,1);<o:p></o:p></p><p class="MsoNormal" style="line-height: 24px;
margin-bottom: 0cm;"><span style="font-family: "Times New Roman",serif;
font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">
lcd.print("PENYUSUP!!!");<o:p></o:p></p><p class="MsoNormal" style="line-height:
24px; margin-bottom: 0cm;"><span style="font-family: "Times New Roman",serif;
font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">
delay(100);<o:p></o:p></p><p class="MsoNormal" style="line-height: 24px;
margin-bottom: 0cm;"><span style="font-family: "Times New Roman",serif;
font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">
}<o:p></o:p></p><p class="MsoNormal" style="line-height: 24px; margin-bottom:
0cm;"><span style="font-family: "Times New Roman",serif; font-size: 12pt;
line-height: 24px; mso-fareast-language: ZH-CN;">}<o:p></o:p></p><p
class="MsoNormal" style="line-height: 24px; margin-bottom: 0cm;">
</p><p
class="MsoListParagraph" style="line-height: 24px; margin-bottom: 0cm; margin-left: 21.3pt;
margin-right: 0cm; margin-top: 0cm; margin: 0cm 0cm 0cm 21.3pt; mso-add-space: auto;
mso-list: l0 level4 lfo1; text-indent: 0cm;"><span lang="IN" style="font-family:
"Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-ansi-language:
IN; mso-fareast-font-family: "Times New Roman";">4.2.<span style="font-family:
"Times New Roman"; font-size: 7pt; font-stretch: normal; font-variant-east-asian:
normal; font-variant-numeric: normal; font-weight: normal; line-height:
normal;">   <!--[endif]--><span style="font-family:
"Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-bidi-font-size:
11.0pt;">Slave<span lang="IN" style="font-family: "Times New
Roman",serif; font-size: 12pt; line-height: 24px; mso-ansi-language:
IN;"><o:p></o:p></p><p class="MsoNormal" style="line-height: 24px;
margin-bottom: 0cm;"><span style="font-family: "Times New Roman",serif;
font-size: 12pt; line-height: 24px; mso-fareast-language:
ZH-CN;">//Slave<o:p></o:p></p><p class="MsoNormal" style="line-height: 24px;
margin-bottom: 0cm;"><span style="font-family: "Times New Roman",serif;
font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">#include
<Servo.h><o:p></o:p></p><p class="MsoNormal" style="line-height: 24px;
margin-bottom: 0cm;"><span style="font-family: "Times New Roman",serif;
font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">#define led

7<o:p></o:p> #define buzz 8<o:p></o:p>   Servo myservo;<o:p></o:p>   int pos = 0;<o:p></o:p>   void setup() {<o:p></o:p>   // put your setup code here, to run once:<o:p></o:p>   Serial.begin(9600);<o:p></o:p>   myservo.attach(10);<o:p></o:p>   pinMode(led, OUTPUT);<o:p></o:p>   pinMode(buzz, OUTPUT);<o:p></o:p>   myservo.write(pos);<o:p></o:p> }<o:p></o:p>   <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px;

mso-fareast-language: ZH-CN;">void loop() {<o:p></o:p>   // put your main code h` ere, to run repeatedly:<o:p></o:p>   if (Serial.available() > 0) {<o:p></o:p>   int data = Serial.read();<o:p></o:p>   if (data == 1) {<o:p></o:p>   Serial.println("180");<o:p></o:p>   digitalWrite(led, HIGH);<o:p></o:p>   digitalWrite(buzz, LOW);<o:p></o:p>   myservo.write(180);<o:p></o:p>   delay(100);<o:p></o:p>   }<o:p></o:p>   else if (data == 2) {<o:p></o:p>   //   ada orang<o:p></o:p> <span style="font-family:

"Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">   digitalWrite(led, HIGH);<o:p></o:p> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">   digitalWrite(buzz, LOW);<o:p></o:p> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">   delay(100);<o:p></o:p> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">   }<o:p></o:p> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">   else if (data == 3) {<o:p></o:p> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">   //   Tidak mendeteksi<o:p></o:p> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">   digitalWrite(led, LOW);<o:p></o:p> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">   digitalWrite(buzz, LOW);<o:p></o:p> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">   delay(100);<o:p></o:p> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">   }<o:p></o:p> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">   else if (data == 4) {<o:p></o:p> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">   //   Si maling membobol dan mengelabui sensor hcsr<o:p></o:p> <span style="font-family: "Times New Roman",serif; font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">   digitalWrite(led, HIGH);<o:p></o:p> <span style="font-family: "Times New Roman",serif;

font-size: 12pt; line-height: 24px; mso-fareast-language: ZH-CN;">   digitalWrite(buzz, HIGH);<o:p></o:p>   Serial.println("0");<o:p></o:p>   myservo.write(0);<o:p></o:p>   delay(100);<o:p></o:p>   }<o:p></o:p>   }<o:p></o:p> } 5. Flowchart [Kembali] -. Master

 <p style="font-family: "Times New Roman";

font-weight: 400; text-align: left;"> -. Slave

 6. Rangkaian Percobaan [Kembali]
 <ul style="text-align: left;">
Rangkaian Percobaan

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Hardware
  <ul style="text-align: left;">
Prinsip Kerja   Project rangkaian ini dibuart bertujuan untuk mencegah terjadi pencurian dibrankas bank. Pada rangkaian ini menggunakan dua buah Arduino yang saling berkomunikasi, yaitu Arduino Master dan Arduino Slave. Kedua Arduino ini menggunakan komunikasi UART (Universal Asynchronous Receiver-Transmitter). UART sendiri adalah bagian perangkat keras komputer yang menerjemahkan antara bit-bit paralel data dan bit-bit serial. Rangkaian ini menggunakan 1 buah sensor touch, 1 buah sensor pir dan 1 sensor Ultrasonik. Sensor touch sendiri diletakkan di depan pintu brankas, sensor ultrasonik diletakkan didepan pintu brankas sedangkan sensor PIR dipasang didekat brankas. Output dari rangkaian ini berupa LCD, Motor Servo, LED Merah dan buzzer. Di rangkaian ini sensor PIR terhubung ke pin 10 Arduino Master. Dan Pin 6 dan 7 dihubungkan ke sensor ultrasonik yaitu ke pin trigger dan pin echo. LCD yang menjadi output terhubung ke Pin 12, 11, 5, 4, 3, dan 2 Arduino Master. Pin receiver Arduino Master dihubungkan ke pin receiver Arduino Slave dan pin transmitter dari Arduino Master dihubungkan ke pin transmitter Arduino Slave. Pada Arduino Slave, pin 12 dihubungkan ke motor servo. Disini motor servo berfungsi untuk membuka menutup pintu. Pin 7 dihubungkan ke resistor kemudian ke LED. Pin 9 dan buzzer. Untuk listing program pada Arduino Master, pertama yaitu kita mendeklarasikan library LCD dan pin-pin yang digunakan pada Arduino Master. Lalu untuk fungsi void setup, yaitu fungsi yang ada pada void setup ini hanya akan dieksekusi sekali. Disini void setup akan mendeklarasian input dan output pada pin-pin

Arduino Master. Kemudian untuk fungsi void loop, fungsi yang akan dijalankan secara berulang, dilakukan pembacaan terhadap masukan sensor infrared ke arduino, mengirim logika LOW dan HIGH ke pin trigger pada sensor ultrasonik, dan melakukan perhitungan jarak sensor ultrasonik dengan rumus (duration/2)/29,1. Disini Duration adalah sinyal yang masuk ke pin echo. Lalu terdapat beberapa perulangan kondisi yang dideklarasikan dengan if dan else if. Untuk contoh seperti pada kondisi Sensor PIR berlogika LOW, Sensor Touch berlogika HIGH dan pada Sensor Ultrasonik jarak yang terukur kurang dari 20 cm. Pada kondisi ini, akan ditampilkan tulisan “Silahkan masuk” pada LCD kemudian Arduino Master akan mengirim karakter “1” ke Arduino Slave, lalu Arduino Slave akan memberikan perintah pada output. ada listing program slave, dideklarasikan library motor servo dan pin pin pada Arduino yang digunakan. Kemudian pada void setup, yaitu fungsi yang dieksekusi sekali, dideklarasikan pin pin yang menjadi input atau output pada Arduino Slave. Untuk void loop, yaitu fungsi yang dieksekusi berulang.Kemudian Arduino Slave akan mngecek apakah ada data yang dikirimkan oleh Arduino Master. Jika ada, maka program akan mengeksekusi perulangan if dengan beberapa kondisi. Sebagai contoh yaitu Ketika Arduino Master mengirimkan data karakter “1”, maka LED akan hidup dan. Pada kondisi ini buzzer akan berbunyi dan motor servo akan bergerak satu arah, yaitu membuka pintu

 <h3 style="text-align: left;">7. Video

[Kembali]</h3> <ul style="text-align: left;">
Simulasi Rangkaian Proteus <iframe allowfullscreen="" class="BLOG_video_class" height="266" src="https://www.youtube.com/embed/dxDM3LszlhE" width="320" youtube-src-id="dxDM3LszlhE"></iframe>

 <ul style="text-align: left;">
Simulasi Project Demo
 <iframe allowfullscreen="" class="BLOG_video_class" height="266" src="https://www.youtube.com/embed/nMH5cWDLCb4" width="320" youtube-src-id="nMH5cWDLCb4"></iframe>
8. Download File [Kembali]

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