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INTRO TO PROTOTYPE DEVELOPMENT

LAB 1A
EG-UY 1004

OVERVIEW

1. Objective
2. Background Information
3. Materials
4. IDBE Implementation
5. Assignment
6. Closing
7. Activity



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OBJECTIVE

- Become familiar with sensors and prototyping components commonly used in EG-UY 1004
- Participate in mock RAD ideation with components from a Spin the Wheel activity



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BACKGROUND INFORMATION

What is prototyping?

- Prototyping is the process of designing and building an early model of a product to test it
- Proof of concept
- In EG-UY 1004, the Rapid Assembly and Design project is centered around prototyping



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BACKGROUND INFORMATION

- Electrical components (e.g. sensors, wires)
- Mechanical components (e.g. gears, wheels)
- SLDPs will have access to the EG-UY 1004 Open Lab
 - Much broader range of materials than what is presented in this activity

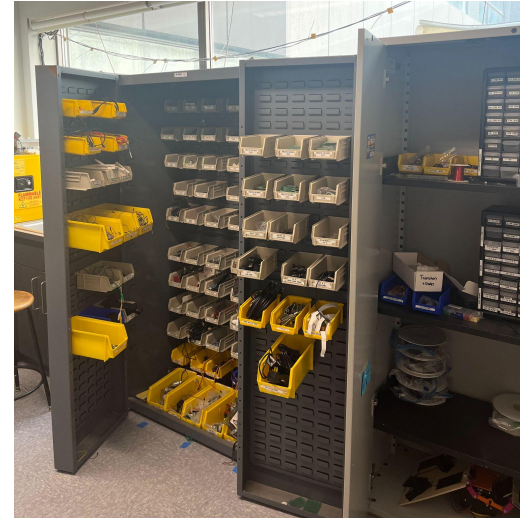


Figure 1: Some EG-UY 1004 materials in Open Lab



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MATERIALS



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LIGHT SENSOR

What it Does

- **Function:** Measures light intensity
- **Output:** Analog or digital signal proportional to light intensity

Potential Implementation

- **Automatic Lighting:** Adjust indoor lighting based on ambient light
- **Smart Garden:** Monitor sunlight exposure for plants



Figure 2: Image courtesy of Amazon



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BUZZER

What it Does

- **Function:** Produces sound when electrical signal is applied.
- **Output:** Audible tone or beep

Potential Implementation

- **Alerts:** Audible alarms or notifications
- **Games:** Provide sound effects in electronic games



Figure 3: Image courtesy of Amazon



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FLUID PUMP

What it Does

- **Function:** Moves fluids from one place to another
- **Output:** Controlled flow of liquid

Potential Implementation

- **Medical Devices:** Control fluid delivery in medical treatments
- **Watering Systems:** Automate irrigation in gardens or greenhouses



Figure 4: Image courtesy of DigiKey



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LCD (LIQUID CRYSTAL DISPLAY)

What it Does

- **Function:** Displays alphanumeric characters on a 16-column by 2-row screen
- **Output:** Visual display of text and simple graphics

Potential Implementation

- **Data Monitoring:** Show system/sensor statuses
- **User Interfaces:** Display information and interact with users

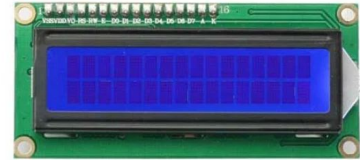


Figure 5: Image courtesy of Arduino



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FSR (FORCE SENSITIVE RESISTOR)

What it Does

- **Function:** Measures force applied
- **Output:** Resistance corresponding to the force applied

Potential Implementation

- **Medical wearables:** Detect muscle contraction
- **Consumer electronics:** Touch sensitive controls
- **Robotics:** Sense touch from robotic limbs



Figure 6: Image courtesy of SparkFun



JOYSTICK MODULE

What it Does

- **Function:** Provides directional control input
- **Output:** X and Y axis positions

Potential Implementation

- **Gaming:** Control game characters or vehicles
- **Robotics:** Manual control of robotic arms or vehicles



Figure 7: Image courtesy of Amazon



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ULTRASONIC SENSOR

What it Does

- **Function:** Measures distance using ultrasonic waves
- **Output:** Distance measurement based on echo time

Potential Implementation

- **Proximity Sensors:** Detect presence of objects or people
- **Level Measurement:** Monitor liquid levels in tanks



Figure 8: Image courtesy of SparkFun



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BLUETOOTH MODULE

What it Does

- **Function:** Enables wireless communication between devices
- **Output:** Wireless data transfer

Potential Implementation

- **Remote Control:** Operate devices remotely
- **Wireless Data Transfer:** Send data between microcontrollers and smartphones

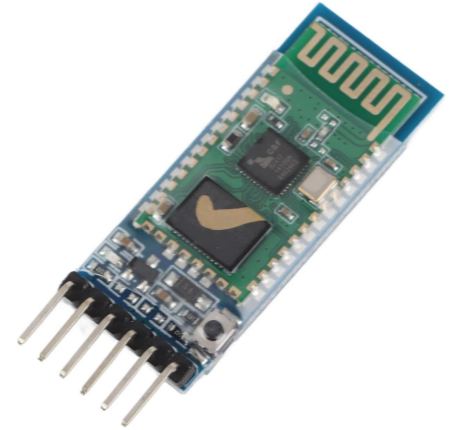


Figure 9: Image courtesy of Amazon



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CO2 SENSOR

What it Does

- **Function:** Measures carbon dioxide concentration in the air
- **Output:** Analog signal proportional to CO2 levels

Potential Implementation

- **Ventilation Control:** Adjust ventilation systems based on CO2 levels
- **Greenhouse Management:** Optimize conditions for plant growth



Figure 10: Image courtesy of Digikey



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IDBE IMPLEMENTATION

- Involve a diverse group of voices in the prototyping process
 - Helps ensure your solution is inclusive
- Consider how your design might affect people and society in the long run
 - Effects on the climate, marginalized groups, etc.

What challenges may you face when trying to balance business goals and ethical design practices? How can you balance the two?



Figure 11: Diverse Voices,
courtesy of LinkedIn



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ASSIGNMENT

Lab 1 Ideation Assignment (one .docx file):

- Identify and document challenges or inconveniences in:
- Your daily life
- Accessibility or disability issues faced by individuals
- Template is found on the EG Manual under Lab 1
- Due at 11.59 PM tonight on the EG website
- One .docx file with both RAD and HIR ideas



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Questions?



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ACTIVITY

Spin the Wheel - total 3 rounds

- Each round, there will be 3 components to be included in your prototype
 - Must include all 3 components in your design
 - Can include other components if wanted
- 10 minutes for discussion per round
- 2 minutes to present your ideas to the class after each round
- TAs will provide feedback on your idea



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ACTIVITY

Spin the Wheel - Round 1

- Discuss a prototype that can be used during **your time at college**



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ACTIVITY

Spin the Wheel - Round 2

- Form small groups with classmates in your major
- Discuss a prototype that can solve a **problem related to your major**



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ACTIVITY

Spin the Wheel - Round 3

- No limits! Come up with a brand new idea for a prototype.



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