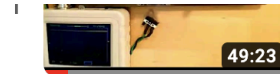


Please also see the index / topic finder below.

Lectures



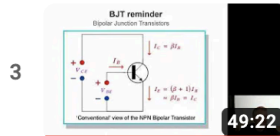
Lec 1 253 2023

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Lec 2a 253 2023

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Lec 2b 253 2023

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Soldering Workshop



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2 Soldering Theory

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3 Safety

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4 Tip preparation

ENPH 253 Core Lectures [AM] - Topic Finder - Video Links

[Here's the link to previous lecture slides and labs](#)

Topic	Start time	End time	Circuit exercise / video link	Circuit time
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Introduction: Lec 0 – 253 - 2023			Lecture 0 Video	
Introduction to Smart instruments	0:00	3:44		
Intro to STM32 “Blue Pill” microprocessor	3:44	6:00		
Intro to sensors used in ENPH 253	6:09	11:55		
Intro to motors, servos used in ENPH 253	11:55	15:25		
Example of sensor and motor use	15:25	17:37		
Intro to mechanical elements and stiffness	18:05	end		
Digital inputs: Lec 1 – 253 - 2023			Lecture 1 Video	
Using the Blue Pill	0:00	4:43		
Collision sensor: Digital input to blue pill	9:12	24:45		
Interrupts for digital sensing	25:06	1:22:00		
(Switch bounce and de-bouncing)	32:00	1:21:50		
((Schmitt Trigger))	40:10	1:07:15		
((311 Comparator, and open collector output. Tour of the data sheet)))	43:21	1:07:15	Homemade schmitt trigger	58:41
Reflectance Sensor as digital input	1:22:33	End	Reflectance sensor	1:25:48
Analog Inputs and Circuits: Lec 2a – 253 - 2023			Lecture 2a Video	
Infrared (IR) Detection	0:00	end		
IR Reflectance Sensor as an analog input	5:35	22:36		
(BJT transistors)	8:00	9:50		
(Photo transistor)	9:55	11:00		
BP Analog inputs	17:54	18:55		
Zener Diodes	18:55	22:05		
Code interface and implementation	22:57	34:45		
IR signal detection	35:00	end		
Making a beacon w AD2	35:30	45:20		
Intro to IR detection	45:50	end	IR detector	48:00
Analog Inputs and Circuits: Lec 2b – 253 - 2023			Lecture 2b Video	
Phototransistors	0:00	3:20	IR detector cont.	0:00
Analog circuits for signal processing	3:20	end		
OP amps and limitations	12:20	32:24	Filter circuit	43:30
Filtering	32:24	end		

Topic	Start time	End time	Circuit exercise	Circuit time
Motors: Lec 3 – 253 - 2023			Lecture 3 Video	
Analog output, D/A conversion	0:00	6:46		
Pulse width modulation (PWM)	6:46	26:09		
Motor drivers	26:09			

(Transistors - BJTs)	28:00	48:50	NPN transistor circuit	31:05
(Transistors – MOSFETs)	48:50	1:01:38	MOSFET circuit	57:30
(High power loads)	1:01:38	1:28:12	Inductive load circuit	1:03:35
(H Bridge driver)	1:28:12	end		
Control: Lec 4 – 253-2023			Lecture 4 Video	
Design Proposals	0:00	23:55		
Control theory	23:55	end		
PID tuning	36:28	end		
Noise and Shielding: Lec 5- 253 - 2023			Lecture 5 Video	
Shielding	3:00	6:00		
Ground loops	6:00	7:34		
Current returns and single point grounds	7:34	14:50		
Optical isolation	14:50	15:38		
Switched currents and twisted pair	33:00	end		
Additional Material				
Frequency detection - 2023			Frequency Detection Video	
- A discussion on how to perform frequency detection on an IR signal				
H bridge - 2023			H-Bridge Video	
- Debugging walk-through for H Bridge				
Tape following stability - 2023			Tape Following Video	
- A discussion on theoretical stability in tape following				