

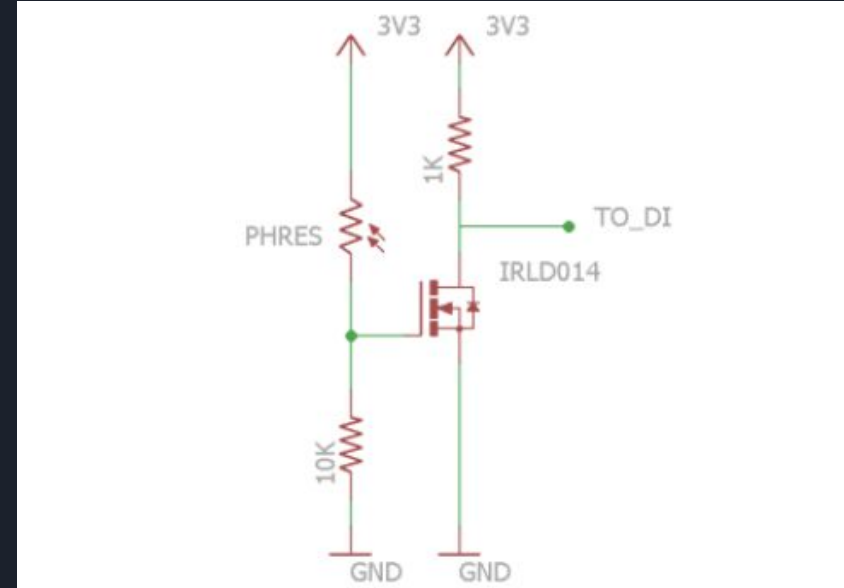
A decorative graphic on the left side of the slide consists of two overlapping parallelograms. The front one is blue and the back one is a light green. They are positioned diagonally, with the blue one partially covering the green one.

# Final Project Presentation

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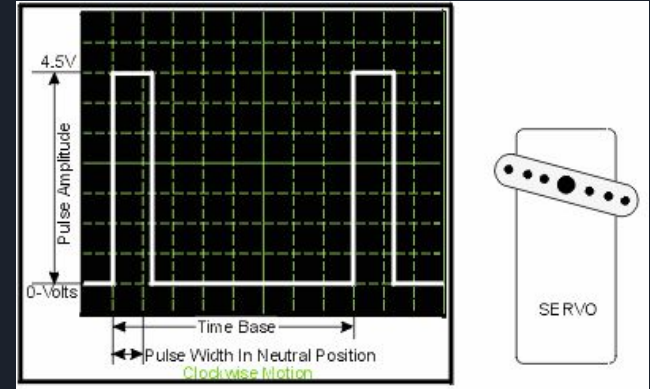
# Task 1: Light Sensing

- Photoresistor increases resistance in darkness
- Leads to less current flowing through the 10K resistor
- This turns the transistor off, breaking the connection with ground
- Output becomes high; this resets the processor

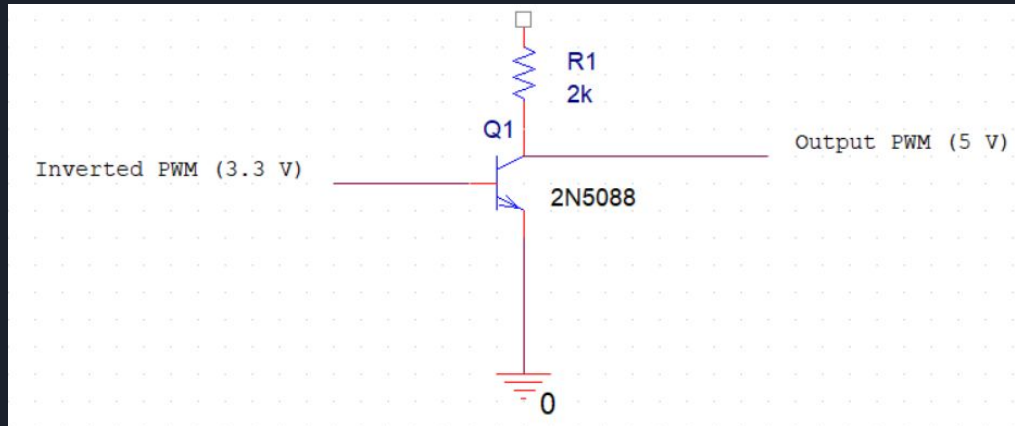


## Task 2: Robotic Arm Movement

- 5 V, 50 Hz servomotor standard
- Use clock divider to switch from 50 MHz processor clock
- Use voltage amplifier to scale voltage up from 3.3 V FPGA output to 5 V servomotor power standard
- Range of pulse: 500 - 2500 microseconds (corresponds to angles 0 to 180 degrees).  
Invert for use with npn transistor



























<http://www.pages.drexel.edu/~kws23/tutorials/PWM/PWM.gif>



# Task 3: Robotic Arm IR Trigger

- Use the IR remote to trigger the robotic arm action
- IR module stores most-recently-pressed keycode in register file
- This value can be referenced to determine which routine the arm performs

Key	Key Code	Key	Key Code	Key	Key Code	Key	Key Code
	0x0F		0x13		0x10		0x12
	0x01		0x02		0x03		0x1A
	0x04		0x05		0x06		0x1E
	0x07		0x08		0x09		0x1B
	0x11		0x00		0x17		0x1F
	0x16		0x14		0x18		0x0C

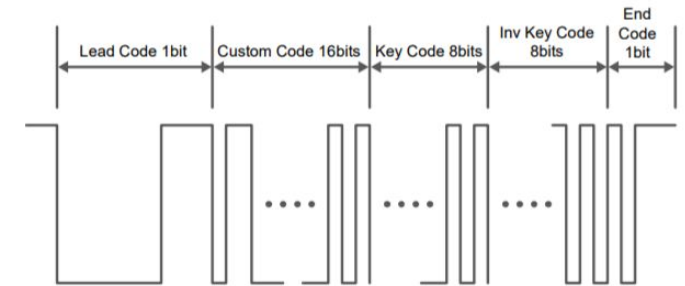


Figure 6-19 The transmitting frame of the IR remote controller

# Task 4: IR Trigger for VGA

- Controlled color of VGA based on status of light and remote button pressed
- Color values for buttons (in hex)

- 7aff33
- ff0000
- ffff00
- 00ff00
- 0000ff
- ff00ff
- 9a00ff
- 000000
- 111111

Key	Key Code	Key	Key Code	Key	Key Code	Key	Key Code
	0x0F		0x13		0x10		0x12
	0x01		0x02		0x03		0x1A
	0x04		0x05		0x06		0x1E
	0x07		0x08		0x09		0x1B
	0x11		0x00		0x17		0x1F
	0x16		0x14		0x18		0x0C

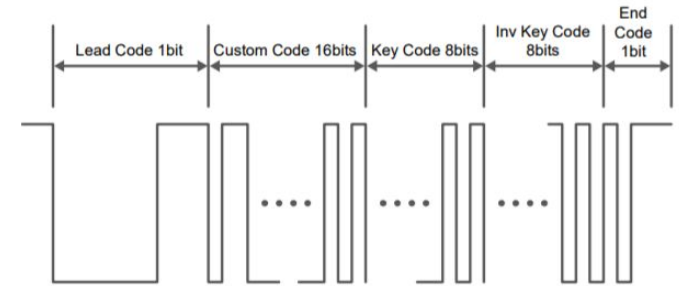


Figure 6-19 The transmitting frame of the IR remote controller



# Major Challenges

- Getting the robot arm to move
  - Servomotor voltage, frequency, width standards
  - Voltage amplification
  - Processor timing
- Handling IR data
  - Processor timing
  - Storing keypresses