

Panel 1

Prior to Le17

IR Circuits

(and a little bit about CDS cells)

ME430 Mechatronics

1

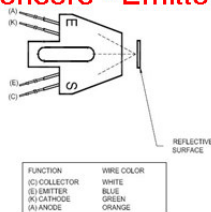
Panel 2

What light related devices will we be using?

Break Beam Circuit - Emitter shining directly at detector (slot sensor)



Tape Sensors - Emitters reflecting off the ground to detector



Photoresistors - CdS cell often used to detect light or with laser pointer



2

Panel 3

Analog-to-Digital Conversions (ADC)

The ADC hardware peripheral allows you to read an analog voltage.

The ADC takes a voltage reading (usually 0.00 volts to 5.00 volts) and converts it to a integer number that ranges from 0 to 1023.

The code for using the ADC requires to Open the ADC then any time you want to read the analog voltage there are four steps:

1. Select the Analog channel (the pin you want to read)
2. Start the ADC conversion
3. Wait for it to finish
4. Read the ADC result (and store it to a variable)

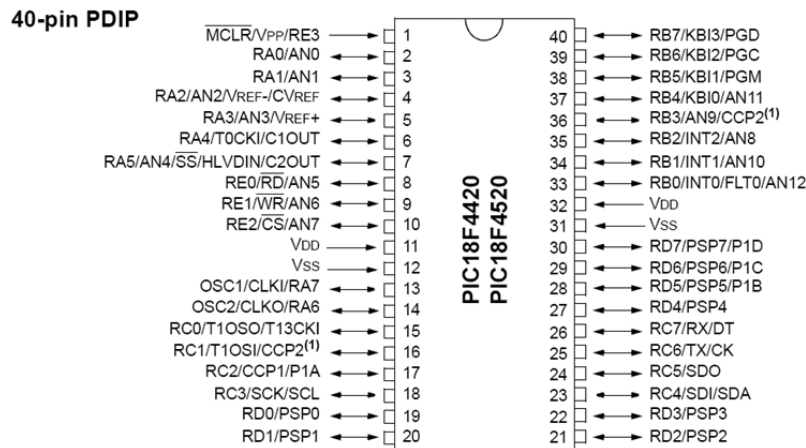
Other commnets:

Analog voltage readings are very useful when using sensors

There are 13 pins that can be used for Analog inputs but really only one can be used at a time

Panel 4

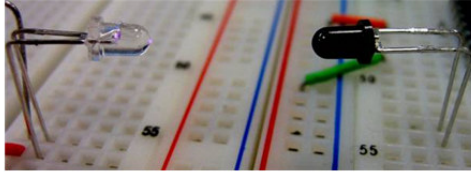
Where will I be connecting the signals?



Panel 5

What is an IR Emitter and an IR Detector?

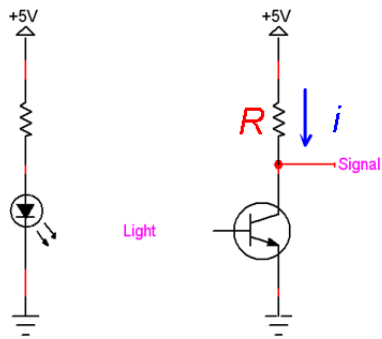
Break Beam Circuit - Emitter shining directly at detector



5

Panel 6

IR Emitter and Detector circuit (Ideal case)

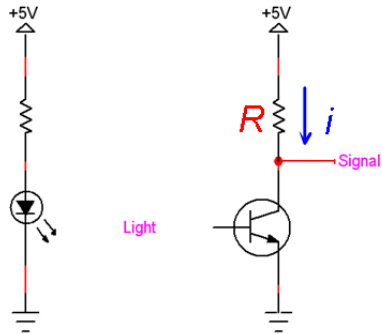


Input	V
Light	
Dark	

6

Panel 7

Everything looks like the light is ON, regardless



Problem:
Always reading a LOW voltage

Solution:
Change the resistor size

Input	V
Light	
Dark	

Light On, collector current = 15 mA
(15 mA is how much it would allow, but no voltages can go negative)

Dark, collector current = 0.8 mA

Current resistor = 5 k ohms

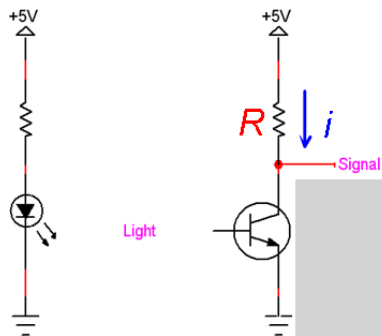
$$V_{\text{signal}} = 5 - iR$$

What value of R might work? _____

7

Panel 8

Your turn



Problem:
Always reading a HIGH voltage

Solution:
Change the resistor size

Input	V
Light	
Dark	

Light On, collector current = 3 mA

Dark, collector current = 0.2 mA

Current resistor = 470 ohms

$$V_{\text{signal}} = 5 - iR$$

What value of R might work? _____


8


Panel 9

Trouble keeping everything straight

Light

Dark

Transistor is 
 (connects GND to signal line)

Transistor is 
 (connects GND to signal line)

Signal to PIC is 

Signal to PIC is 

ADC readings around 


ADC readings around 


In lab:

Turn  LEDs

In lab:

Turn  LEDs

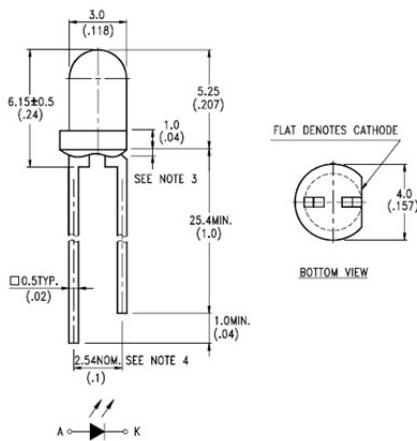
If it's ALWAYS ON your resistor is  because even small currents cause large voltage drops with large resistors.

If it's ALWAYS OFF your resistor is  because even large currents can't cause large voltage drops with small resistors.

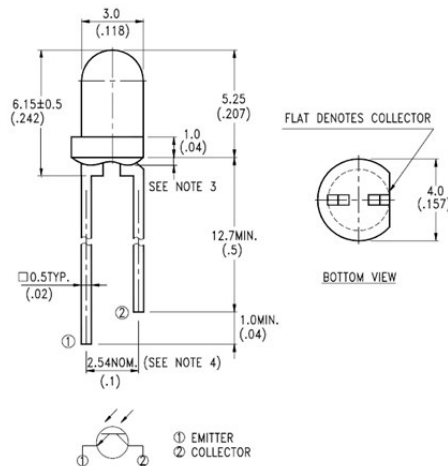
Panel 10

Reference for wiring

IR Emitter



IR Detector



Panel 11

Slot sensors

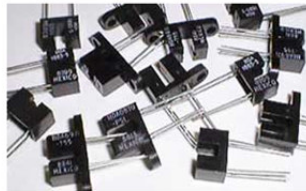
[Home](#) > [Infrared Items](#) > [Slot Interrupters](#)

Sharp GP1A50HR Opic Photointerrupter



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Opto Interrupters



Item Number : GP44

Unit Price: \$2.49

Quantity

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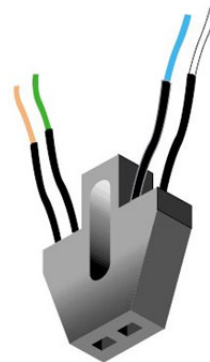
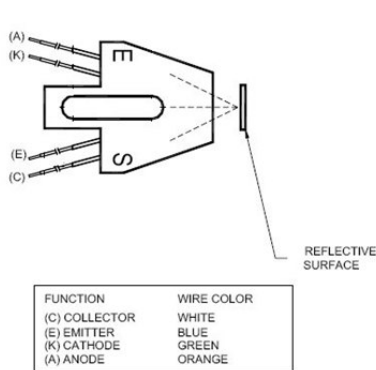
Detailed Description

Package of high quality prime opto interrupters. These are long lead with markings on them. Most are made by Honeywell. Several different types in each package. Package of 20. CODE 7: 100% Prime Parts. Stock # GP44

Panel 12

How are tape sensors different?

Tape Sensors - Emitters reflecting off the ground to detector



Panel 13

Using a CdS cell (Photoresistor)

Light from beam of a laser pointer



Determine if the room is dark

