Panel 1

Prior to Le17

IR Circuits

(and a little bit about CDS cells)

ME430 Mechatronics

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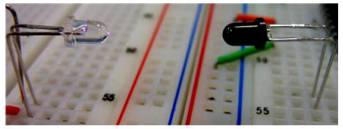
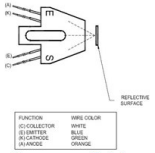
Panel 2

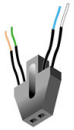
What light related devices will we be using?

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

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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

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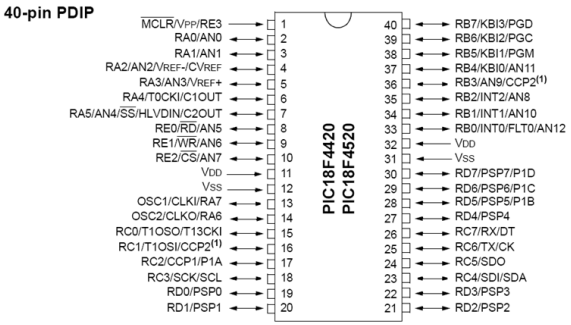
Panel 4

Where will I be connecting the signals?



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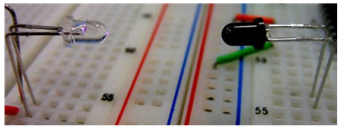
Panel 5

What is an IR Emitter and an IR Detector?

Break Beam Circuit - Emitter shining directly at detector



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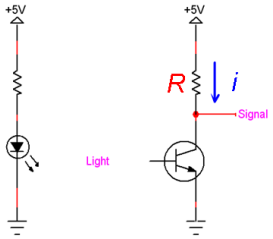
Panel 6

IR Emitter and Detector circuit (Ideal case)



Input	V
Light	
Dark	

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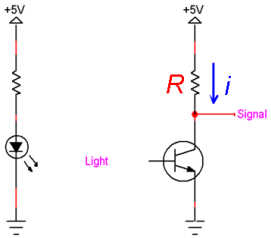
Panel 7

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

$V_{signal} = 5 - i R$

What value of R might work? _____

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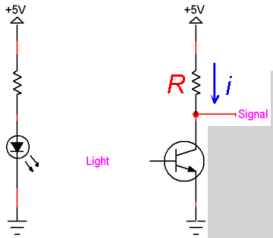
Panel 8

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

$V_{signal} = 5 - i R$

What value of R might work? _____

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

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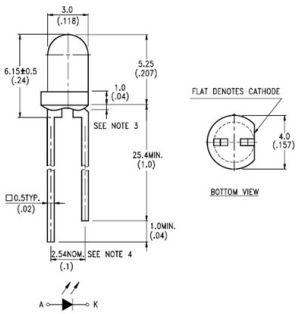
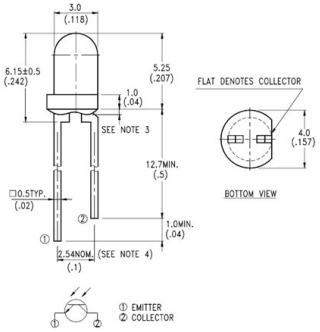
Panel 10

Reference for wiring

IR Emitter



IR Detector



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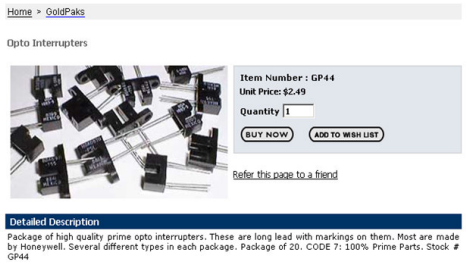
Panel 11

Slot sensors



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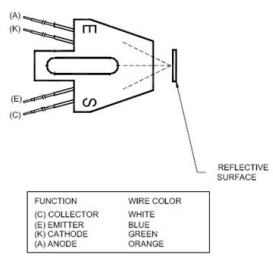
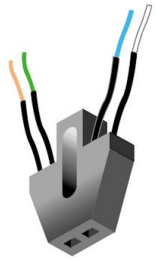
Panel 12

How are tape sensors different?

Tape Sensors - Emitters reflecting off the ground to detector



FUNCTION	WIRE COLOR
(C) COLLECTOR	WHITE
(E) EMITTER	BLUE
(K) CATHODE	GREEN
(A) ANODE	ORANGE



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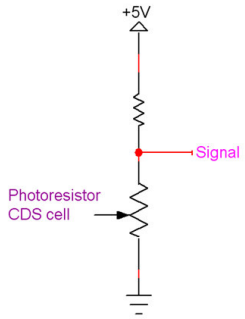
Panel 13

Using a CdS cell (Photoresistor)

Light from beam of a laser pointer



Determine if the room is dark

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