

## Week 5 Lab

### Light Sensors

Light sensors are one example of variable resistors

When a resistor presents a variable resistance, there is a classic technique for interfacing with a microcontroller.

This is done by creating voltage division by a fixed resistor and the variable resistor. Put this in to an A/DC port and compare to a threshold value.

The HC11, as a CMOS microcontroller, will not allow current to flow into its inputs.

The A/D inputs are provided along J1.

### A/D Converter Review

When you write a byte to the ADCTL register, a sample begins.

ADCTL							
7	6	5	4	3	2	1	0
CCF	-	SCAN	MULT	CD	CC	CB	CA

### Single time sample on pin ADC4 (AN4):

```
LDAA    #%00000100
STAA    ADCTL
```

When you put a 0 on the CCF, you are commanding the A/DC to get a sample.

With a 2 MHz clock, it completes a sample every 16 microseconds. It actually gives you four so that you can average them. The results are put into ADR1, ADR2, ADR3, ADR4. The CCF gets set to a 1.

The ADCTL, then, can be polled using the following loop:

```
L1:     TST    ADCTL
        BPL    L1
```

The resolution of the least significant bit (LSB) is  $\frac{V_{RH} - V_{RL}}{256}$ . Since our  $V_{RH}$  is +5V and our  $V_{RL}$  is 0V, this value is 19.6 mV.

## This Week's Tasks

### Basic Light Seeking Behavior

Turn off all other processes and write a process that seeks the light.

- a. Robot starts driving forward until it is about 2 feet from the light source, at which point it stops.
- b. If the flashlight moves closer to the robot, it backs up.
- c. If the flashlight moves further from the robot, it moves forward.

If the light stops moving, the robot stops moving.

This can be done with a single eye on or both eyes on.

### **Light Following Behavior**

Put on a left and a right eye, mounted to the robot like bug eyes. They should be mounted, not hanging loose and flopping like antennas.

They should be mounted at the width of the both of the robot so they appear more like eyes or headlights which are balanced across the width of their surface.

If the light moves left, you turn left. If the light moves right, you turn right.

If you lose the light, you should seek again. This can be done by:

1. Moving forward
2. Stopping and spinning (panic mode)