# Jeff Page
Line Following Robot

Robot with:

- **Chassis, 4 motors and wheels**
- **Infrared line sensor with 0-5V output**
- **10 V and 6 V power source**
- **Dragon 12- Light Board**
- **H bridge**
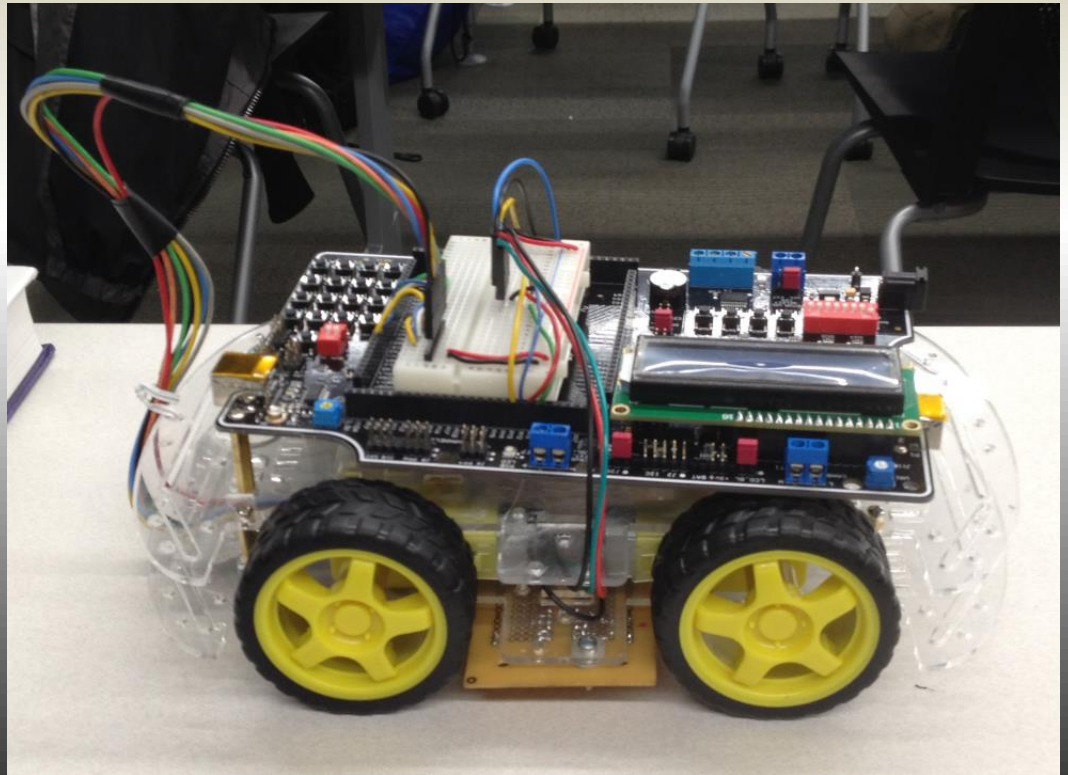
Infrared sensor for line detection

- **Used an infrared emitter and phototransistor to measure the infrared reflectivity of a surface.**

- **The voltage output ranged from 4.8 to 4.95 volts depending on whether the sensor was on white tape or on the carpet.**
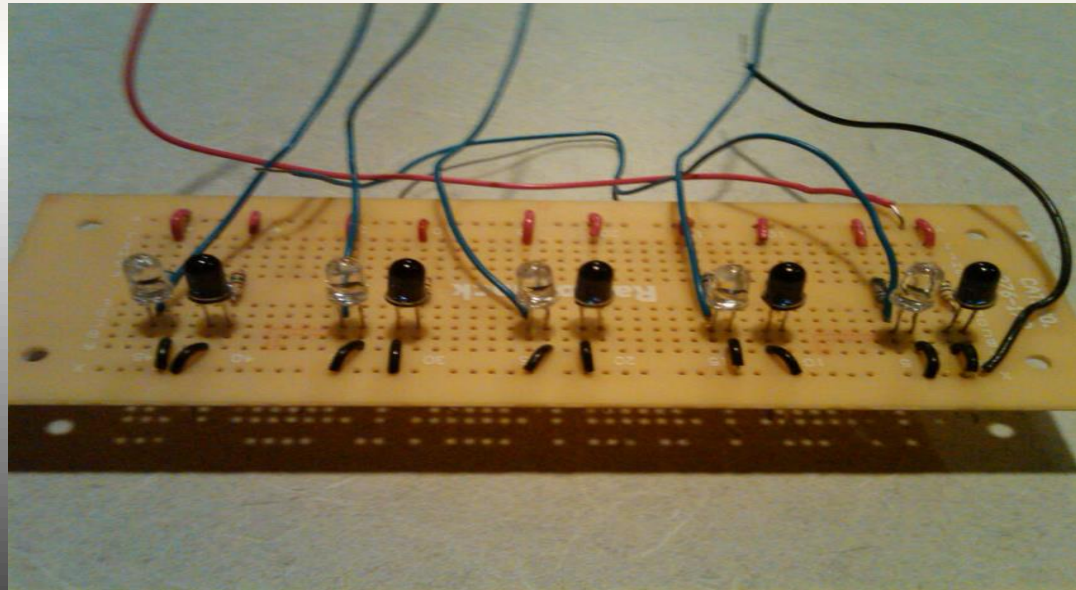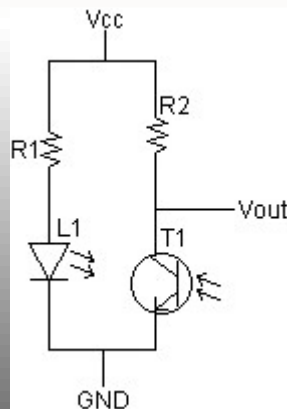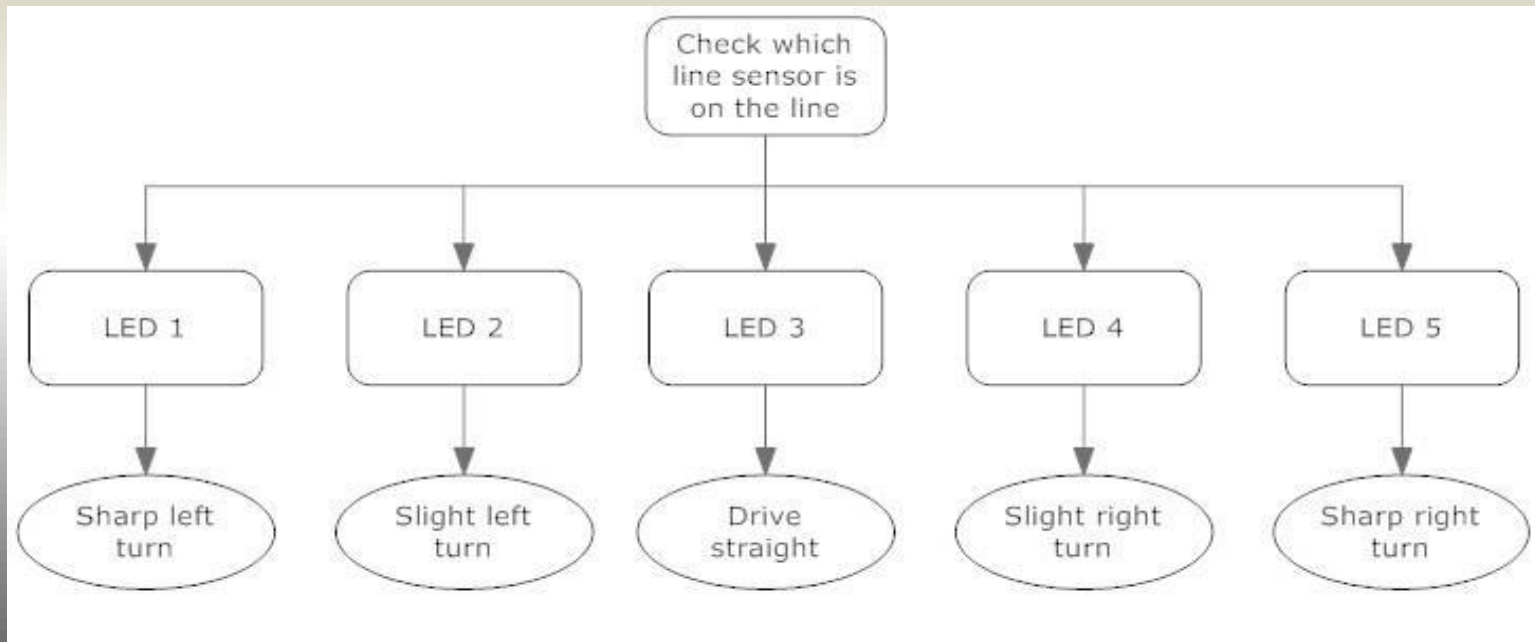
Infrared sensor for line detection

I designed an op amp to provide a 0-5v output. This sensor is used as an input for the HSC12 and then the Analog to Digital converter is used to determine the voltage level of each sensor.

A comparator is utilized in the C code to decide which sensor in over the line.
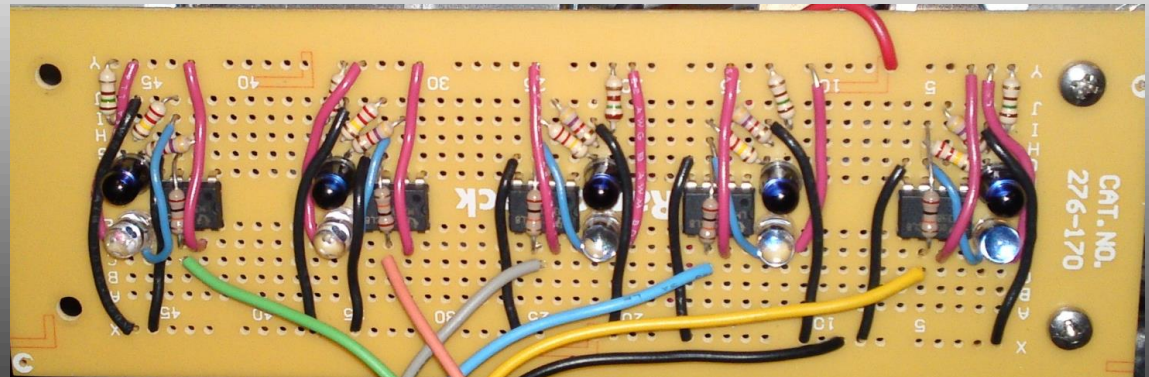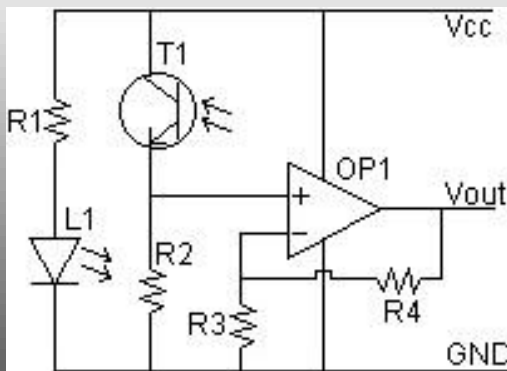
Turning car based on the LED status

C code

In the C code I completed the Analog to Digital conversions and compared the output of the sensor values to determine which sensor has the highest input. Then with the highest value senor I light the LEDs and command the motor torque to drive the vehicle right or left.

Assembly code

In the assembly code I wrote the motor control function for 2-4 motors so that it may be utiizeded by the C code.

```
led[0] = ATD1DR0;
led[1] = ATD1DR1;
led[2] = ATD1DR2;
led[3] = ATD1DR3;
led[4] = ATD1DR4;
/PORTB = 0x01;

if(led[0] > led[1] && led[0] > led[4] && led[0] > led[2] && led[0] > led[3]){//&&
}else if(led[1] > led[2] && led[1] > led[3] && led[1] > led[4] && led[3] > led[0])
}else if(led[2] > led[1] && led[2] > led[3] && led[2] > led[4] && led[2] > led[0])
}else if(led[3] > led[1] && led[3] > led[2] && led[3] > led[4] && led[3] > led[0])
}else if(led[4] > led[1] && led[4] > led[3] && led[4] > led[2] && led[4] > led[0])
}
```

H Bridge

The board did not have enough current to drive the motors so I used an H-bridge to drive the motors. Using a PWM signal I can send the H-bridge a signal so that it can feed the motors with a higher power level than what the board can. The H Bridge has multiple modes. I used the dual-analog mode to drive the motors. 0V for reverse, 2.5V stop the motor and 5V runs the motor forward. I used a PWM to achieve the correct voltage output from the PP0/1 ports and into the H bridge.