

# Project Proposal:

## Line Follower Robot

### Group Members:

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### Project Objective & Introduction:

Our robot is a simple line follower which detects and follows a line drawn on the floor with the aid of IR sensor.

### Project Specifications:

Component	Quantity
Infra-Red Sensor	5
Infra-Red Receiver	5
Potentiometer (Variable Resistor)	5
Comparator (LM324)	5
LED	5
Dual H-Bridge(L298)	1
We are still working on our algorithm to process the sensor's outputs. So the components required for the processor are not yet included in the list. (It may be implemented using a ROM/Mux/Logic Gates)	
Resistors	As Needed
Capacitors	As Needed
Diodes	As Needed
Transistors (NPN)	As Needed
555 Timer	1
Counter	1
Comparator (LM339)	1
DC Motor	1
Power Supply	1

## Project Deliverables:

- Robot would be able to follow black line.
- Robot would be able to accomplish above mentioned task without jittering.

## Project Modules and Design Overview:

**Infra-Red Sensor:** Sensor consists an array of IR emitters and detectors coupled with comparators that would help in keeping trace of a black line on a white background by giving logic high and low based on whether the sensors detects the track or not.

**Comparator:** The voltage out of Infra-Red sensor would be compared to a threshold voltage using a comparator.

**Processor:** Output from the sensors is fed to the processor which processes the data and modulates the PWM accordingly. We are still trying to improve our processor's algorithm and have yet to figure out the details of the processor. But the basic gist is that if the right (/left) sensors detects the track, processor changes the input to the PWM which in turn reduces the duty cycle of right(/left) motor and causes the robot to turn right(/left).

**PWM:** Following the processors command, PWM slows down the desired motor to turn the robot in the direction of the track.

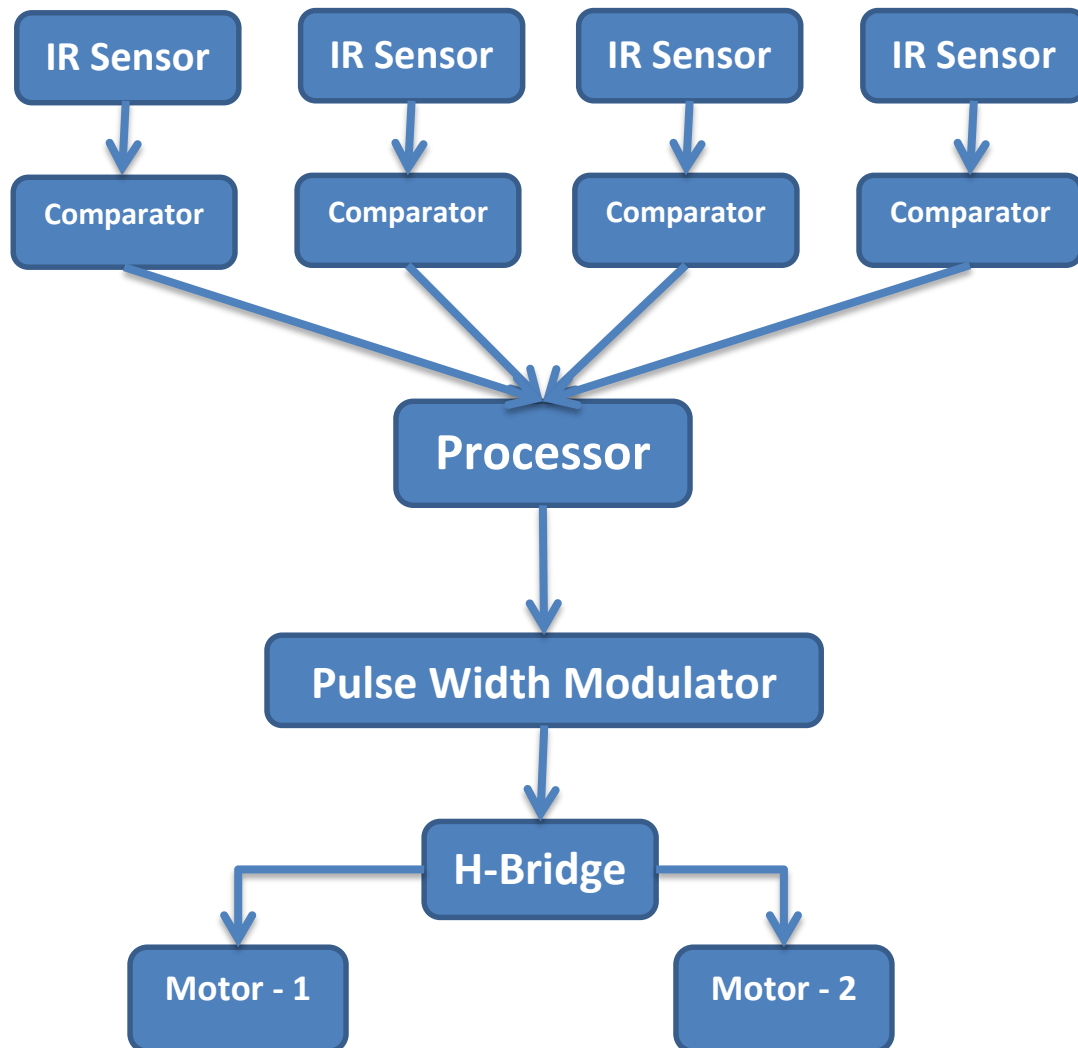
(PWM) Pulse width modulation is a digital modulation technique in which width of the pulse is varied according to requirement based on modulator signal information. The average value of voltage fed to the motor is controlled by changing the duty cycle at a fast pace. The longer the duty cycle is, the higher the power supplied to the load. The main reason for choosing PWM for controlling the speed of the motor is that the power losses in switching the voltage is very low.

Our PWM would consist of 555 timer, counter, and comparator.

**H-Bridge:** We will use a dual H-bridge to drive two motors with the potential provided by the PWM generator.

**Motors:** A total of 2 motors will used to move the robot using a Dual-Bridge.

**Block Diagram(s):**



**Project Breakdown (3 Check points and Final Submission):**

**Check Point-1 Target:**

PWM on a breadboard, using a 555 timer, counter and a comparator.

**Check Point-2 Target:**

We would have a working design of Sensors and Processor on ISIS, which would later be printed on a PCB.

**Check Point-3 Target:**

We would get the Sensor and Processor Design etched on a PCB, ready for assembly.

**Check Point -4 Target:**

Making the robot chassis and Assembly: Putting it all together.

**If Time Permits:**

Adding a 360 rotation function which could be called when robot encounters an obstacle or reaches end of track.