Ahsanullah University of Science & Technology

Department of Electrical & Electronic Engineering

Measurement & Instrumentation Project

Course No. : EEE-2211

Project Topic : Maze Solver Robot

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Submitted by –

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Sudip Maitra	(11.02.05.031)
Mohaiminul Hasan Maruf	(11.02.05.032)
S.M. Mohon Hasan Rabby	(11.02.05.036)
Miftahul Islam Shaikat	(11.02.05.048)

Our circuit uses IR to detect obstacle. A 555 IC to control the input for the motor. A L293 motor driver is used to drive the motors. The body is made of light yet strong hard-board. The circuit is built on a breadboard although the sensors were soldered on a piece of vero-board. The circuit is as follows:
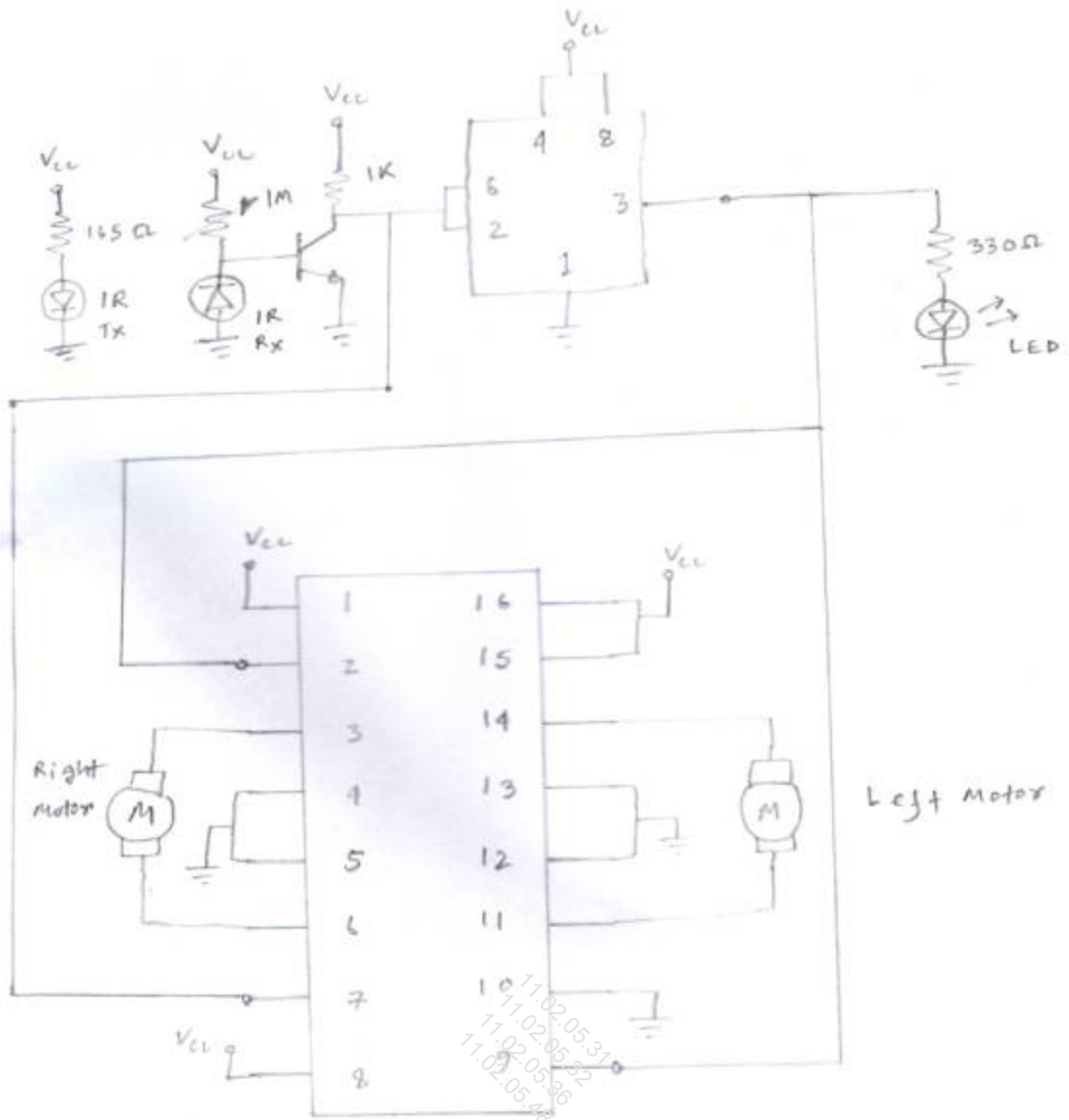
The base to emitter voltage is provided by the voltage drop across the photo-diode. A IR transmitter is used to emit infra-red light. IR reflects back from any surface (except black) and the photo-diode receives it. The resistance of the photo-diode decreases when IR is incident. When the photo-diode receives IR (detects an object in front) the voltage drop across the photo-diode drop below 0.7V which turns off the transistor and collector to emitter voltage (V_{CE}) increases to almost V_{CC}. A POT is used to calibrate the photo-diode to fall below 0.7V once IR is incident. The voltage from collector is fed to 555's pin2 and pin6. V_{CE} is obviously greater than 2/3 V_{CC} and output pin 3 is pulled low. The output from pin 3 is fed to the motor driver input. The right motor is connected between pin 3 & 6. The Enable pin 1 is always high. Input pin 2 is connected to pin 3 of 555. Input pin 7 of L293 is connected to collector of BC547. So, when the IR sensor detects an obstacle in front, the base emitter voltage drops below 0.7V. V_{CE} rises to V_{CC}, pin 3 of 555 goes low. Input pin2 gets low and input 7 of the motor driver gets high causing the motor to rotate in the opposite direction. Enable pin 9 also connects to Pin 3 of the 555, so the left motor stops moving.

Troubleshooting:

When the sensor was placed directly in front of the body it could not clear the corner because once the car turned a bit the distance between it and the wall became larger so the car kept moving forward instead of turning which caused it to crash into the wall and stall. This problem was resolved by placing the sensor at an angle so that the sensor could always sense the wall no matter what the position the car is in. The sensor board is not attached to the body permanently, it's is connected by two flexible wires so that it's position can be adjusted. The problem & the solution both are illustrated though some sketches below:
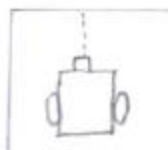
IR bounces back from the well & Photo-diode receiver it.
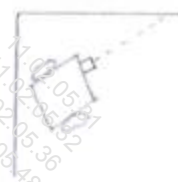
After turning a bit the distance between Photo-diode & wall increases which gets out of the range causing it to crash into the side wall.
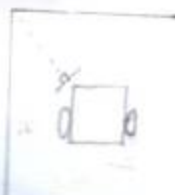
Sensors are placed at on angle

The sensors stay well within range when the robot turns.