

Ahsanullah University of Science & Technology
Department of Computer Science & Engineering



Gesture Recognition Robot

Microcontroller Based System Design(CSE 3216)

Submitted to:

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Overview:

In this microprocessor-based lab, our project is about a robot that can be controlled without a joystick. With our hand movement, we can control the robot.

It's easy to control a robot with a hand instead of a joystick. So, our primary purpose is to make that possible and make it able to detect hand movement with a different position. Our project has an accelerometer to detect hand movement as a sensor, and Arduino is used as the programming platform.

Instruments:

1. ADXL335 Accelerometer
2. Arduino Uno(Atmega32)
3. HT12E Encoder IC
4. HT12D Decoder IC
5. L293D Motor Driver IC
6. General-Purpose PCB
7. 12v/9v Geared Motor
8. 12/9v Power Supply
9. 7805 Voltage regulator
10. Robot Chassis (Optional)

Features:

Done:

With hand gestures, the robot can move,

- ❖ Forward
- ❖ Backward
- ❖ Right
- ❖ & can be stopped.

Undone:

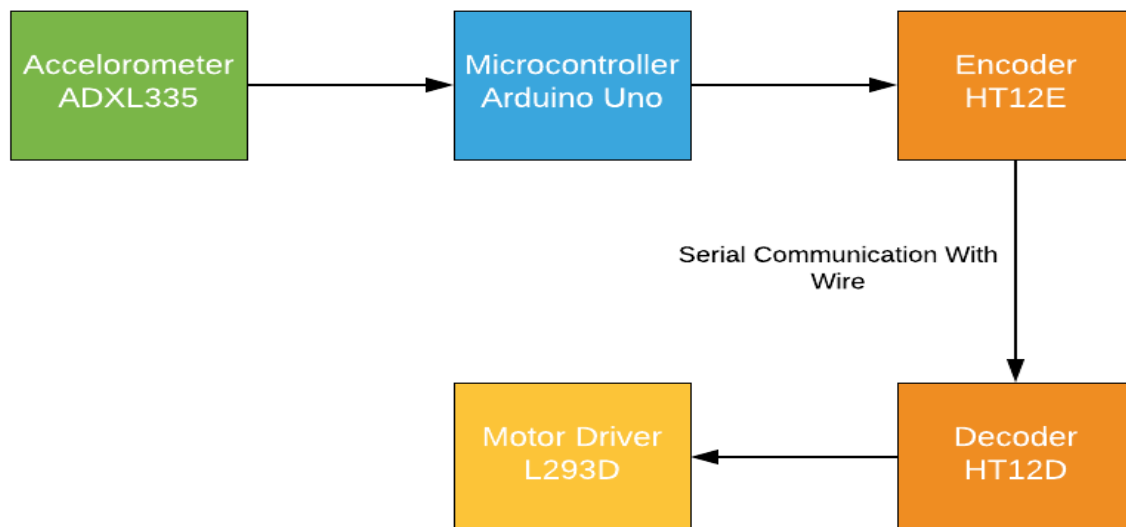
- ❖ Not wireless

Working Principle:

The brain of the robot is an Arduino Uno(Atmega32). It is controlled with code. The gestures made by a hand is recognized by the acceleration measuring device called accelerometer (ADXL335).

The Accelerometer reads the X Y Z coordinates when we make hand gestures. It then sends the X Y Z coordinates to the Arduino. We don't need the Z-axis. We need only X and Y. The Arduino checks the values of coordinates and sends 4bit data to the Encoder IC in accordance with the data received from the accelerometer. The Encoder passes the data to Decoder with the help of a serially connected wire. The 4bit data sent by the Encoder to the Decoder is decoded and passed to Motor Driver IC. Later the motor driver makes the decision to turn the two motors in the required direction.

Work Flow:



The diagram illustrates the hardware setup for the project. It features an **HT12E** encoder module connected to the digital pins of an **Arduino Uno (Rev3)**. The encoder's pins are connected as follows: Pin 1 to GND, Pin 2 to 5V, Pin 3 to D13/SCK, Pin 4 to D12/MISO, Pin 5 to D11/PWM/MOSI, Pin 6 to D10/PWM/SS, Pin 7 to D9/PWM, Pin 8 to D8, Pin 9 to D7, Pin 10 to D6/PWM, Pin 11 to D5/PWM, Pin 12 to D4, Pin 13 to D3/PWM, Pin 14 to D2, Pin 15 to D1/TX, and Pin 16 to D0/RX. A 1MΩ resistor (R1) is connected between Pin 3 and Pin 4. The Arduino is powered by a 5V supply connected to its VIN pin. The **ADXL335** Breakout Accelerometer Triple Axis module is connected to the Arduino's I2C pins (A4/SDA and A5/SCL) and its own VCC and GND pins. The module's pins are connected as follows: Pin 1 to GND, Pin 2 to VCC, Pin 3 to A4/SDA, Pin 4 to A5/SCL, Pin 5 to GND, Pin 6 to VCC, Pin 7 to A0, Pin 8 to A1, Pin 9 to A2, Pin 10 to A3, Pin 11 to A4, Pin 12 to A5, Pin 13 to GND, Pin 14 to VCC, Pin 15 to A0, Pin 16 to A1, Pin 17 to A2, Pin 18 to A3, Pin 19 to A4, Pin 20 to A5, Pin 21 to GND, Pin 22 to VCC, Pin 23 to A0, Pin 24 to A1, Pin 25 to A2, Pin 26 to A3, Pin 27 to A4, Pin 28 to A5, Pin 29 to GND, Pin 30 to VCC, Pin 31 to A0, Pin 32 to A1, Pin 33 to A2, Pin 34 to A3, Pin 35 to A4, Pin 36 to A5, Pin 37 to GND, Pin 38 to VCC, Pin 39 to A0, Pin 40 to A1, Pin 41 to A2, Pin 42 to A3, Pin 43 to A4, Pin 44 to A5, Pin 45 to GND, Pin 46 to VCC, Pin 47 to A0, Pin 48 to A1, Pin 49 to A2, Pin 50 to A3, Pin 51 to A4, Pin 52 to A5, Pin 53 to GND, Pin 54 to VCC, Pin 55 to A0, Pin 56 to A1, Pin 57 to A2, Pin 58 to A3, Pin 59 to A4, Pin 60 to A5, Pin 61 to GND, Pin 62 to VCC, Pin 63 to A0, Pin 64 to A1, Pin 65 to A2, Pin 66 to A3, Pin 67 to A4, 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to GND, Pin 398 to VCC, Pin 399 to A0, Pin 400 to A1, Pin 401 to A2, Pin 402 to A3, Pin 403 to A4, Pin 404 to A5, Pin 405 to GND, Pin 406 to VCC, Pin 407 to A0, Pin 408 to A1, Pin 409 to A2, Pin 410 to A3, Pin 411 to A4, Pin 412 to A5, Pin 413 to GND, Pin 414 to VCC, Pin 415 to A0, Pin 416 to A1, Pin 417 to A2, Pin 418 to A3, Pin 419 to A4, Pin 420 to A5, Pin 421 to GND, Pin 422 to VCC

The diagram shows two separate circuit sections. The left section is a 7805 voltage regulator (IC1) powered by a 12V source. It has two 100µF capacitors (C1, C2) for input and output filtering. The output (VO) is connected to a resistor (R1) and an LED (LED1). The right section is an L293D motor driver (IC2) powered by a 12V source. It has two 100µF capacitors (C1, C2) for input and output filtering. The output (VO) is connected to a resistor (R1) and an LED (LED1). The L293D is connected to two motors (M1, M2) and a 50K resistor (U1) connected to an Encoder.

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Pictures:

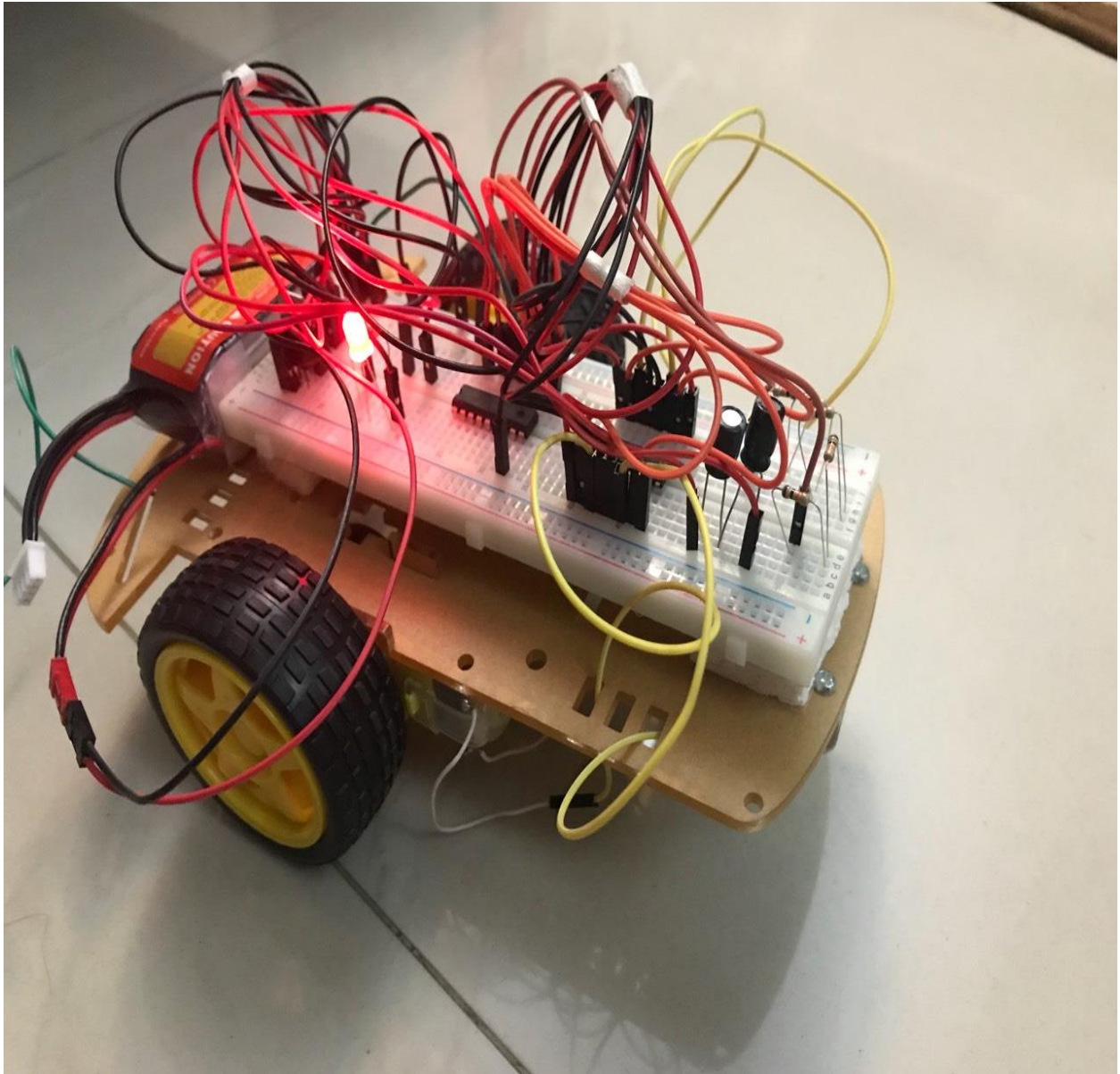


Figure 3: Receiver Robot

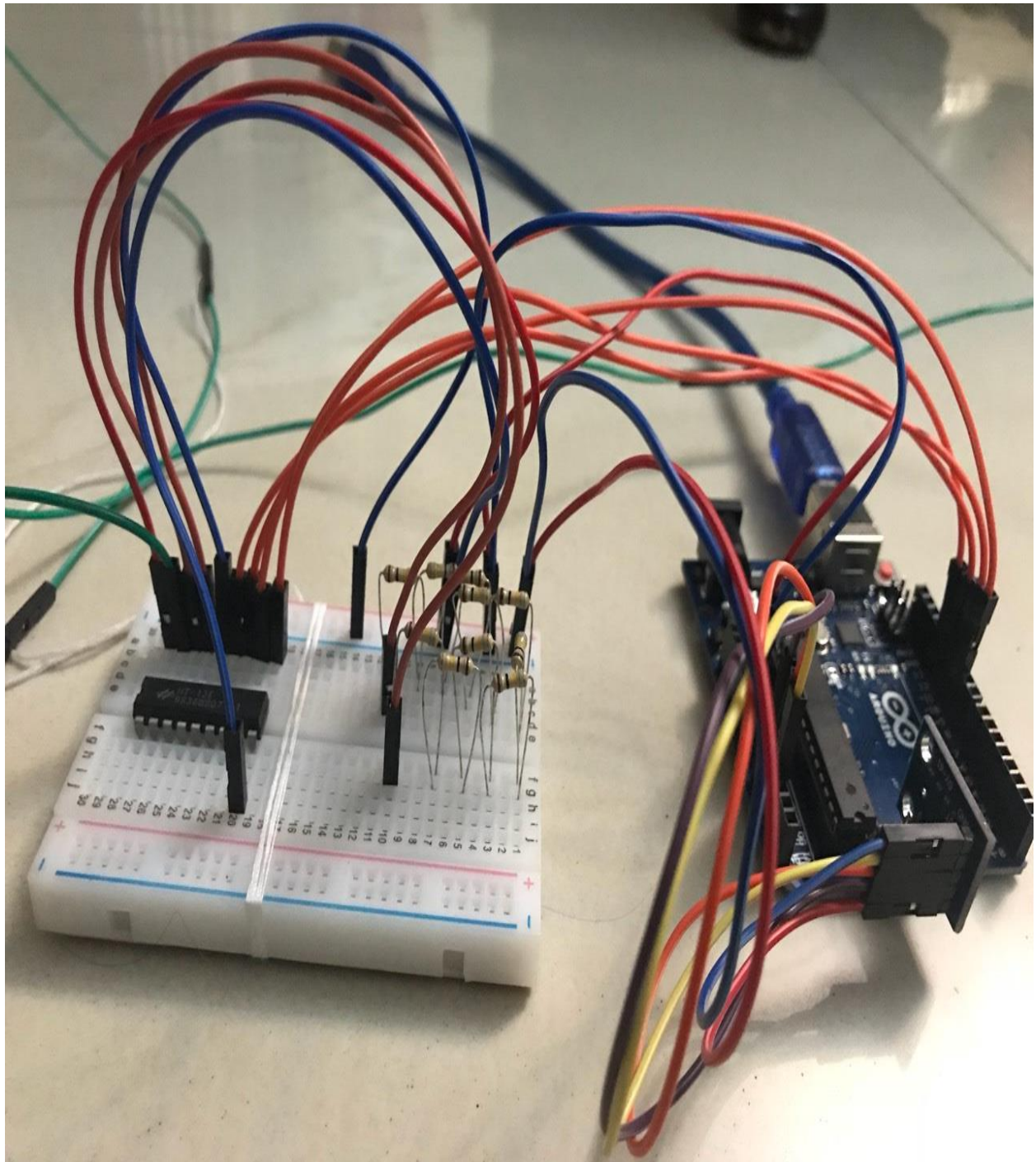


Figure 4: Transmit with Arduino

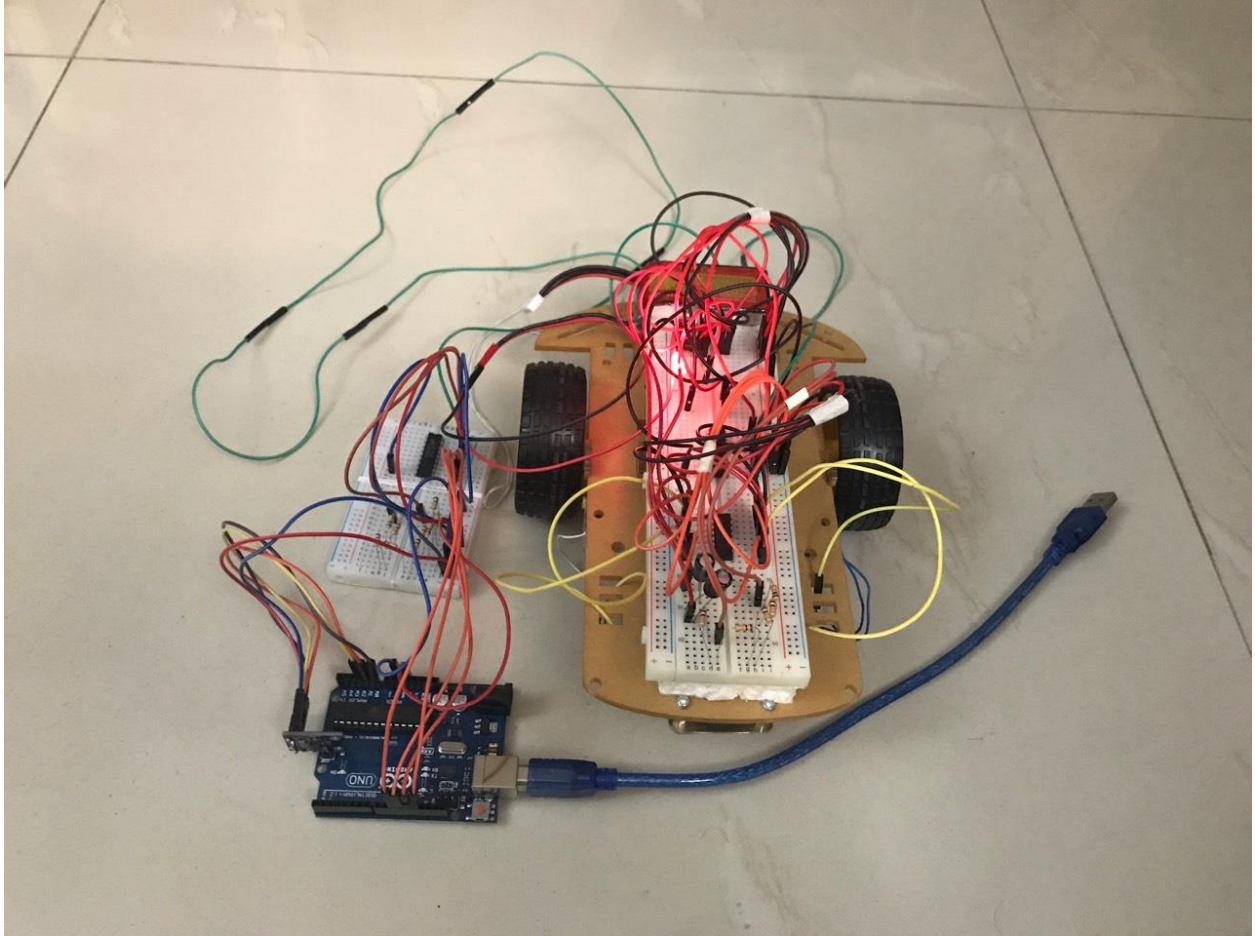


Figure 5: Full Project

Conclusion:

Our project is not wireless. So, our main future plan is to make it wireless using a transmitter and receiver module.

In the future, we are planning to use a video camera which will be placed in front of the robot to capture videos.