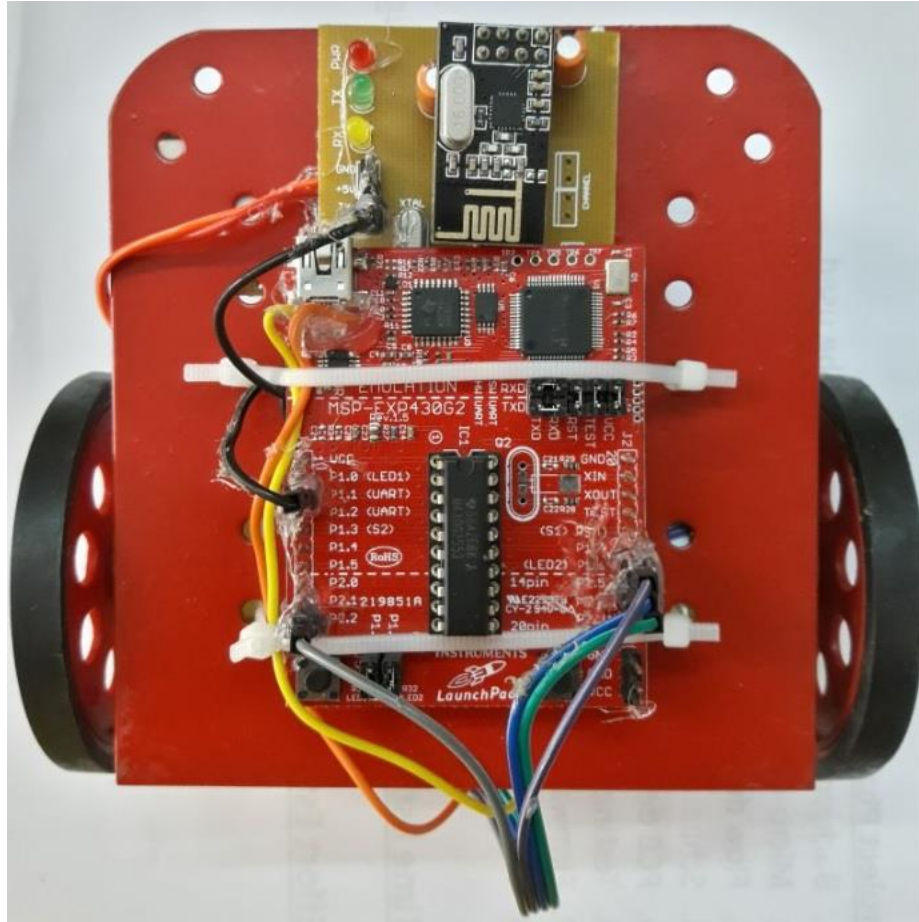


ECE 511: PROJECT REPORT

GESTURE CONTROLLED RC CAR



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TABLE OF CONTENTS

Sr. No	Contents	Page. No
1	Abstract	3
2	Motivation	3
3	Solution	3
4	Description	4
5	Flowchart	5
6	Results and Conclusion	6
7	Appendix	7

TABLE OF FIGURES

Sr. No	Contents	Page. No
1	Block Diagram	1
2	Transmission Flowchart	6
3	Reception Flowchart	6
4	Transmitter Schematics	7
5	Receiver Schematics	8

1. Abstract:

The aim of the project is to develop a gesture controlled device that can recognize commands through hand gesture and provide desirable result in the environment. For demonstration purposes, we are going to develop a Gesture Controlled RC Car using MSP430.

2. Motivation:

We as kids have always been fascinated by a remote-controlled car. This has been the root cause of motivation for coming up with the project to build something that would be interesting as well as challenging to implement. The whole idea of implementing something like a RC car sounds cool and the finished product looks simple, but it was mixed with lots of challenges and complex interfacing which motivated us towards in depth learning.

3. Solution:

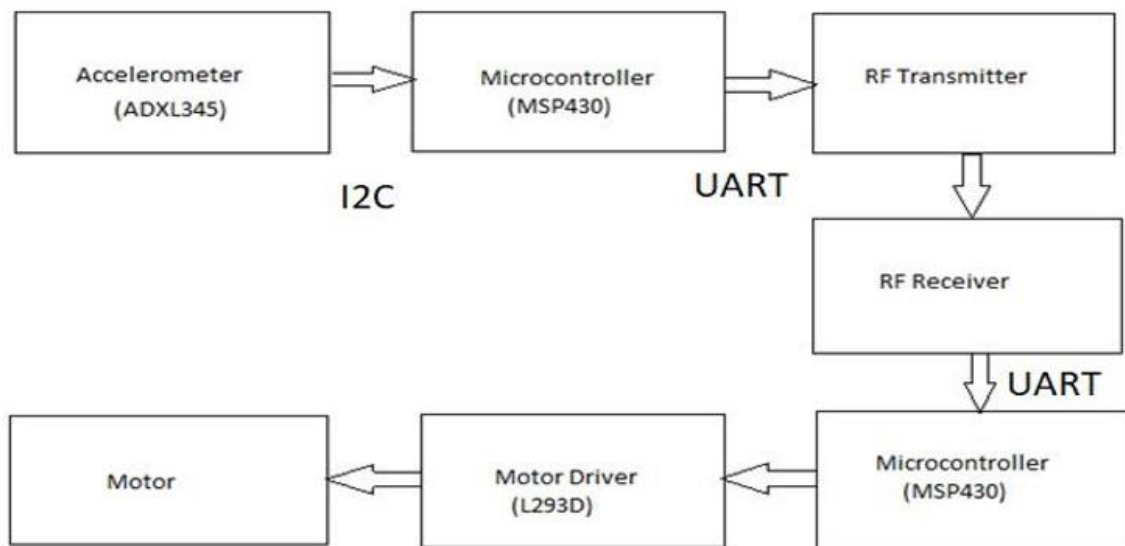


Figure1: Block Diagram

4.Description:

The project is divided into two parts: The Transmitter side and the Receiver side.

Transmission:

The transmission takes place as follows, ADXL 345 (Digital Accelerometer) is the input to the MSP430. ADXL produces 3 outputs (X-axis, Y-axis, Z-axis). The ADXL communicates with microcontroller using I2C (Inter-Integrated Circuit protocol) communication protocol. The output of ADXL 345 is given to the MSP430 where SDA is connected to P1.7 and SCL is connected to P1.6. The input from ADXL 345 is processed by the controller and provided as an output to the transmitter. The transmitter being used is nRF24L01. The MSP430 communicates with the transmitter using UART (Universal Asynchronous Receiver/Transmitter) communication protocol. The output of the MSP430 is fed to the transmitter where pin P1.2(UART) is connected to TX.

Reception:

The reception takes place as follows, the transmitter output is detected by the Receiver (nRF24L01). The communication between receiver and transmitter is wireless. The MSP430 communicates with Receiver using UART (Universal Asynchronous Receiver/Transmitter). The receiver output is fed to the MSP430 where RX is connected to P1.1(UART). The inputs from the receiver are fed to the MSP430 which in turn drives the motor Driver IC(L293D).

Motor Driver (L293D):

The IC L293D is used to implement H-Bridge. L293D consist of two H-bridge. H-bridge is the simplest circuit for controlling a motor. It amplifies the current to drive the DC motors. It is used for clockwise & anti-clockwise rotation of DC motor. Basically, used for driving DC Motors coupled with rear wheels. The inputs for L293D are connected to MSP 430 port pin P1.6, P2.5, P2.3, and P2.4.

PWM (Pulse Width Modulation):

PWM is basically high frequency pulses, modulated with the duty cycles. In our case, we have kept the frequency to 800hz since the motor is slow reacting load. The full-time pulse is given by digital value 255. On time varies between 0 to 255 for speed control.

5.FLOWCHART:

1)Transmission

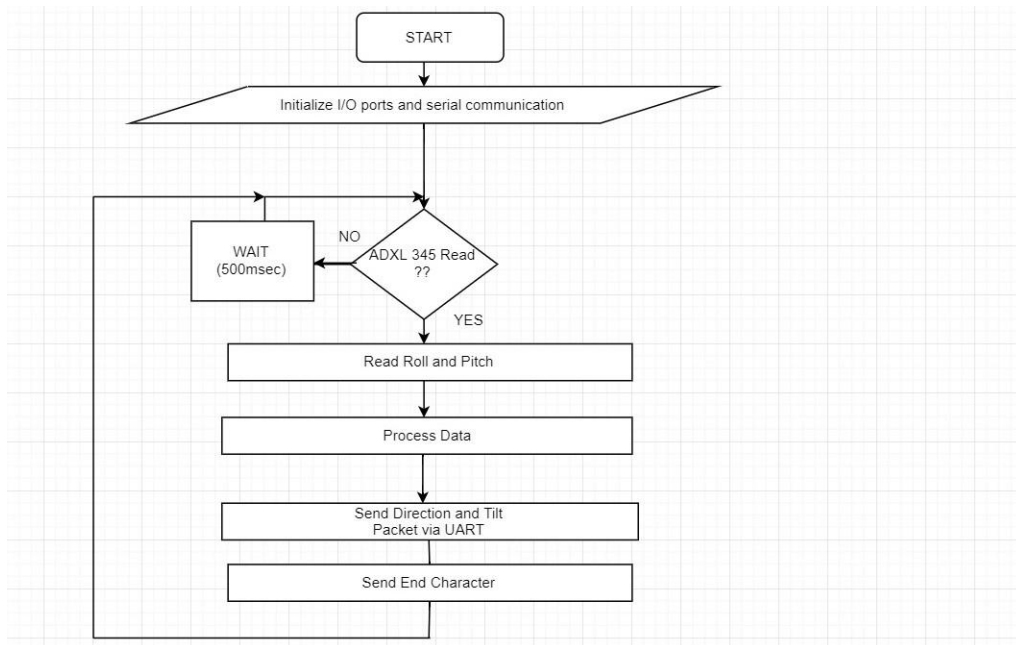


Figure 2: Transmission Flow

2)Reception:

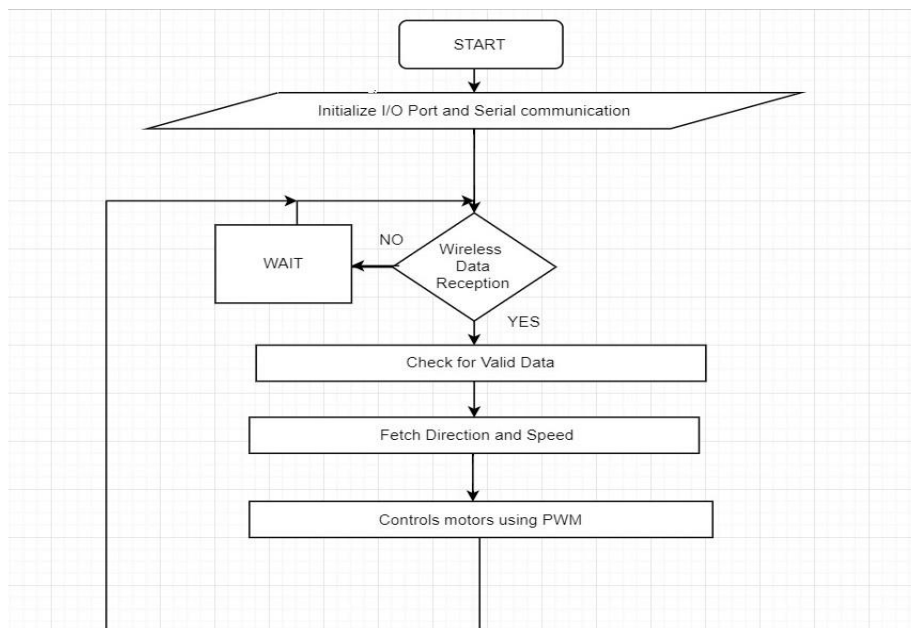


Figure3: Receiver Flow

6.Results and Conclusion:

The Gesture Controlled RC Car was successfully implemented. Algorithms used to control the car were successfully implemented and controlled the vehicle as desired. To conclude, the group was successful in implementing all the gestures with forward, backward, right and left movement of the car with speed control.

Objectives achieved:

- Successfully interfaced ADXL345 with Msp430.
- Successfully implemented UART between MSP430 to Nrf24L01(transmission).
- Successfully implemented UART between Nrf24L01(Receiver) to MSP430.
- Servo mechanism using PWM.

Appendix A: Task Division

- Sairaj: Microcontroller Programming, Interfacing and Report writing
- Ajinkiya: Motor driver Interfacing, Programming, and Report writing
- Surya: Wireless Transceiver interfacing and Report Writing
- Pratheek: Components testing and interfacing

Appendix B: Major Components

Sr.no	Components	Quantity
1	MSP-EXP430G2	2
2	Nrf12401	2
3	Capacitors (0.1uf,10uf)	2,3
4	Capacitors (1000 uf)	2
5	Capacitors (470 uf)	2
6	Resistors	2
7	Rectifier Bridge(DB107)	2
8	Led	8
5	DC Motor	2
6	ADXL 345	1
7	Motor Driver IC L293D	1
8	Voltage regulators (L7805)	2
9	Car Assembly	1
10	Connecting Wires	
11	Battery (9V)	2

Appendix C: Schematics

Transmitter Side:

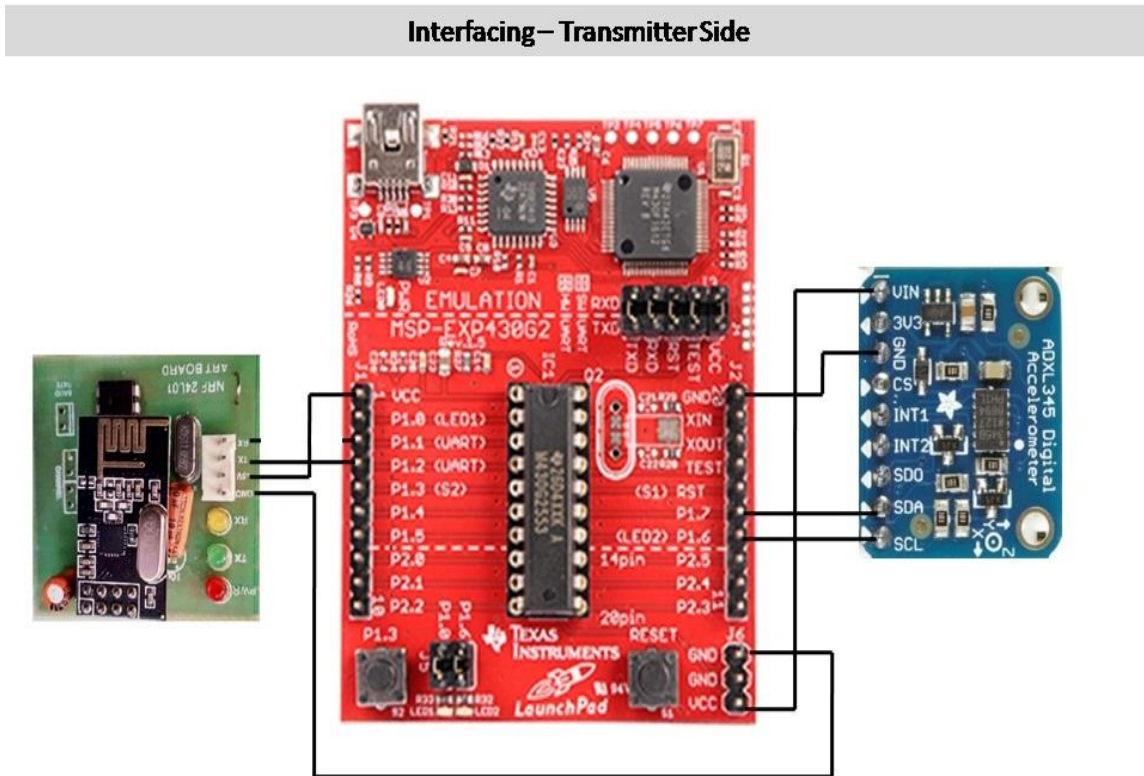


Figure 4: Transmitter Schematics

Receiver Side:

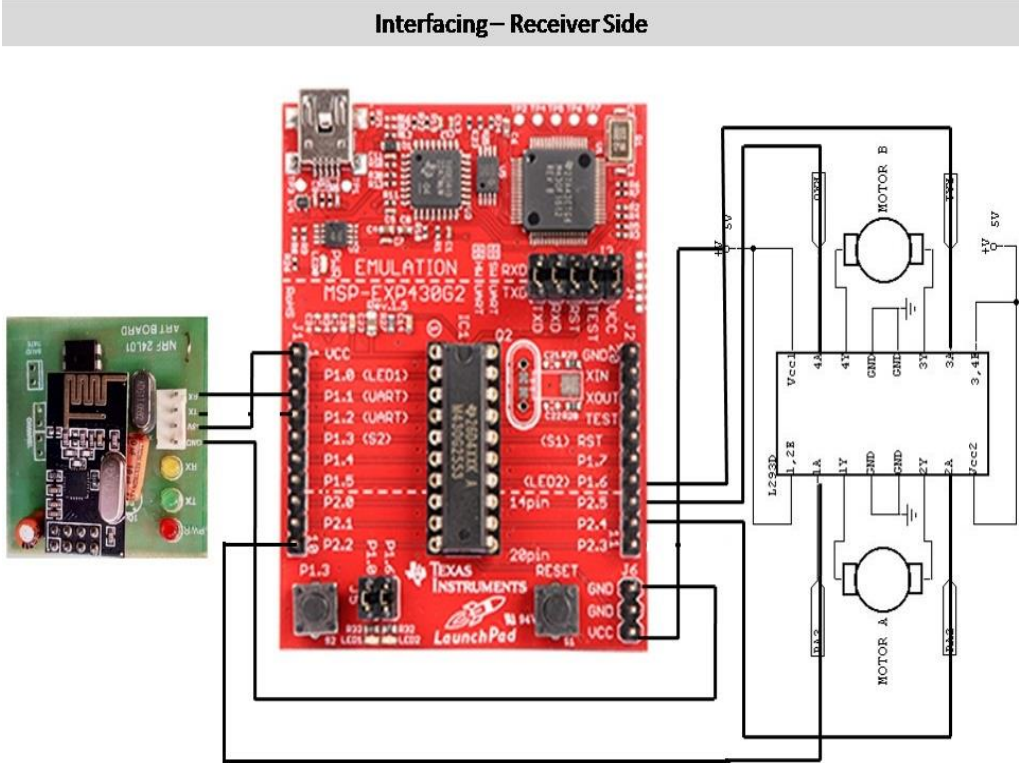


Figure 5: Receiver Schematics