HANDY CAR

Group 8

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Motion Sensing

- It is a technology which has become quite popular these days.
- Motion sensing is used across many fields.
- It is used along with gaming consoles.
- It is also used in our mobiles.
- It is used in fitness trackers.
- Its FUN!!!

Overview

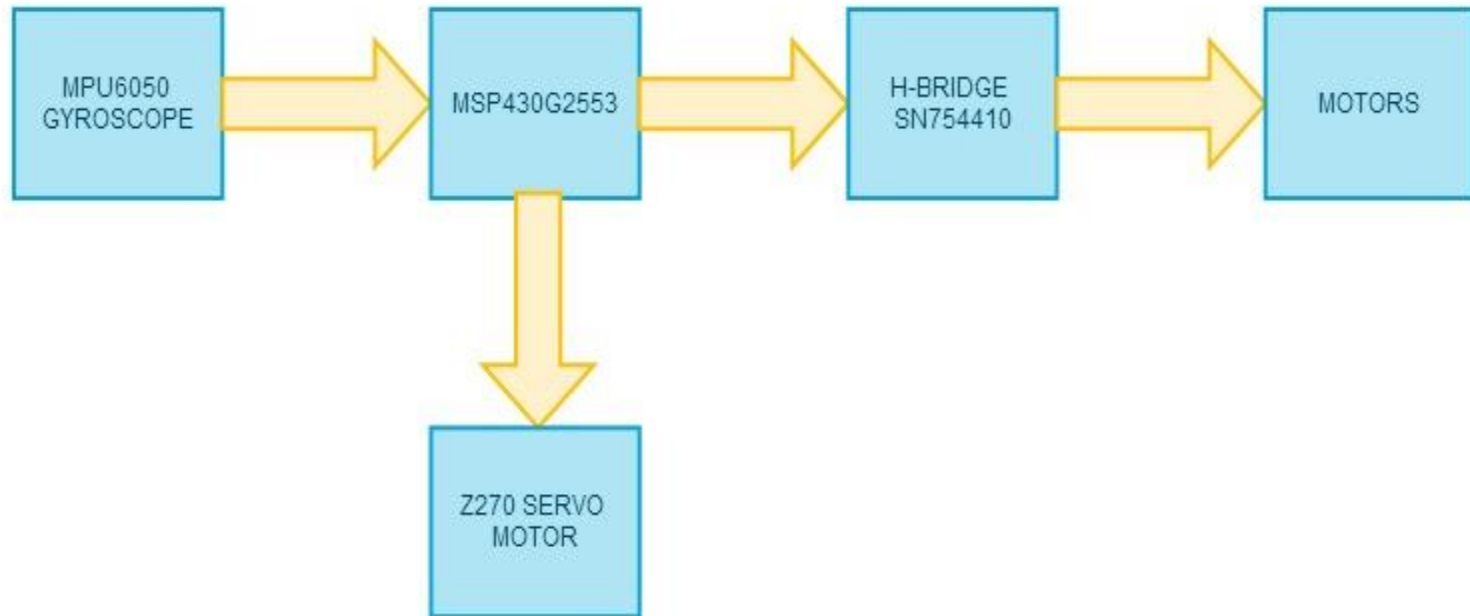-> Hand gestures are used to control the speed and direction of the car.

Pitch values from the gyroscope are used to control forward and reverse direction

-> Roll values from the gyroscope are used to control the direction

Components Used

- MPU6050 (Gyroscope)

- MSP430G2553

- DC Motors and H-Bridge (SN754410)

- Servomotor

- Push button for RESET

Block Diagram

GYROSCOPE / ACCELEROMETER

The Accelerometer is used for motion sensing. The Accelerometer is attached to a glove.
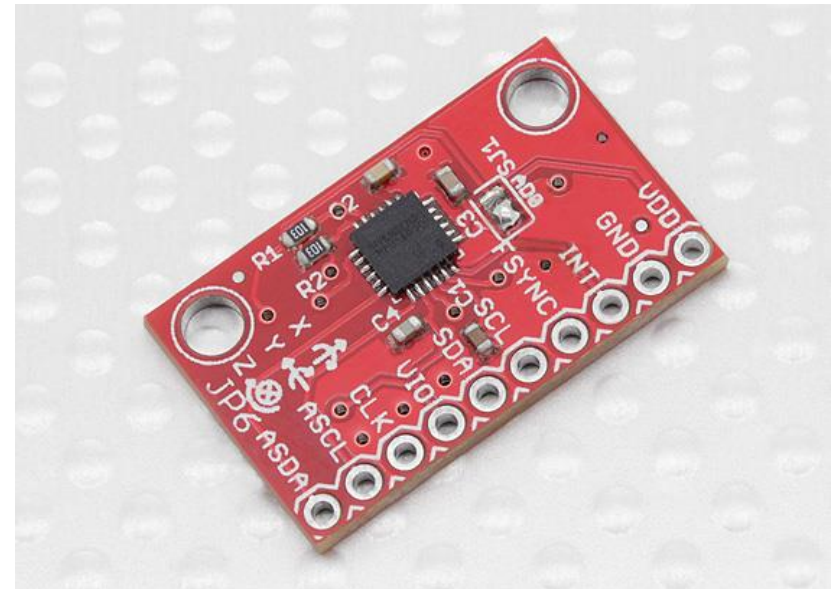We can control the toy car using the hand gestures.
The Accelerometer used here is MPU6050.
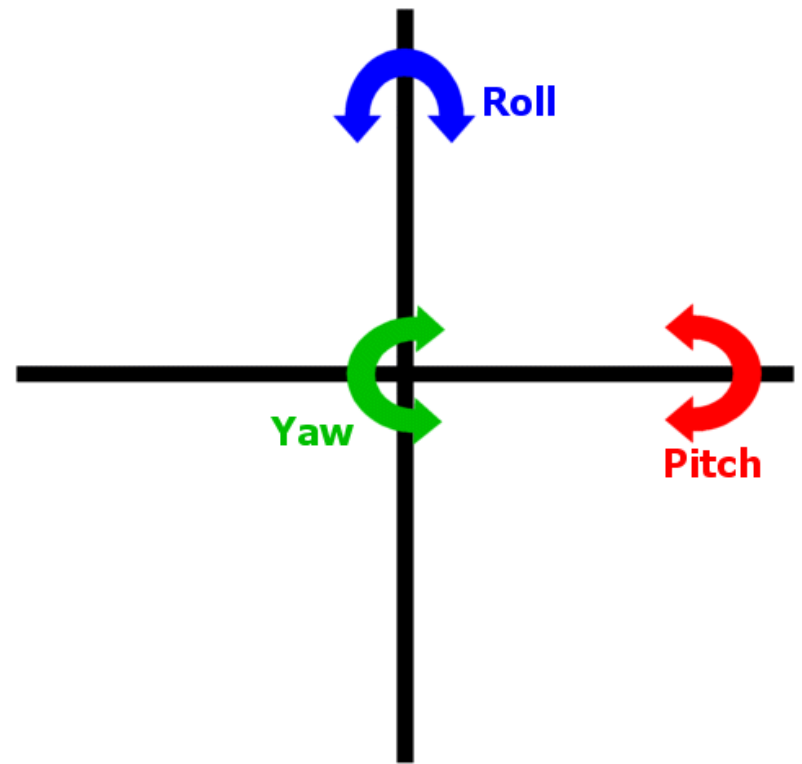
INTERFACE :
I2C protocol is used.
Ports P1.6 and P1.7 are used for I2C communication.

Interfacing MPU6050 with MSP430

God knows !!!

I2C – A Conversation Between two people

- Master sends a start bit followed by 7bit slave address.
- It is then followed by a single read or write bit.
- If there are any slaves in the line ,the slave will respond with an acknowledge bit.
- Data transfer takes place.
- The slave sends another acknowledge bit.
- Master finally sends a stop bit

- MSP is a indeed a true master and it really gets what it wants!!!

Calibration

- Calibration is a very important aspect in any working system which uses sensors.
- Without calibration the sensor values are almost useless.
- The origin changes after each and every reset and for each and every person's hand orientation.
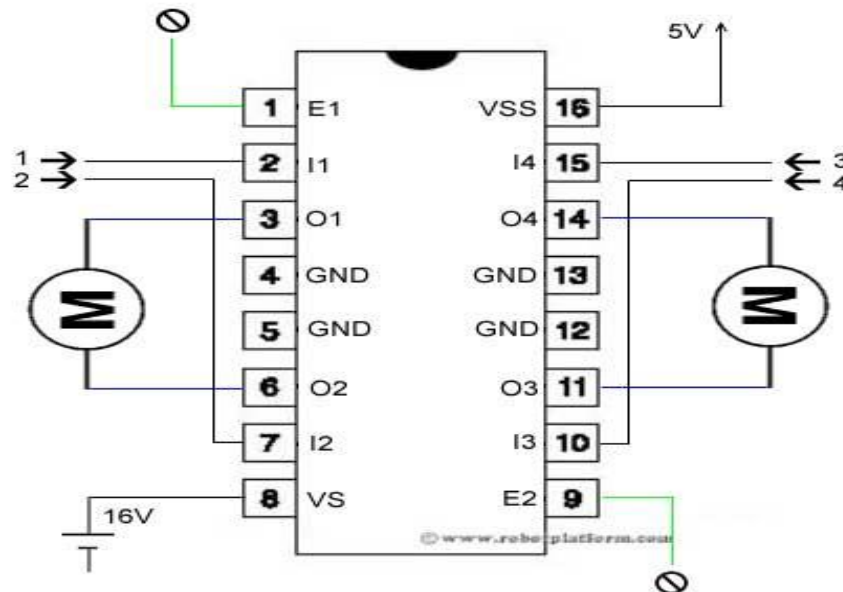
MOTOR & MOTOR DRIVER

Motor driver IC is SN754410
Forward and backward motion is driven by 9Vdc Motor.

Interface:
•Output via P1.2
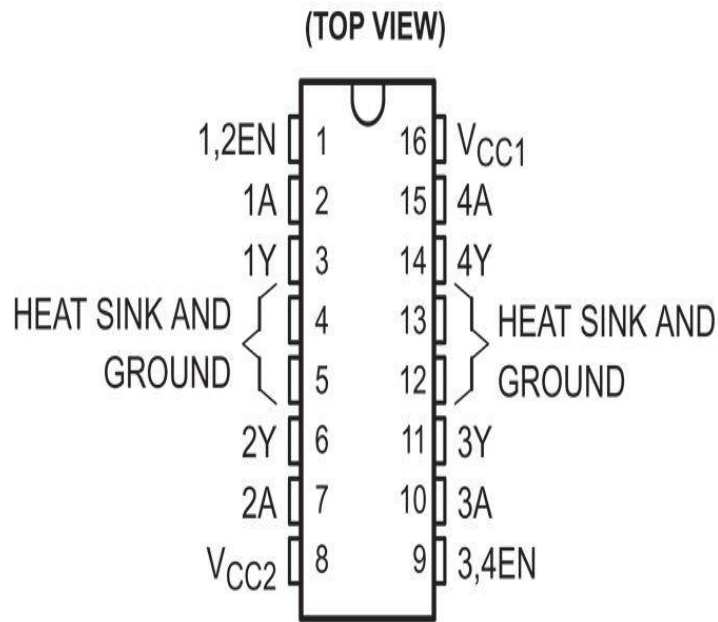Pins P1.0 and P1.1 for control directions

→	Input from Microcontroller : 4 Inputs – I1, I2, I3, I4	
⊘	Enable Pins : E1 & E2	
M	Output to 2 Motors : O1, O2 & O3, O4	
GND	Connect to microcontroller ground	

Interfacing DC motor with MSP430 using H-bridge SN754410

SN754410
QUADRUPLE HALF-H DRIVER

(TOP VIEW)

1,2EN	1	16	V_{CC1}
1A	2	15	4A
1Y	3	14	4Y
HEAT SINK AND GROUND	4	13	HEAT SINK AND GROUND
	5	12	
2Y	6	11	3Y
2A	7	10	3A
V_{CC2}	8	9	3,4EN

FUNCTION TABLE
(each driver)

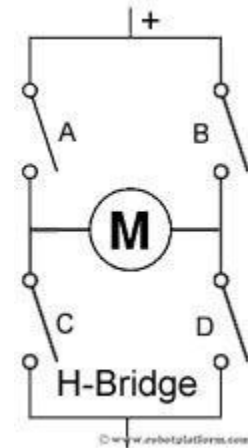| INPUTS†		OUTPUT
A	EN	Y
H	H	H
L	H	L
X	L	Z

H = high-level, L = low-level
X = irrelevant
Z = high-impedance (off)
† In the thermal shutdown mode, the output is in a high-impedance state regardless of the input levels.
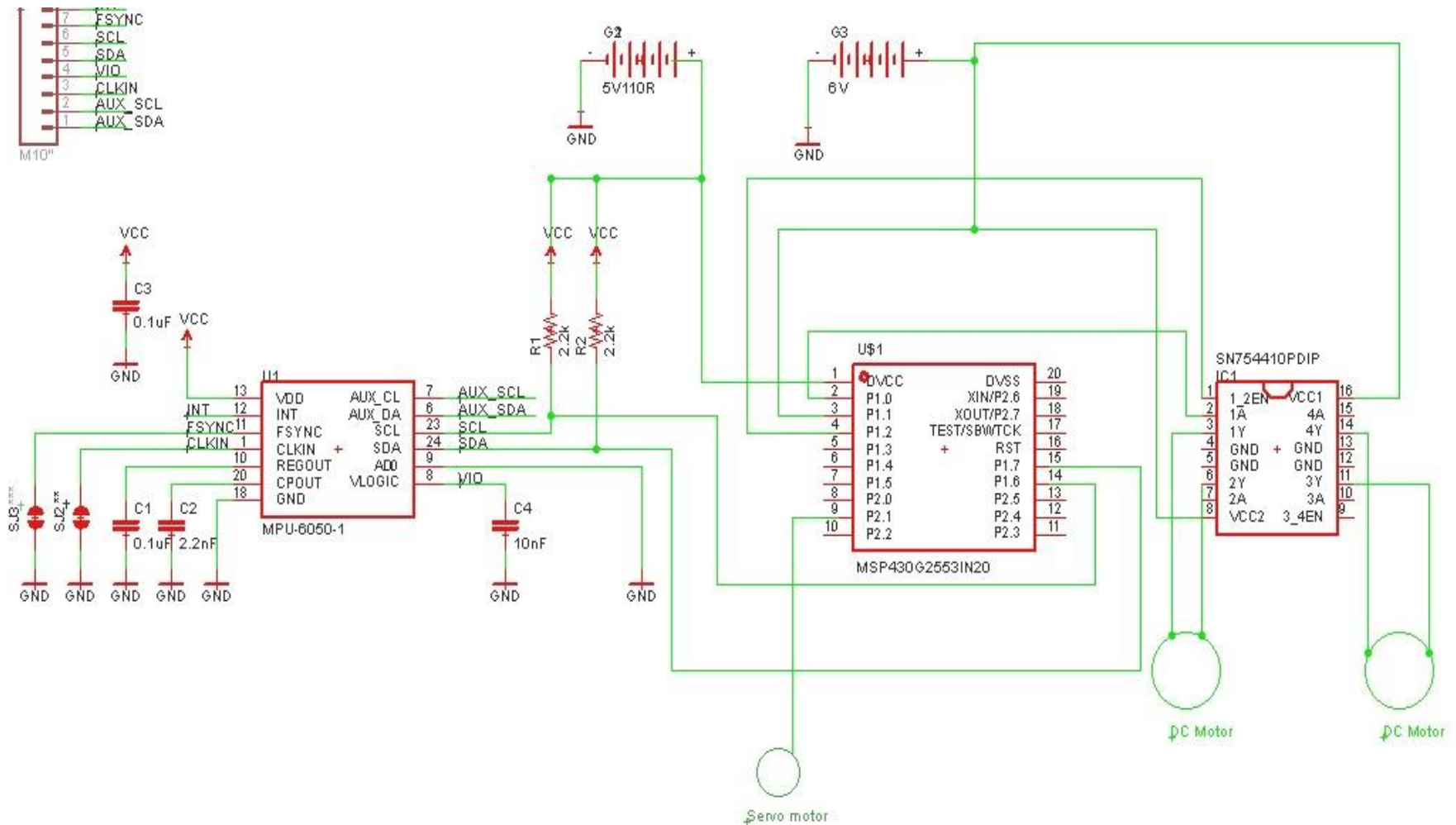
H-Bridge

SERVO MOTOR

Z270 servo is used for control the directions of the Bot.

Servos are controlled by sending an electrical pulse of variable width, or **pulse width modulation** (PWM), through the control wire. There is a minimum pulse, a maximum pulse, and a repetition rate. A servo motor can usually only turn 90 degrees in either direction for a total of 180 degree movement. The motor's neutral position is defined as the position where the servo has the same amount of potential rotation in the both the clockwise or counter-clockwise direction. The PWM sent to the motor determines position of the shaft, and based on the duration of the pulse sent via the control wire; the rotor will turn to the desired position. The servo motor expects to see a pulse every 20 milliseconds (ms) and the length of the pulse will determine how far the motor turns.

Minimum Pulse — Pulse Width 1 ms — 0°

Neutral Position — Pulse Width 1.5 ms — 90°

Maximum Pulse — Pulse Width 2 ms — 180°
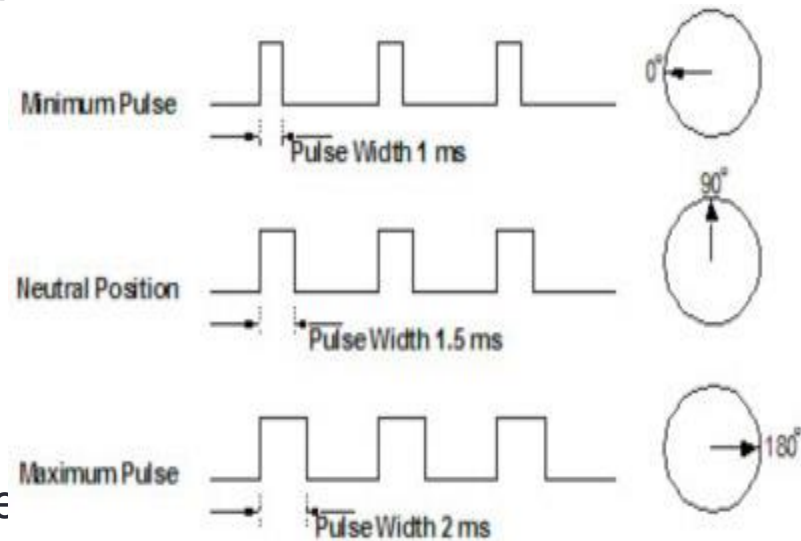
Schematic Diagram

Task Division

- Arvin Asokan – Gyroscope Interfacing and Calibration
- Urvi Tank- H-bridge Motor Interfacing
- Sai Kasyap – Servo Motor Interfacing
- Nikhil – Hardware and System Integration

Future Expansion

Thank you

Queries ?

Demonstration