WIRELESS GESTURE DRIVEN ROBOTIC VEHICLE

Presented By:

Helpman Phawa

Praveen Kumar G M

Shalini M

Shwetha L S

Guided by:

Dr.S.S.Parthasarathy

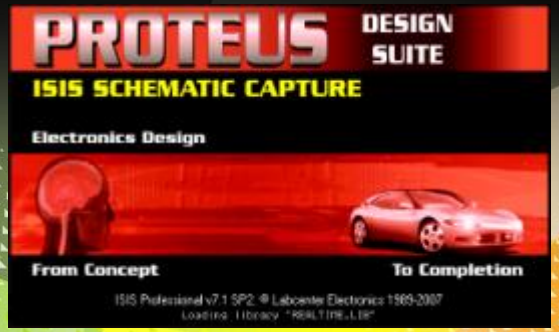
Professor

PESCE Mandya

PROJECT OVERVIEW

Designing a Robotic Vehicle which can be controlled by an Android smartphone through gestures

- Designing a Virtual System Model and simulating it
- Build the same using hardware components in real world
- Control it using android smartphone through gestures



WHY……?

- Our motivation to work on this project came from a disabled person who was driving his wheel chair by hand with quite a lot of difficulty and for the people who cannot move from one place to other.
- To try some new and innovative way of controlling electronic stuffs using smartphone and to smarten lifestyle.
- Controlling robotic vehicles using smartphone enhances it to use for controlling purpose more than just as a telecommunication device.

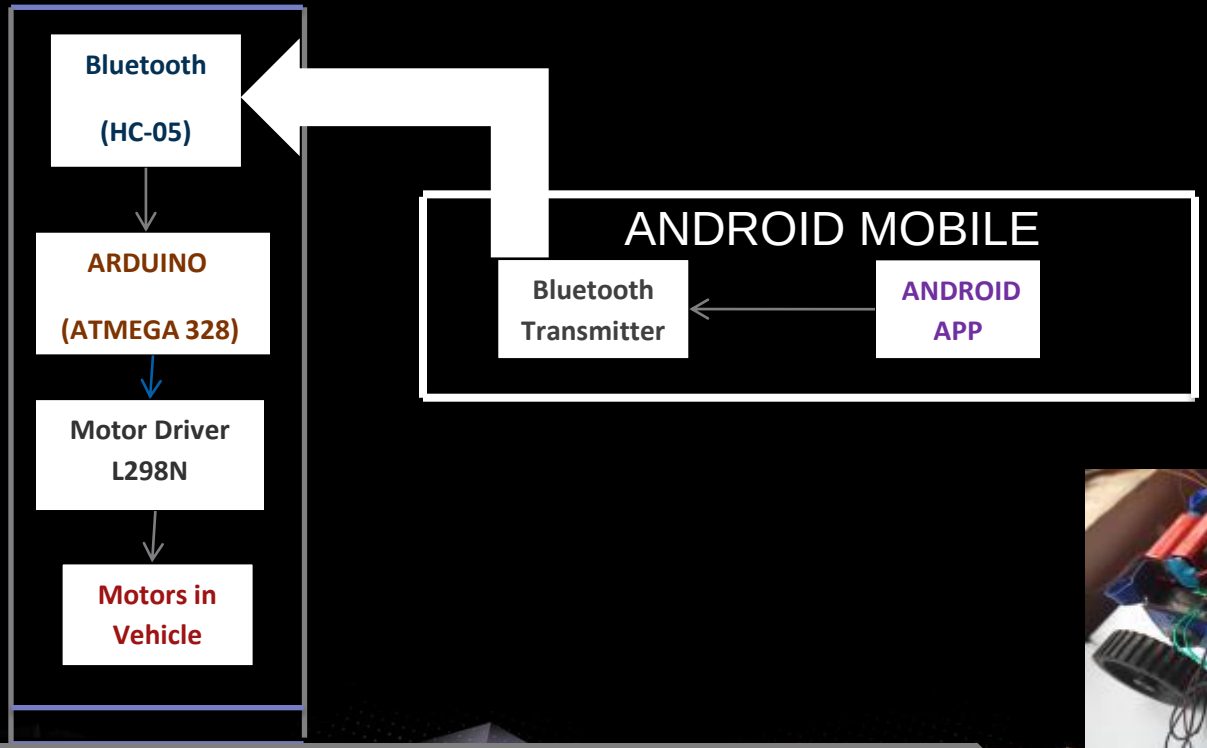
GESTURE DRIVE

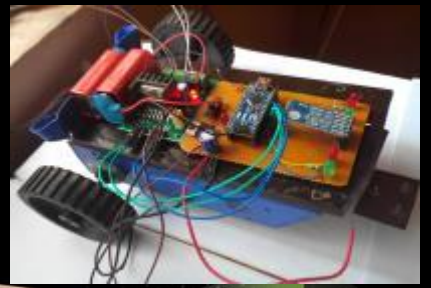
- ✓ A gesture is an action that has to be seen by someone else and has to convey some piece of Information
- ✓ Controlling the Electronic equipment with the movements is called gesture drive
- ✓ Here we are going to control a robotic vehicle using android phone. Tilting the mobile in all directions

Block Diagram:

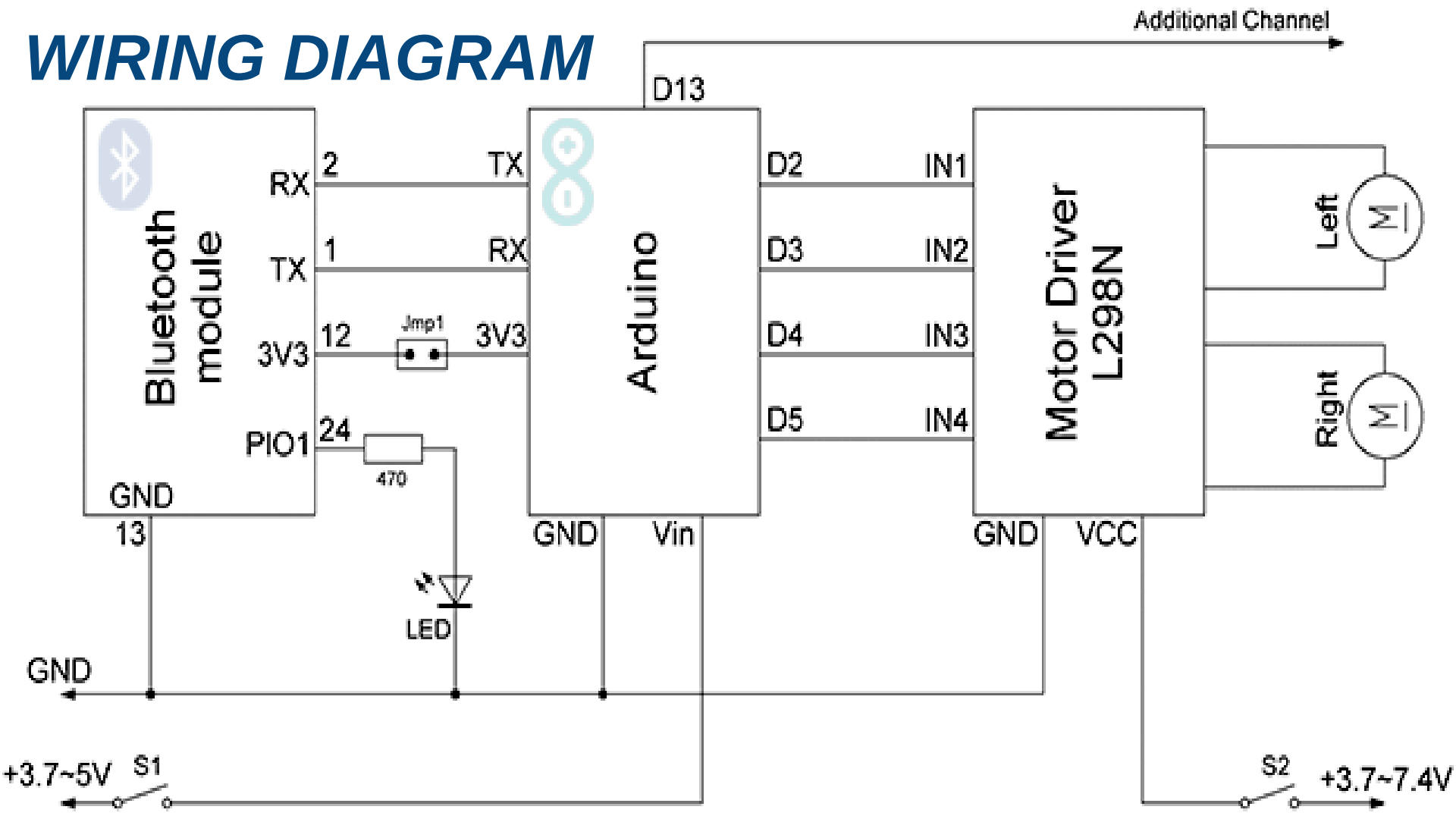
Wireless Gesture- Driven Robotic Vehicle

ROBOTIC VEHICLE SIDE





WIRING DIAGRAM

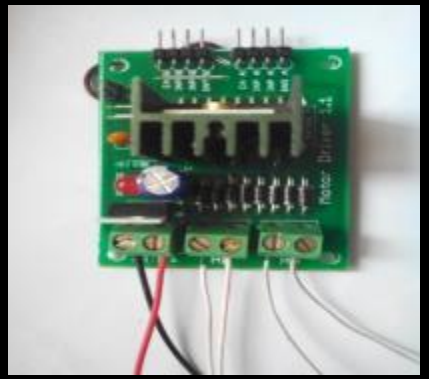


CONSTRUCTION

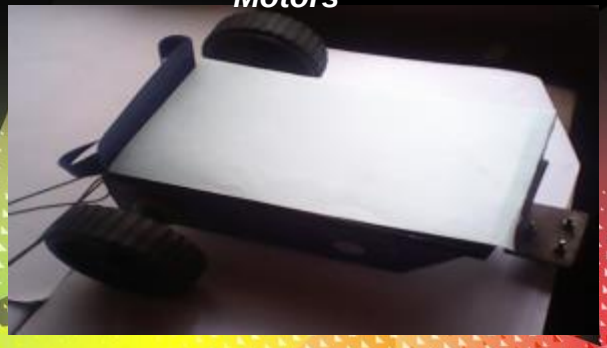
Arduino nano v3.0

Bluetooth HC-05

L298N Motor Driver Board



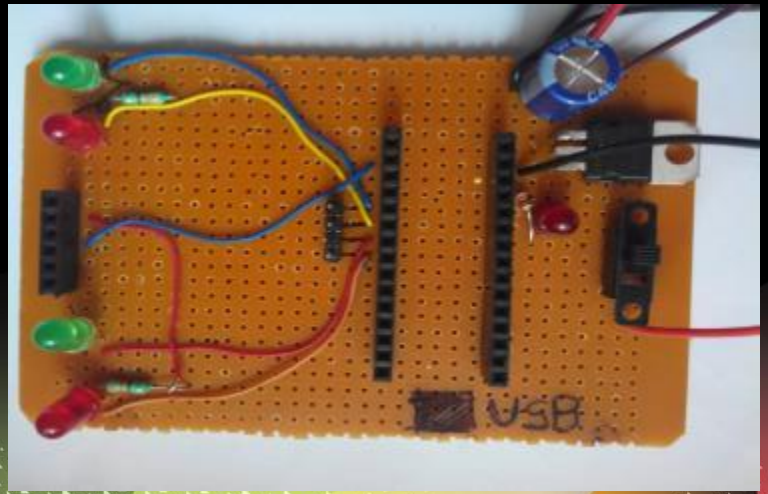
Robotic Chassis with Wheels & Motors

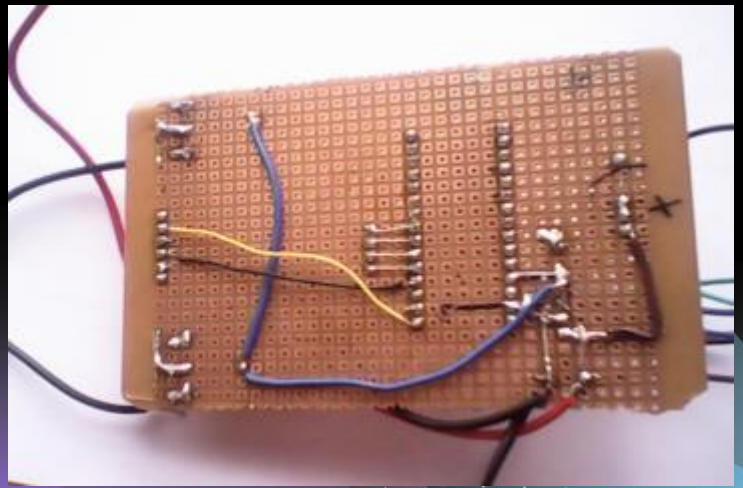


Battery

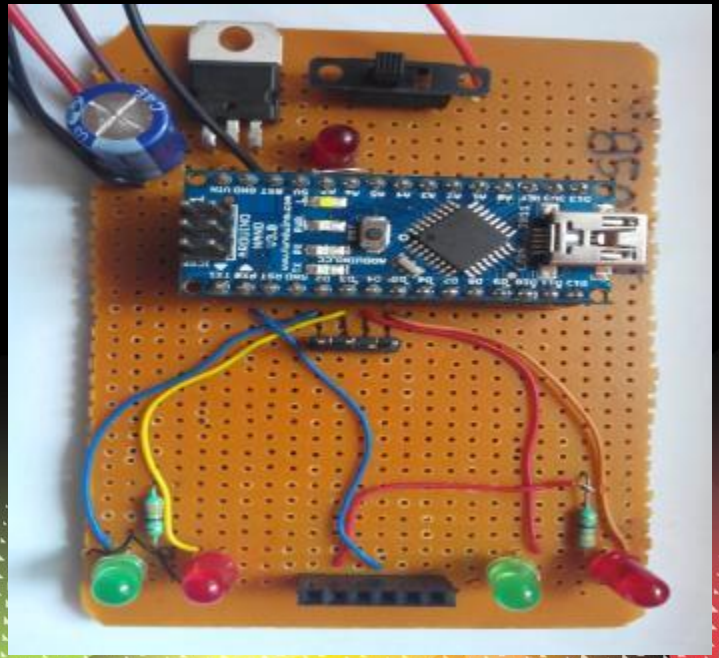
DESIGNING A CIRCUIT BOARD

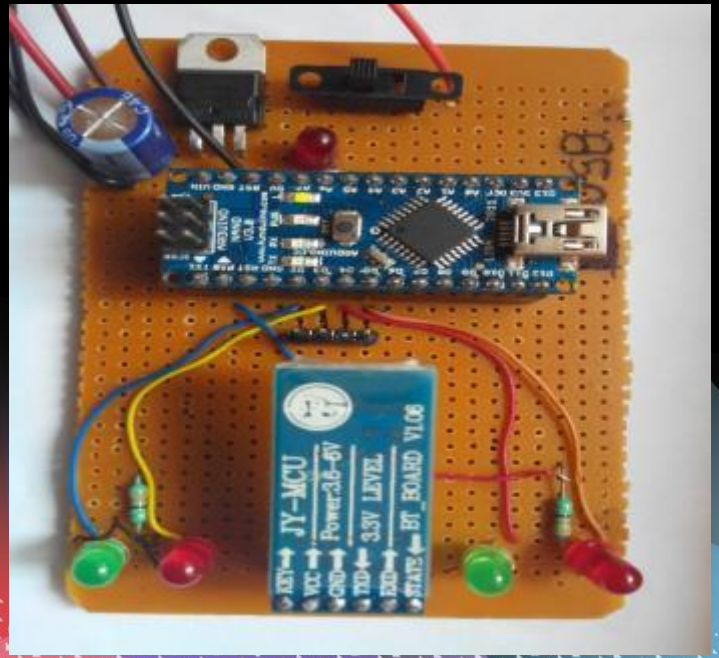
- Solder the headers, LEDs, Voltage Regulator circuit to give a supply of 5V to the entire circuit on Base Board.
- Use a resistors for limiting the voltage and current for diodes and for other low power components



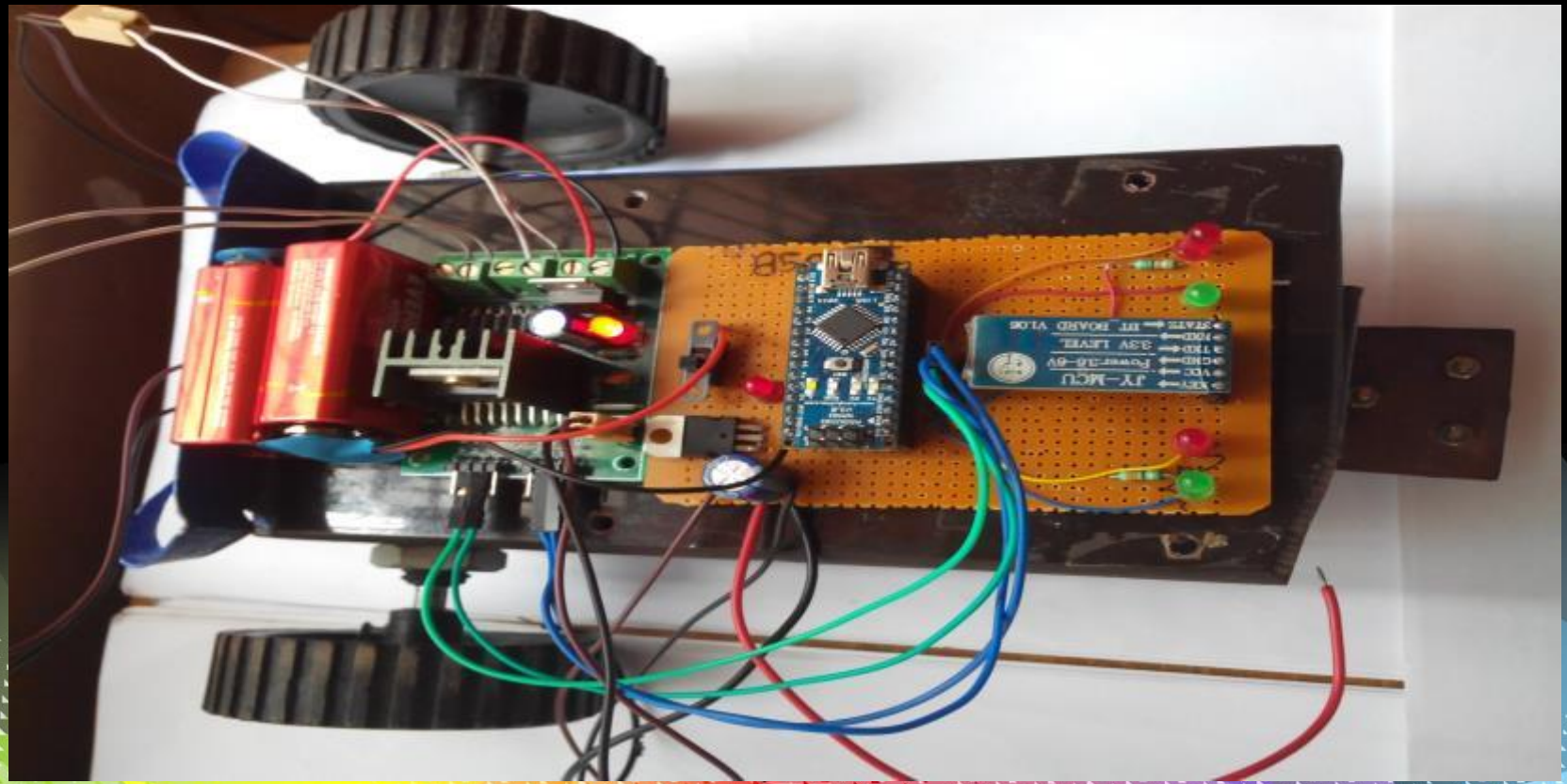


➢ ARDUINO NANO (MICROCONTROLLER) BOARD AND BLUETOOTH HC-05 ON CIRCUIT BOARD





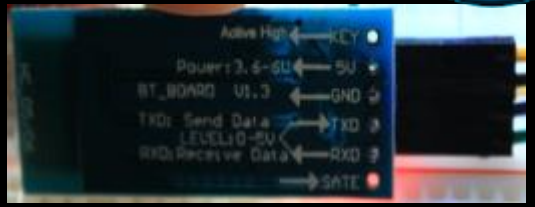
COMPLETE ROBOTIC VEHICLE IN WORKING CONDITION



SYSTEM OVERVIEW

Arduino Nano v3.0 MCU

Bluetooth module



Battery

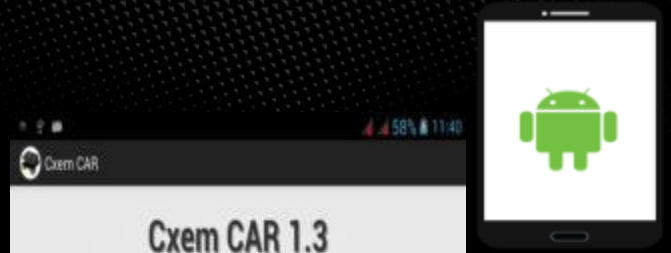
Motors in Vehicle

Motor Driver L298N

Android Mobile

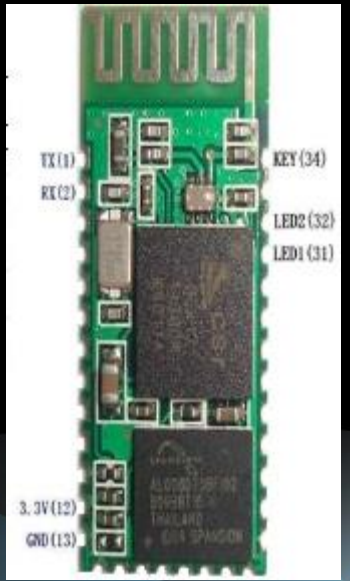
ANDROID SMARTPHONE WITH CONTROLLER APPLICATION

- Creates socket for communicating with Bluetooth modem, using its known address
- Reads gesture and throttle values, transmits periodically on socket's Output Stream
- Listens on socket's Input Stream for error messages from Arduino



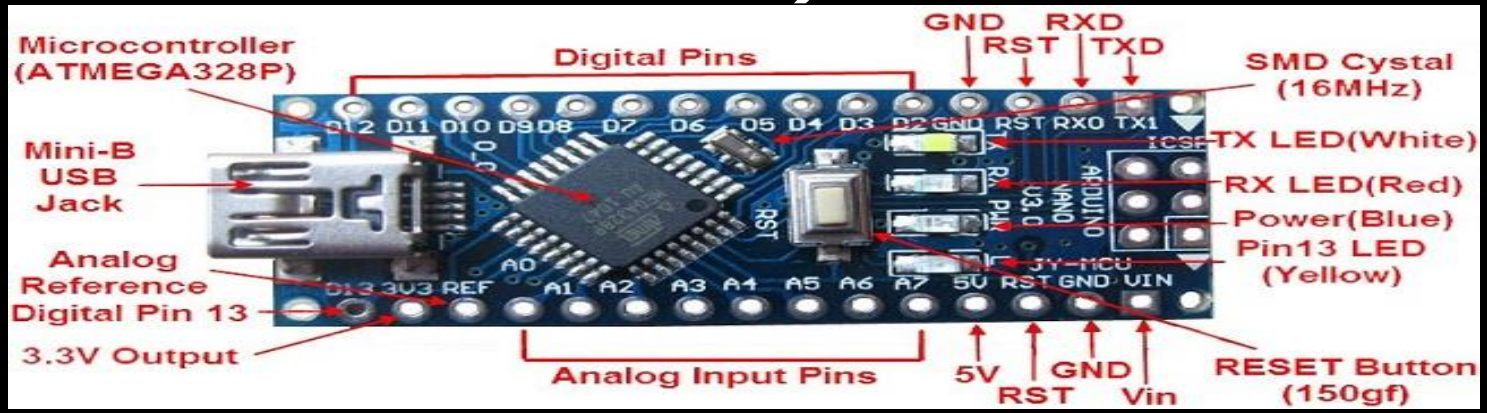
BLUETOOTH MODULE

- ***Want Class 1 Bluetooth for long range (~100m)***
  - Chosen model: HC-05
- ***Essentially implements a wireless serial stream***
  - When modem receives a message via Bluetooth, it sends that message via serial using UART to Arduino
  - When modem receives a message via serial, it sends that message via Bluetooth
  - Uses Universal Asynchronous Receiver and Transmitter(UART)



- ***Has static network address which Android controller uses to establish a connection***

ARDUINO NANO V3.0 (ATMEGA 328P MICROCONTROLLER)

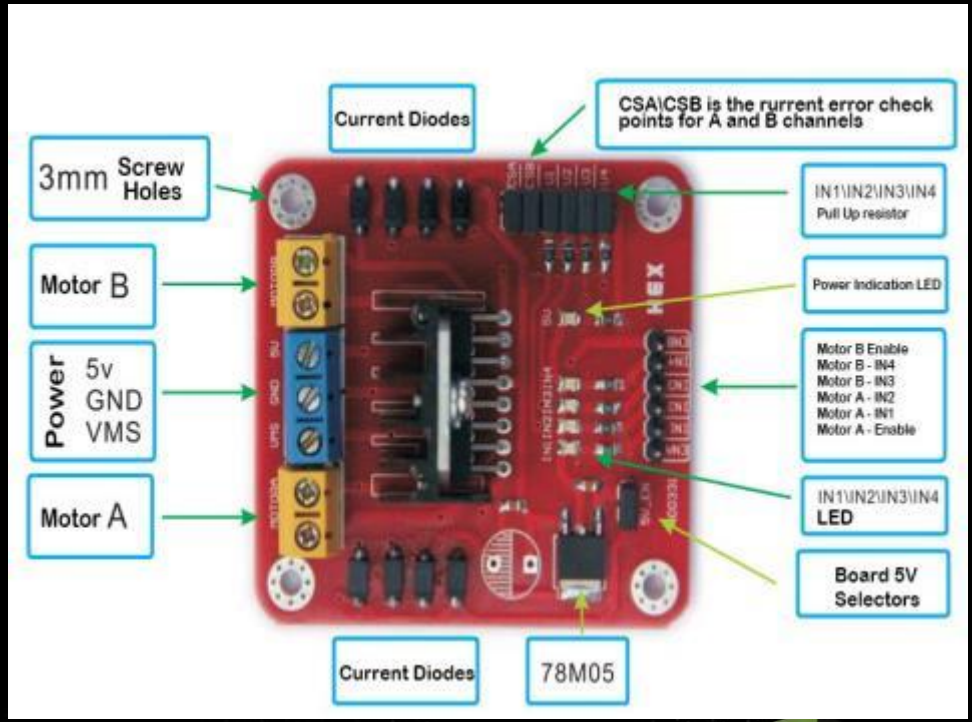


Implements differential controlling

- The program is loaded into the microcontroller to interface bluetooth and motor driver

MOTOR DRIVER (L298N)

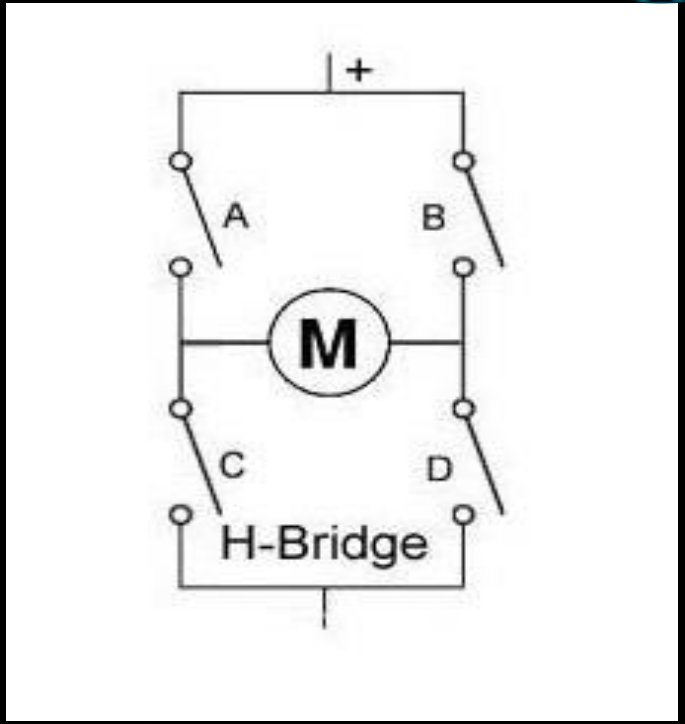
- ***L298N Motor Driver Shield for Arduino***
  - Dual full H Bridge Motor Driver
  - Can driver 2 DC motors individually
- ***Motor control requires full processor attention***
  - Monitor motor speed
  - Continuously adjust motor voltage to minimize error between desired and actual motor speeds



Dual-full H-Bridge

The circuit has four switches A, B, C and D.

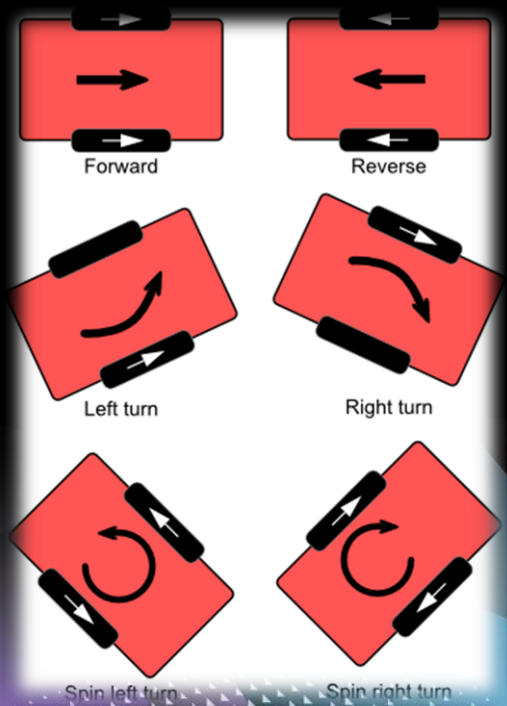
- Turning these switches ON and OFF can drive a motor in different ways.
- When switches A and D are on, motor rotates clockwise.
- When B and C are on, the motor rotates anti-clockwise.
- When A and B are on, the motor will stop. .
- Turning on A & C at the same time or B & D at the same time acts as a break



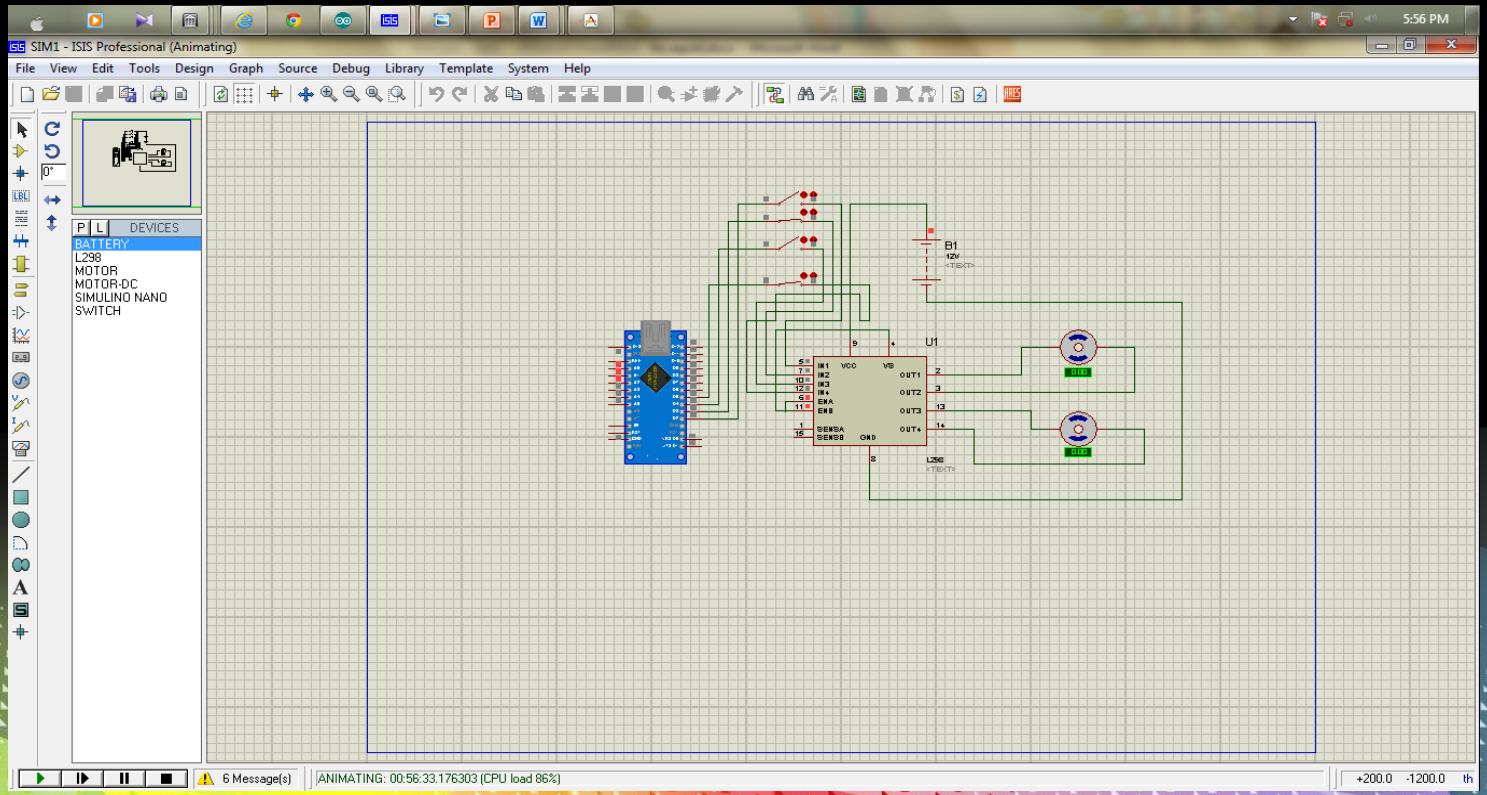
DRIVE TRAIN (DC MOTORS IN ROBOTIC VEHICLE)

- *Vehicle driven by left and right DC motors*
- *Motor torque speed based on estimated vehicle weight, desired acceleration*

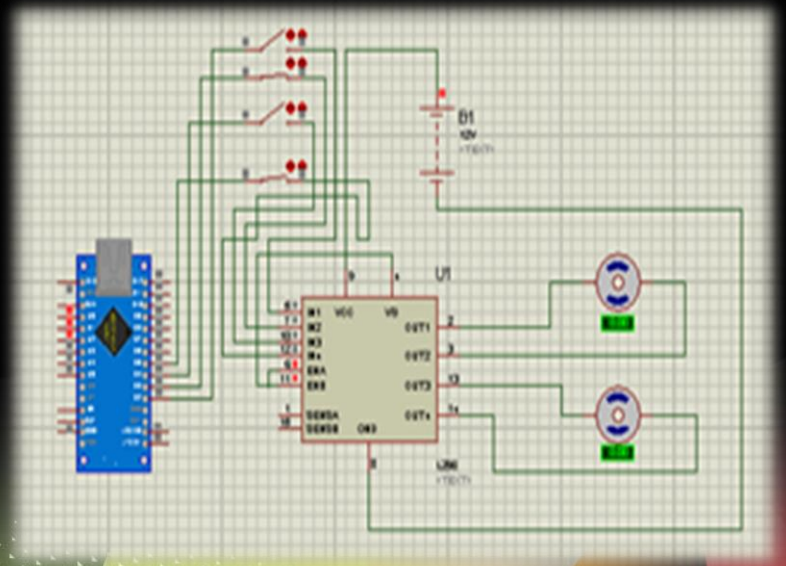
- *Differential steering employed*
  - **Turn vehicle by driving motors at different velocities**
  - **Ball casters in front allow pivoting; no additional wheels needed**

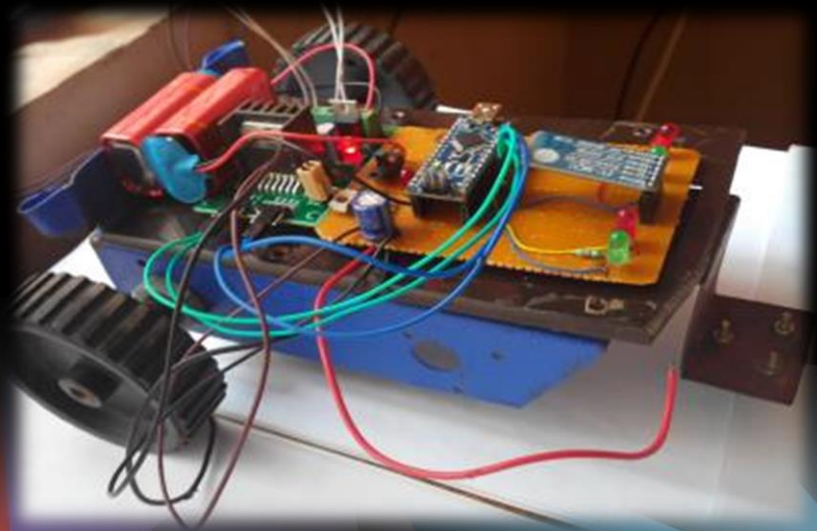


SIMULATION USING ISIS PROTEUS



RESULT


B1
12V
U1
IN1
IN2
IN3
IN4
ENA
ENB
VCC
VS
OUT1
OUT2
OUT3
OUT4
SENSA
SENSB
GND
L298



APPLICATIONS

- For entertainment and gaming
- It can be used in various industries for picking various objects where human intervention is not desired.
- For military applications.
- It can be used to target enemy without any human being crossing the territory.
- It is robust, sensitive and fast moving, hence can be applied in rescue operations.

FUTURE ENHANCEMENT

- Enhanced for home automation using smartphone.
- Advanced motion: i.e. robot arm controlled by servo motor.
- Obstacle avoidance: Install proximity sensor; develop algorithms to steer around / back up when obstacles detected.
- Vision: Use camera to transmit frames back to Android application for display to user.
- Bluetooth too low-bandwidth; switch to Wi-Fi.

CONCLUSION

- The development of this project is challenging yet quite enjoyable and comfortable.
- The outcome of the work is a simple robot which is controlled by a smartphone and its movement.
- People with physical limitations such as handicapped people could use the feature from this thesis to compensate their abilities.