A PROJECT REPORT

ON

Self Driving And Human Following Trolley

Project report submitted in partial fulfilment of requirement for the degree of

BACHELOR OF TECHNOLOGY

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

Submitted By

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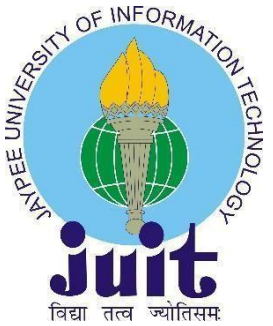
UNDER THE SUPERVISION OF

DR NISHANT JAIN

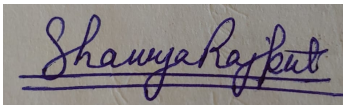


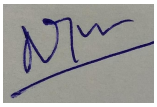
JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

May, 2021

DECLARATION

We declare that the major project "**Self Driving And Human Following Trolley**" submitted at **Jaypee University of Information Technology, Waknaghat, India** is a genuine record of our work done under the oversight of **Dr. Nishant Jain**. We have not presented this work elsewhere for the other degree or certificate.





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This is to certify that the above statement made by the candidates is correct to the simplest of my knowledge.

Dr. Nishant Jain
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Date: May,2021

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ACKNOWLEDGEMENT

We are hereby grateful to recognize **Dr Nishant Jain** for his significant direction in the course of this undertaking work.

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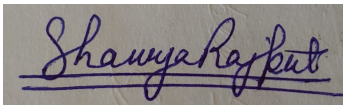

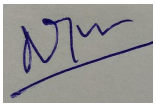

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ABSTRACT

The project is based on human following trolley using a arduino. This trolley will automatically avoid an obstacle, and trolley follow particular person. To accomplish this target the objective of our work is to make a robot that tracks the objective as well as move towards by keeping away from deterrents while following.This trolley will work with help of arduino and other sensors which are used to identify any obstacle or person in front. Arduino is the main part and ultrasonic sensor is the main sensor that would detect the person with respect to trolley. Remaining sensors like ir and pir are used to detect the person's position without any contact between the user and the trolley.

LIST OF FIGURE

.

LIST OF TABLE

Chapter 1

Introduction to Self Driving And Human Following Trolley

1.1.About

Having a robot collaborator clearly resembles a fantasy for all . A robot which will help us convey things, go with us at shopping centers, or during a running meeting at the recreation center. A robot which help attendants at emergency clinic, or carrying the clinical supplies during battle to harmed fighters. In this task we will make a model of self driving and human after streetcaThis streetcar will be valuable in different regions i.e conveying gear, directing.

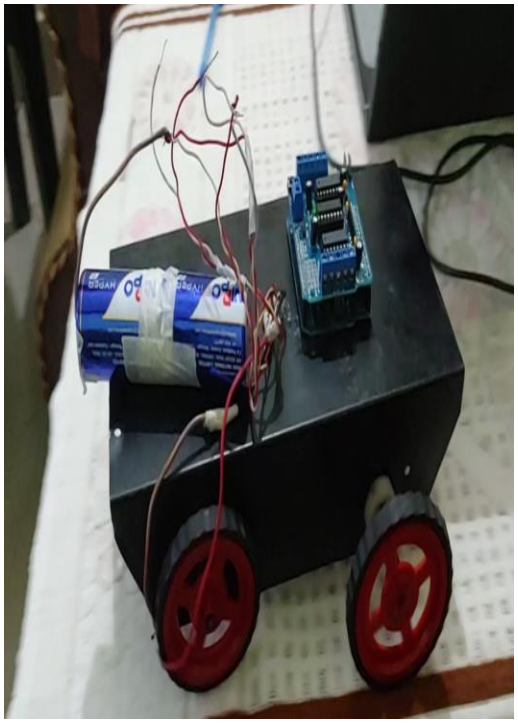


Fig.1.1. 3D model of trolley.

1.2. Objectives-

- To make a trolley which can -

    1) Follow Human.

    2) Detect Obstacles.

    3) Controlled using a remote.

    4) Can secure it self.(from falling and theft).

    5) Controlling Using Bluetooth.

1.3. Applications –

- Industrial automated equipment carrier.
- Automated Cart.
- To guides in museum.
- Deliver medication in hospital.
- Carrying luggage.
- Assisting old and physically special people.
- Can be used in airports.
- Can be used to serve people at restaurants and malls.

1.4 Literature Review

Paper Name	Author	Published In	Date Of Conference	Location
Human-following robot using infrared camera	Quoc Khanh Dang , Young Soo Suh	2012 10th Conference on Regulator, Mechanization and Systems	24-26 May. 2012	China
A Study of Ultrasonic Sensor Capability in Human Following Robot System	W. W. Tai, B. Ilias, S.A. Abdul Shukor, N. Abdul Rahim and MA Markom	IOP Conference Series: Materials Science and Engineering, Volu me 705, 5th International Conference on Man Machine Systems	26–27 August 2019,	Pulau Pinang, Malaysia
Human Detecting and Following Mobile Robot Using a Laser Range Sensor	Takafumi Matsumaru, Jianzhao Cai	IEEE Transactions on Industrial Electronics 51(1):2 29 - 237	March 2004	-

Table no.1 literature review

Chapter 2

Proposed Design

2.1. Design:-

The design of our project is vary basic it consist of some sensors with arduino and basic codes.

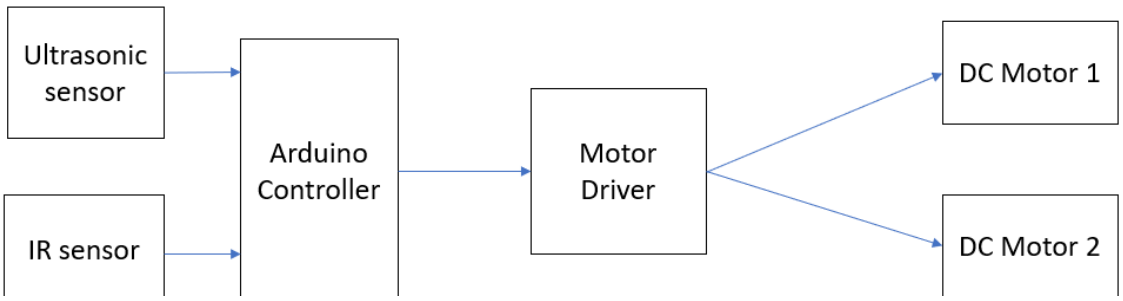


Fig. 3.1 Basic figure of connections.

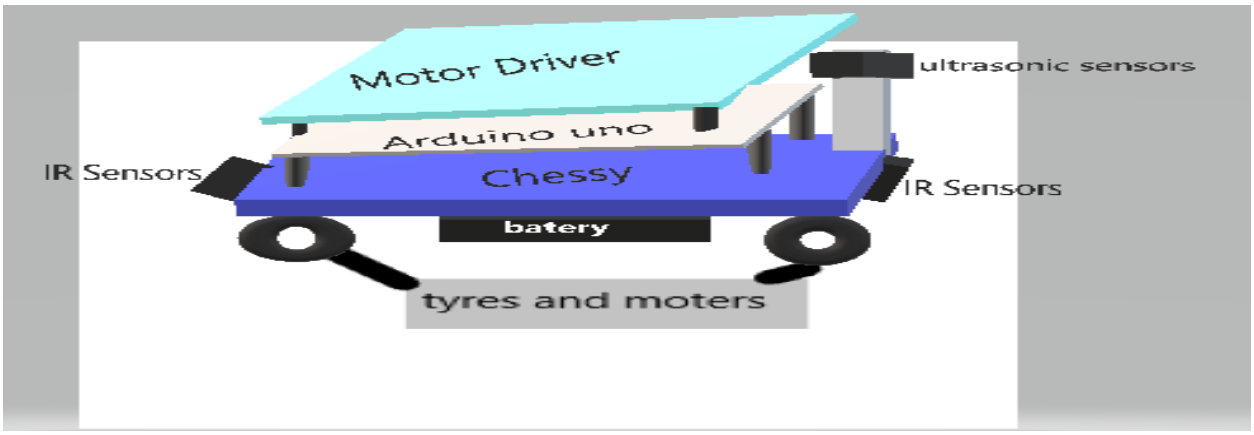


Fig2.2 . 3D model of project.

Fi2.3. Maintaining Safe Distance –

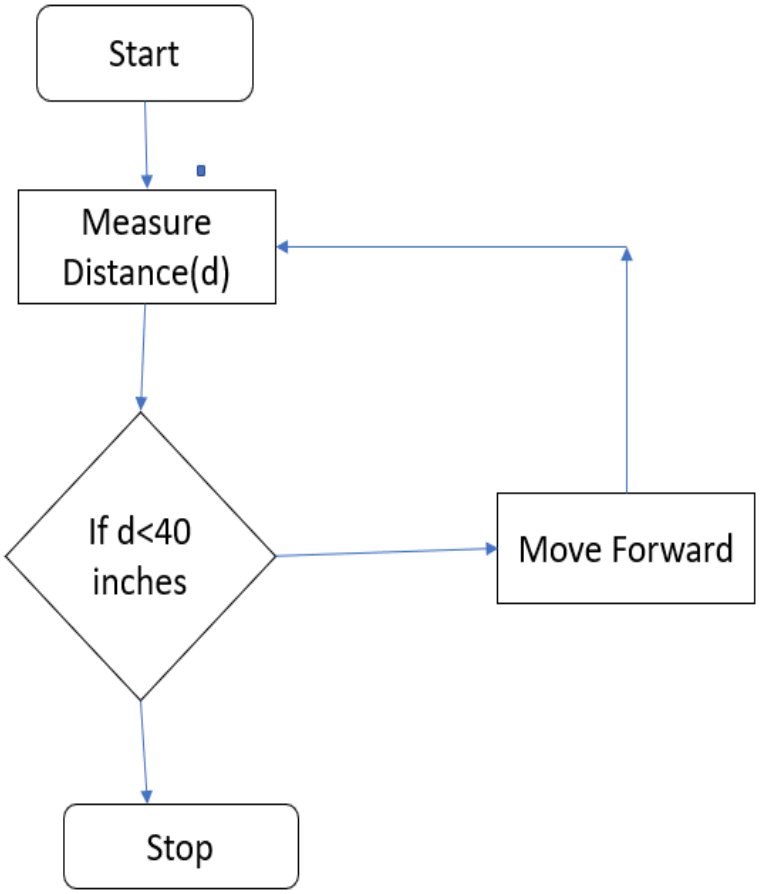


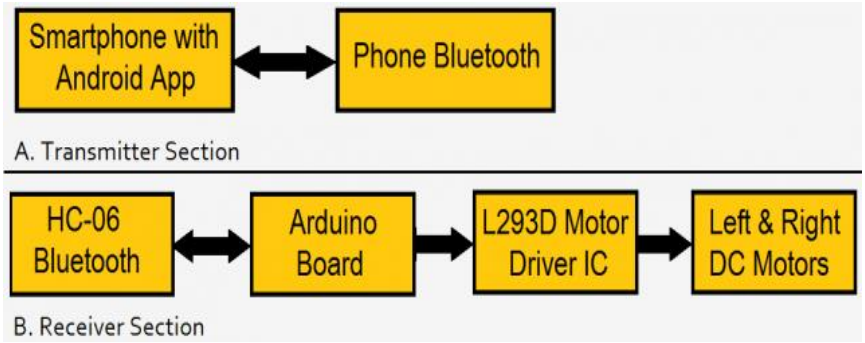
Fig2.4. Block diagram of basic processes.

We are using ultrasonicsensor for avoiding obstacleandto take care of a selected distance.The ultrasonic-sensor will work perfectly within a range of 4 meters.This ultrasonic sensor is put at the highest point of robot to precisely gauge distance between the robot and target object..We will attach two IR sensors to robot.

2.2. Using App

We are being trying to build an app to control our device .App will be used to operate out device using a phone .We will be using various techniques to implement our app. App will help control the other function of our robot.

First, in the Android App , we have utilized a few keys as forward, converse, left, right, stop, wellbeing , speed and on and off . When a key is squeezed, the comparing information is sent to the Bluetooth Module from the Phone over Bluetooth Communication. In the Arduino code, the Arduino UNO gets any of this information from the Bluetooth Module (according to the key squeezed) and plays out a straightforward switch case activity, where each case related with fitting directions to the Motor Driver Input Pins. For model, on the off chance that 'Forward' key is squeezed in the Android Phone, '1' is communicated. Arduino will at that point make IN1 and IN3 as HIGH and IN2 and IN4 as LOW to accomplish a forward movement.



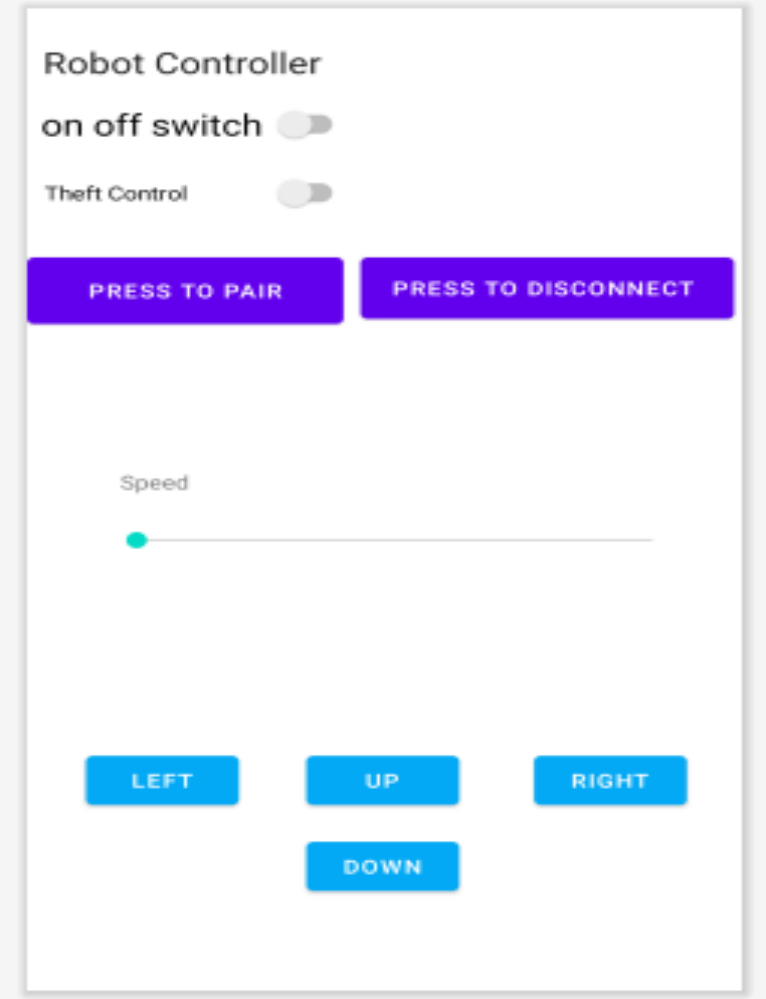


Fig2.5. App layout.

2.3. Componenets

- 1) Arduino uno
- 2) DC gear motor
- 3) Ultrasonic sensor.
- 4) Jumping wires
- 5) Motor driver
- 6) 4 wheels
- 7) Breadboard
- 8) Servo motor
- 9) Battery

- 10) Battery holder
- 11) IR sensors

2.3.1. Arduino Uno –

- It is a microcontroller board.
- We can use an extrapower suly and by using battery.

Fig2.6 Arduino

- To connect it with computer we csn use a USB port.

2.3.2. Motor Driver –

It is an integrated circuit chip which we will use as a motor controlling device in our project.

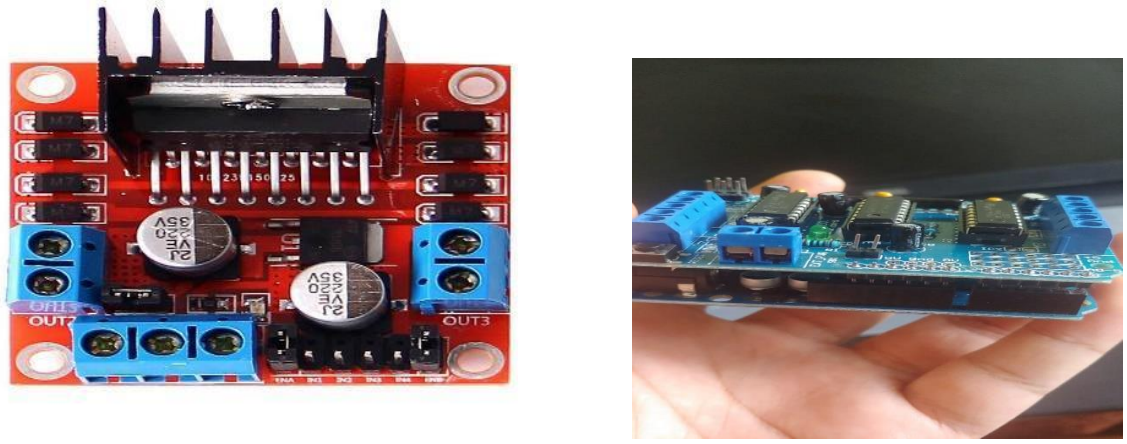


Fig2.7.Motor-drivr

A motor driver makes the motor move as per the given instructions or the inputs (high and low).Motor require high current as compared to the controller. It take a less and convert it into hcs.

2.3.3. Ultrasonic Sensor –

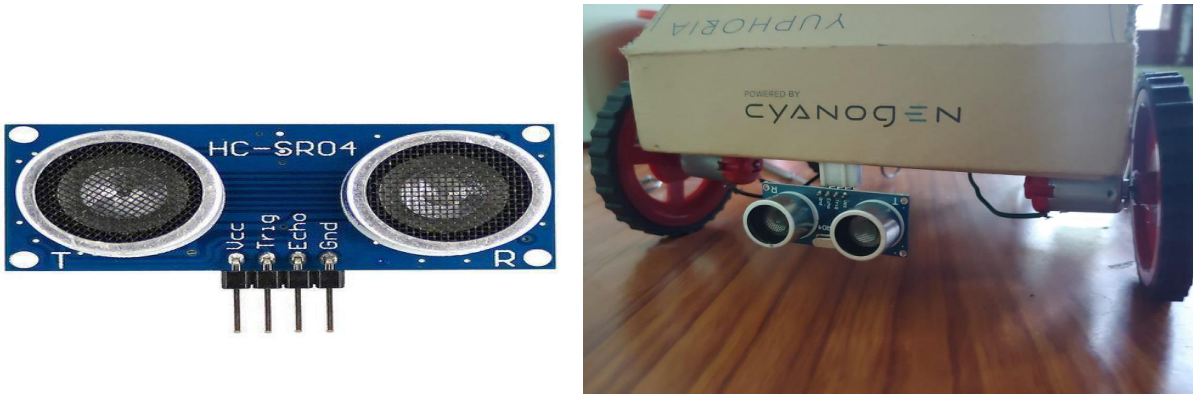
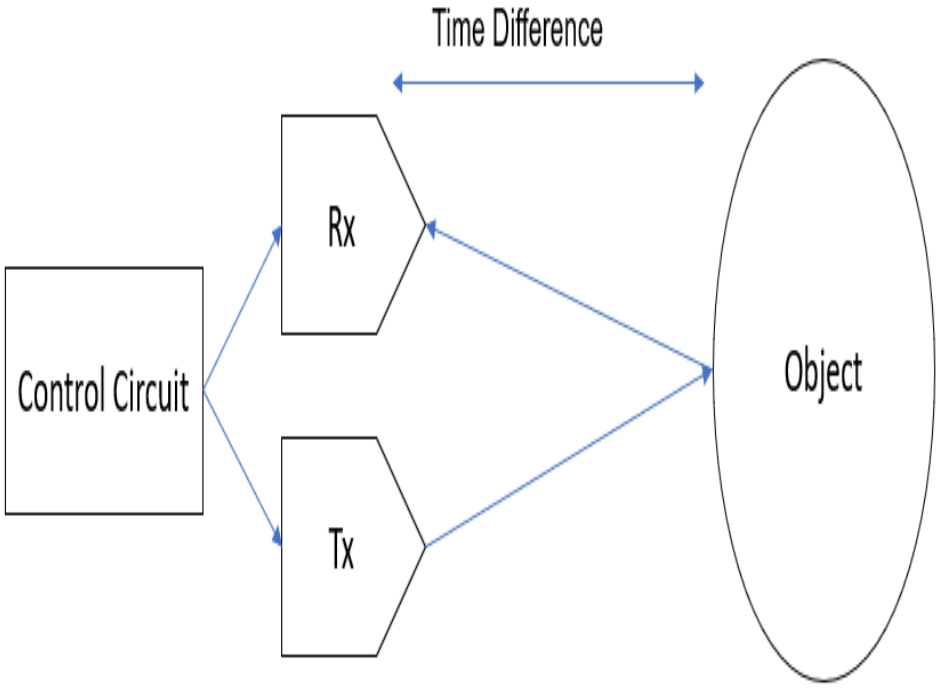


Fig.2.8.ultrasonic sensors.

It helps in estimating the distance of an objective. It will radiate ultrasonic waves, and convrts the sound that is electrical sign. Components of sensor are - the transmitter (which emanates the sound) and the recipient (which experiences the sound after it's headed out to and from the objective)

2.3.3.1 Ultrasonic Sensor Principle-

The design of the system consist of two units: one is processing unit and other is controlilg unit.The processing unit consists of various sensors .Control unit is liked with the processors Sensors helps the robot work fine.All the sensors helps in making one decision.



Block diagram of working of ultrasonic sensor

-

2.3.4. IR Sensor –

There are two types of infrared sensors: active and passive.

1) An active Ir Sensor can both transmit and detects at same time .
2) Passive ir can only detect.

Fig 2.9 IR sensor

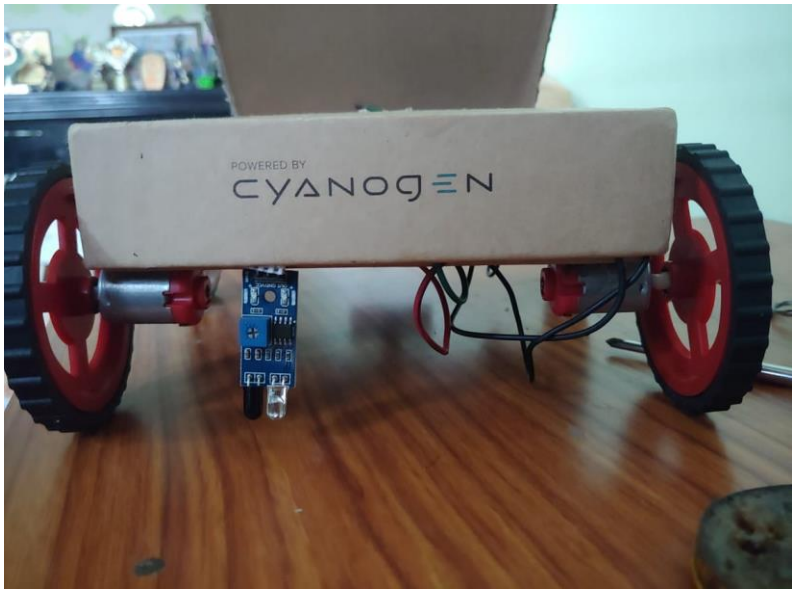
In this undertaking we will utilize PIR. Yet, it can just recognize human moving.

2.4 Working Model

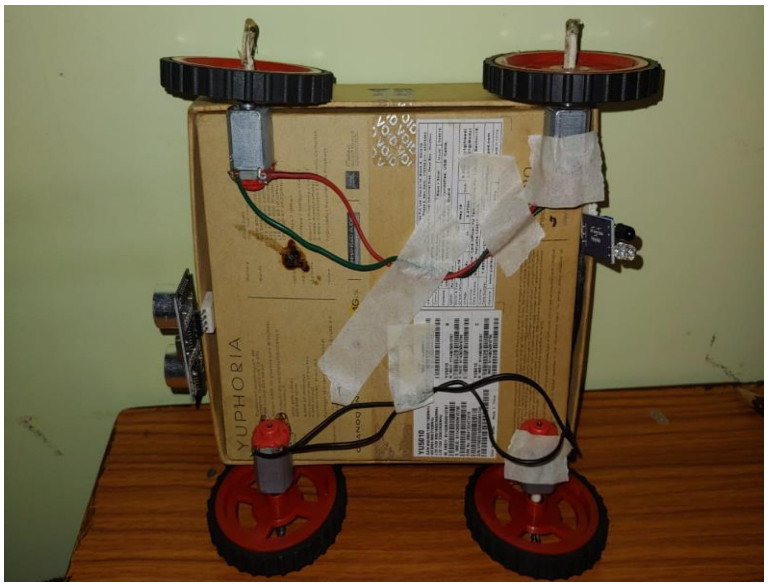
Front View

Top View

Rear View



Bottom View



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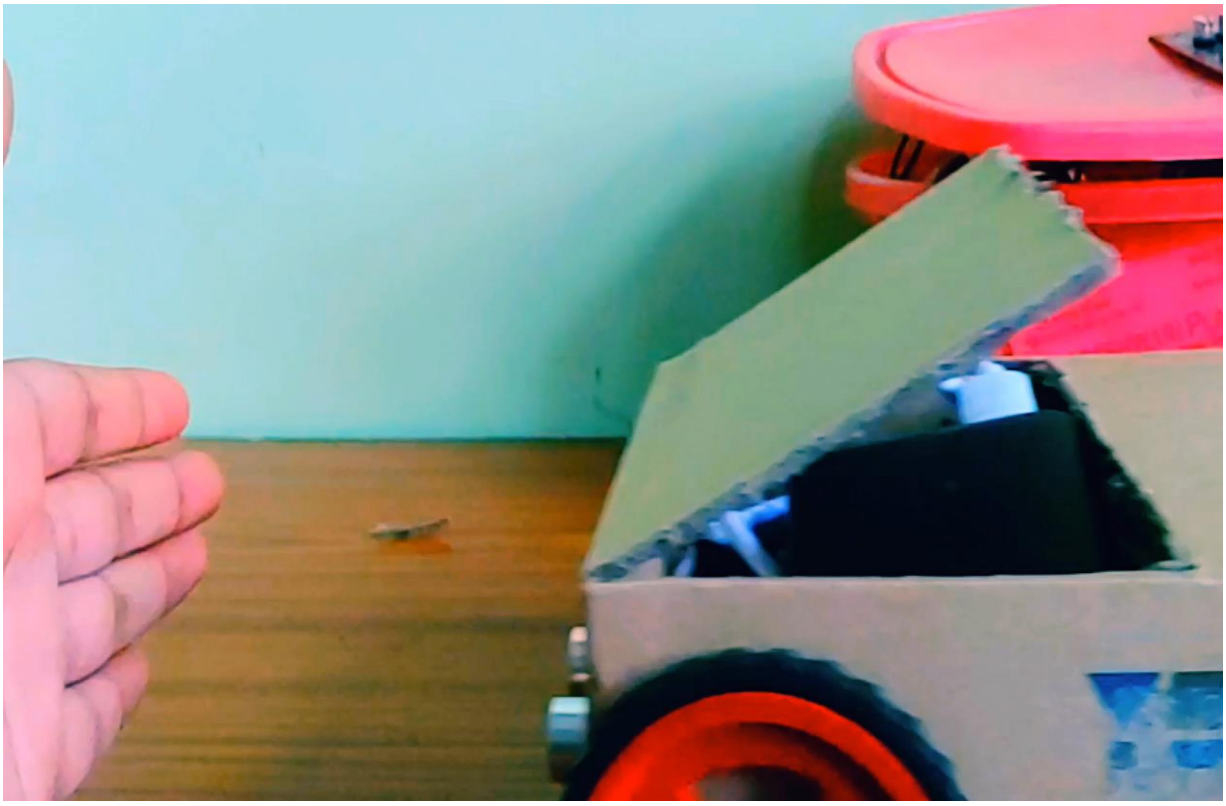
Video :-



2.4) Code :-

- //Ultrasonic sensor factors
- #define ENA 5
- #define IN1 7
- #define IN2 8
- #define IN3 9
- #define IN4 11

```
#define carSpeed 150
#define carSpeed2 150
int rightDistance = 0, leftDistance = 0;
void forward(){analogWrite(ENA, carSpeed);
 analogWrite(ENB, carSpeed);
 digitalWrite(IN1, HIGH);
/*digitalWrite(IN2, LOW);
 digitalWrite(IN3, LOW);*/
 digitalWrite(IN4, HIGH);
 Serial.println("Forward");
}
analogWrite(ENA, carSpeed);
 analogWrite(ENB, carSpeed);
 digitalWrite(IN1, HIGH);
/*digitalWrite(IN2, LOW);
```

```
•          digitalWrite(IN3, LOW);*/
•          digitalWrite(IN4, HIGH);
•          Serial.println("Forward");
•         }
•         void back() {
•          analogWrite(ENA, carSpeed);
•          analogWrite(ENB, carSpeed);
•          digitalWrite(IN1, LOW);
•          digitalWrite(IN2, HIGH);
•          digitalWrite(IN3, HIGH);
•          digitalWrite(IN4, LOW);
•         Serial.println("Back");
•         }
•         /*void left() {
```

```
• void right() {
• analogWrite(ENA, carSpeed2);
• analogWrite(ENB, carSpeed2);
digitalWrite(IN1, HIGH);
digitalWrite(IN2, LOW);
digitalWrite(IN3, HIGH);
digitalWrite(IN4, LOW);
Serial.println("Right");
}*/
void stop() {
digitalWrite(ENA, LOW);
• digitalWrite(ENB, LOW);
• Serial.println("Stop!");
• }
• void arrangement() {
```

```
//myservo.attach(3);/connect servo on pin 3 to servo item/
 Serial.begin(9600);
 pinMode(Echo, INPUT);
 pinMode(Trig, OUTPUT);
 pinMode(IN1, OUTPUT);
pinMode(IN2, OUTPUT);
 pinMode(IN3, OUTPUT);
 pinMode(IN4, OUTPUT);
pinMode(ENA, OUTPUT);
 pinMode(ENB, OUTPUT);
 stop();
 }
void loop() {
if((Distance > 20){
```

```
•	stop();
•	}else if(Distance <= 20) && (Distance >= 10)) {
•	forward();
•	}else if(rDistance <= 10) {
•	back();
•	delay(100);
•	}
•	/* else if(rightDistance - 3 > leftDistance) {
•	left();
•	delay(100);
•	}else if(rightDistance + 3 < leftDistance) {
•	right();
•	delay(100);
}*/else{ stop(); }
```

Users Command	Arduino O/P Digital Pins (2,3,4,5)	L293D Input Pins (2, 7, 10, 15)	L293D Output Pins (3, 6, 11, 14)
Forward	H L H L	H L H L	H L H L
Backward	L H L H	L H L H	L H L H
Left	- H L L L for 1s, then H L H L if previous Command was Forward - H L L L for 1s. then L H L H if previous Command was Backward		
Right	- L L H L for 1s, then H L H L if previous Command was Forward - L L H L for 1s, then L H L H if previous Command was Backward		
Stop	L L L L	L L L L	L L L L

Chapter- 3

Applications

3.1 Use as trolley –

This robot can be used as a load carrying trolley in airports, malls, restaurants.

3.2 Use In Hospitals –

.2.1 Serving Robots In Hospitals

There are numerous assignments in clinics where pushing and pulling of material is required. These hard core errands can be effortlessly completed by utilizing serving robots . Robots are likewise conveyed to supply food to different patients dwelling in medical clinic . They are utilized in the conveyance of food and drinks, apportioning of medications, eliminating of messy clothing, conveyance of new bed material, and transportation of ordinary and tainted waste and so forth inside the medical clinic

3.2.2 Disinfection Robots

Such robots are generally utilized in showering germ-free combinations over enormous outside regions e.g., private focuses of the city. These robots are distantly controlled to keep away from perilous contact with the sanitizer shower.

3.3 Use In Army-

3.3.1 Carrying Loads-

Robots in army can be used to carry heavy loads where movement of vehicles is restricted.

This can be very helpful in providing relief to the army.

3.3.2 Search and Rescue Robots –

This robot can also be used for the purpose of searching and rescuing , as it can go to places where humans cant.

3.4 Industrial automated equipment carrier.

We can use our robot in automotive industry to guide or to carry row and finished goods from one place to anoter place around the factory.

3.5 As guide in museums.

We can use our robot for guiding people in people according to their preference.

Chapter – 4

Challenges And Solution

4.1. Various Challenges

There are a few difficulties that are being confronted when building robots -

An individual after robot ought to be working appropriately in a jam-packed climate. It ought not be lost during following when there is a great deal of development in front.

4.1.1 In situation like city crowd robot can get easy confused.

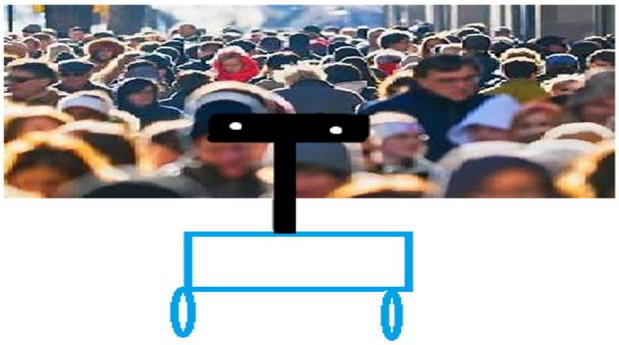


Fig 3.10.-traffic and robot.

4.1.2 A robot following person can increase or decrease speed

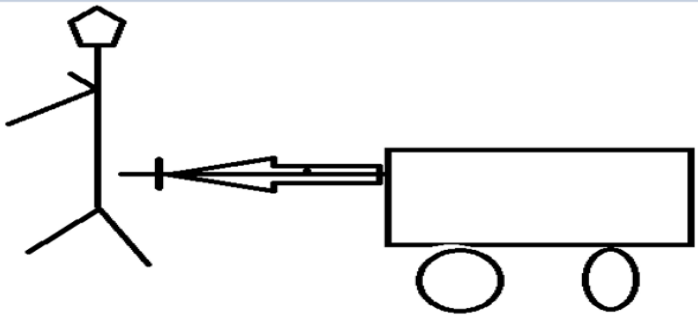


Fig3.11.:- man following robot.

4.1.3 There should be a safe distance between the robot and the man.

4.1.4 Robot should be able to detect stairs.

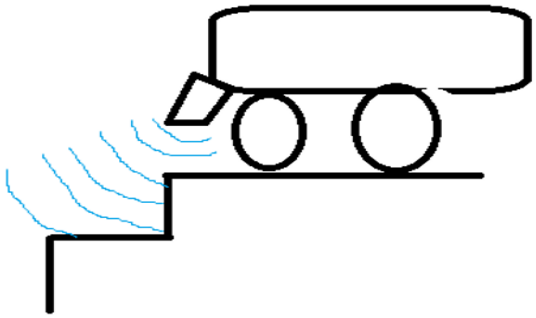


Fig 3.12- detecting stairs

4.2 Solution for our Problems

4.2.1. Theft Protection :

We can use various techniques to protect our luggage from theft some of them are as follow:--

4.2.1.1. Motorized lead.

The motorized lid will be open only by an app or remote.

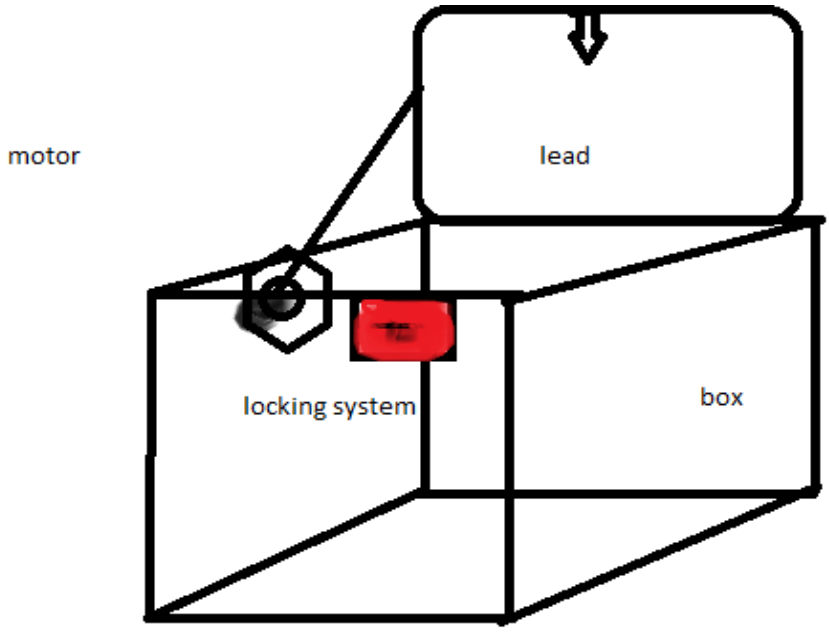


Fig3.12. Motorized lead

4.2.1.2 Theft alarm.

This will monitor the weight in the trolley if the weight = 0 the alarm will blow.

4.2.1.3. App notification .

We will receive a notification in our mobile phone via app.

4.2.2 . Stairs in Front:

In such case we will be using sensors which are placed in our trolley which will are set accordingly. In case of any stares the motor stop working and the we get a notification in our app.

4.2.3 Change in direction(reverse):

In such case we will be using sensors which are placed in our trolley which will are set accordingly. To reverse the direction of robot we need to backwards the course of current move through the motor. It can be done using H-bridge circuit.

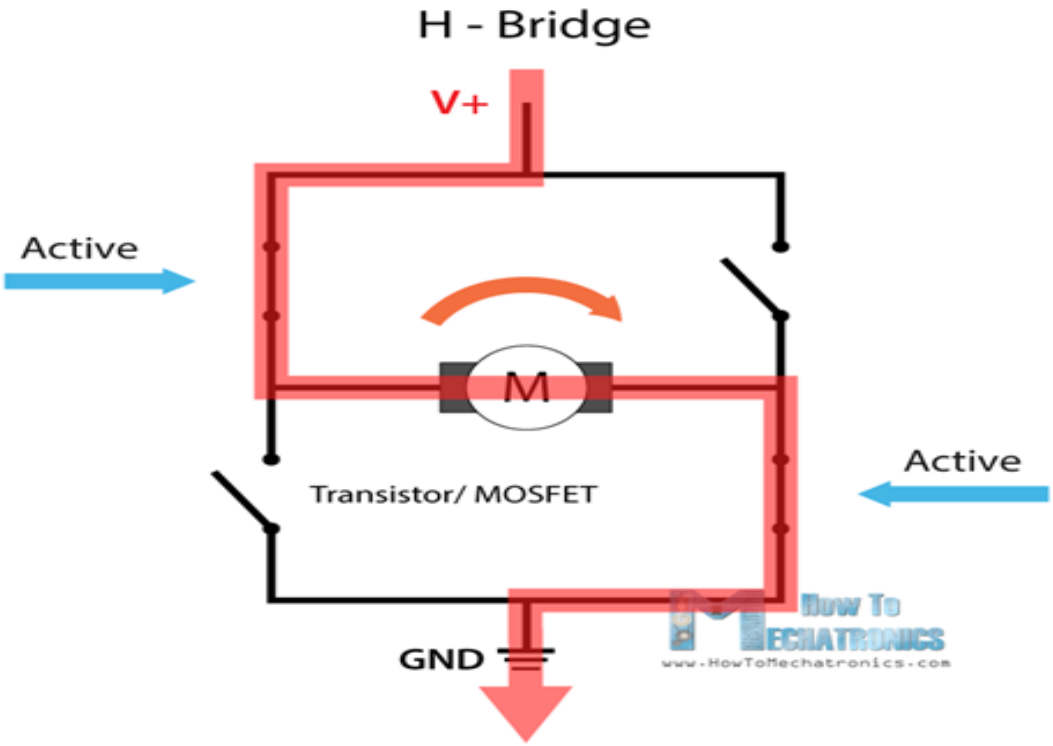


Fig.3.13.:-- basic diagram .

4.2.4. Increasing Or Decreasing speed

Controlling Speed Of Motor-

Speed of the motor are often controlled by controlling the voltage to the input of motor. It are often done using PWM signal. Pwm is a method of reducing delivery of the power.

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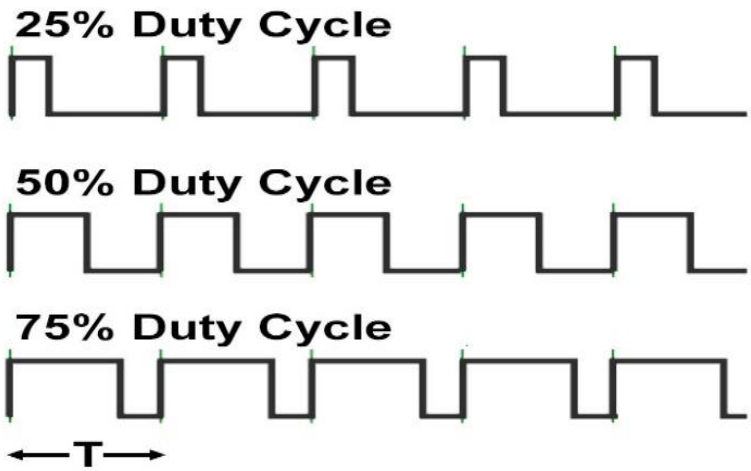


4.3 Work Done :-

Work done in 7th semester	**Work done in 8th semester**
Basics Of Project	Secure from theft
Literature Review	Use of app
Identified the sensors required	Functions of trolley (increase or decrease speed, direction change)

Identified Challenges Faced	Motorized lead

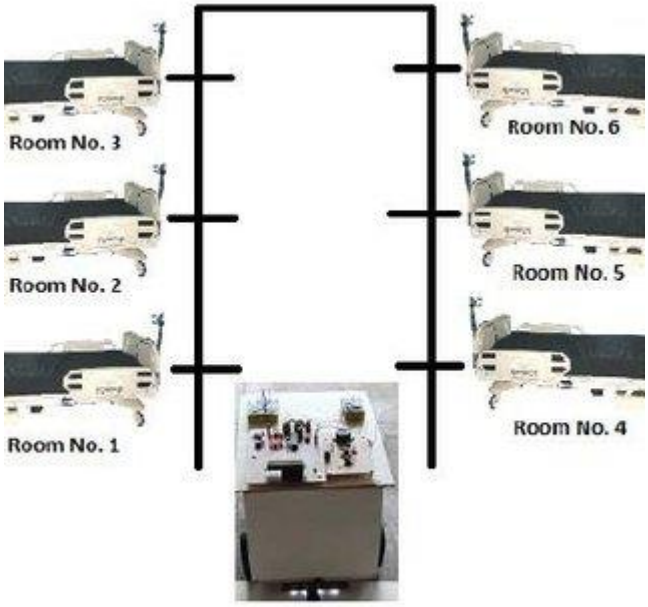
Table no.2 Work done

Chapter 5

Features

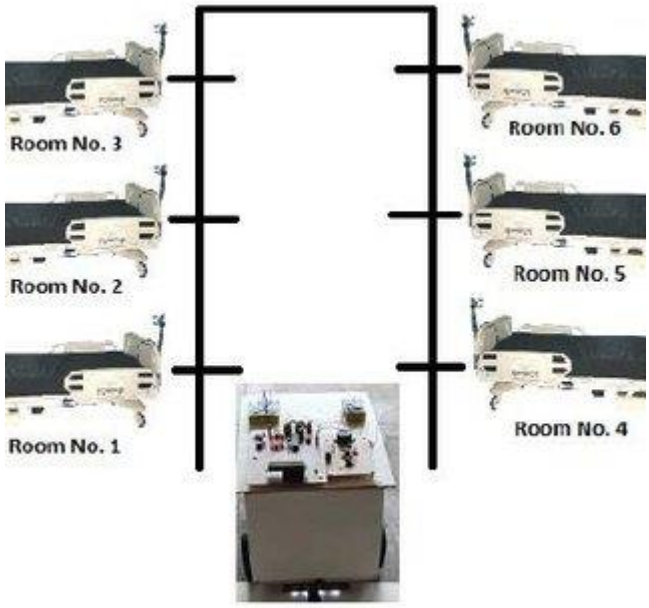
5.1. Use In Hospitals-

A line devotee robot can be utilized in emergency clinic. The robot utilizes IR sensors to detect the line. An IR sensor can be fitted close to the patient's bed to which association has been made with the robot as well. The switch for it very well may be actuated by the stock individual in the microcontroller itself. On the off chance that the switch is squeezed, a banner piece is set in the microcontroller, from which the robot follows the line and reaches close to the patient and give the medication to the patient.



5.2) Stairs Or Pit Detection :-

we have introduced two distance sensors on one or the other side of the robot to distinguish changes somewhere far off between the robot and the ground. The sensors effectively screen changes in distance, permitting the robot to effectively explore around drop-offs. it would take an estimation and see it as a source of perspective. At that point as the individual moves, assuming the distance expands, you know it's a pit, assuming the distance diminishes, you know it's a staircase(upward). It is as yet not altogether secure in light of the fact that it depends on two static perspectives (one for every sensor), which implies the robot could in any case be stumbled by more modest negative obstructions. Eg-potholes.



5.3) Motor – a easily replaceable motor can be used , so that if there is need to carry heavy stuff it can carry easily.

5.4) Speed- motor speed can be controlled with the help of the app.

5.5) Switch- a switch can be placed in robot so that we can easily switch between line follower and human follower.

5.6) Army- a robot can be made which can be used in rough terrains where vehicles can not go. It can also carry the inventory and other luggage of the soldiers.

Chapter 6

Conclusion

- The project that we are working on have various features. We have implemented different sensors in this trolley which helped in tracking and following the object. This robot will be helpful in various fields. It can be used as trolley in airports or malls , guiding robot in museums , assistance for elderly , carrying vehicle in army , delivering medications in hospitals and many more.

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