Acknowledgement

At this pleasant movement that having successfully completed our project, we wish to convey our sincere thanks and gratitude to the management of our college who provided all the facilities to us.

We would like to express our sincere thanks to principal **Prof. Satish R. Kerkal**, for supporting us to do our project and offering adequate duration in completing our project.

We are also grateful to Head of Department **Prof. Umale A.R.** for this constructive suggestions and encouragement during our project. Wish deep sence of gratitude, we extend our earnest and sincere thanks to our guide **Prof. Girge R.S.** for his kind guidance during project.

We also express our indebt thanks to our teaching & non teaching staff of **MECHANICAL ENGINEERING DEPARTMENT, GOVERNMENT POLYTECHNIC AWASARI (KH).**

- MR. Khadse D.P.
- MR.Hamid Zheer
- MR.Padmavat B.S.
- MS.Nagwade S.S.
- MR.More S.S.
- MR.Jadhav A.B.
- MR.Pokharkar S.D.

THANKS TO ALL.

Adaptive Head Light Control

DEDICATED TO OUR BELOVED PARENTS


SAMARTH RURAL EDUCATIONAL INSTITUTE, RAJURI'S

SAMARTH GROUP OF INSTITUTIONS COLLEGE OF ENGINEERING BELHE

SAMARTH COLLEGE OF ENGINEERING

SGOICOE

www.sreir.org/engg/

A STATE LEVEL CONFERENCE / EVENT

"RECENT TRENDS IN SCIENCE & TECHNOLOGY"

- Sponsored by -

Savitribai Phule Pune University, Pune

Savitribai Phule Pune University

Certificate

This is to certify that

Mr./~~Ms.~~ Raut Mayur Shivaji

From Government Poly. Awasari (Kh) has ~~participated~~ / secured 2nd rank in paper presentation / project exhibition entitled

with Adaptive Head Light control

on 14.03.2018

Prof. A. L. Khatode
Event Co-ordinator

Prof. D. S. Deshmukh
Dean Academics

Dr. A. S. Goje
Principal

ABSTRACT

The highest fatal traffic accident rate occurs on roads at night time. In most cases, the late recognition of objects in the traffic zone plays a key role. These facts point to the importance of the role of automobile forward-lighting systems. In order to provide enhanced day as well as night time safety measures, this work aims to design and build a prototype of headlights by adapting a conventional static headlamp with every close eye on cost and reliability. Different kinds of tests were done on critical parts of the system in order to determine its accuracy, its response time and the system impact.

Adaptive Head-light Controlling System (AHCS) aims at automatically adjusting the headlamps beam of the vehicle in a vertical direction to illuminate the sudden variation in the road ahead as much as possible without causing any discomfort to drivers. The head-light is mounted on the Servo motor. Accuracy, reliability and availability of the components were few considerations during the conceptualization stage.

Contents

❖ List of Figures:-

❖ List of tables:-

1. INTRODUCTION

Preventive and active safety of road vehicles is one of the top priorities in car design and development nowadays. Passive and active safety systems have been developed in R&D activities to produce vehicles that will perform at the highest level of safety and ensure comfortable driving under various conditions. Moreover, researchers have been trying to develop preventive and active safety systems that will actively support driving safety using today's advanced mechatronic systems. Lighting in modern vehicles has been steadily improving in the last decades. Modern technology provides new light sources and more powerful optical systems. With current sensors and control equipment, advanced dynamic lighting systems are possible. The Adaptive Headlight Control System (AHCS) is the outcome of engineering efforts in developing the next generation lighting systems not only for drivers but also for all other road users. AHCS automatically adjusts the light to match the direction of travel. That enables the driver to react more quickly because he/she will see the road ahead more clearly. AHCS significantly enhances driving safety in the dark by dynamically adjusting the headlights according to the vehicle’s current direction of travel to ensure optimum illumination of the road ahead and to give the driver much better visibility.

2. OBJECTIVE

- To investigate the lighting conventional system and mechanism in automobiles.
- To study the properties of an ultrasonic sensor and its working principles.
- To design and develop an Adaptive Lighting System to be implemented in automobiles.
- To propose a lighting system that can be commercialized for the types of Transportation.
- Operating time must be low.

3. WORKING

When any variation or Discounity well as another object or Vehicle comes across the road the ultrasonic Sensor senses the any sudden obstacles. Ultrasonic Sensor in air include continuous wave and pulse echo technique. In the pulse echo method, a burst of pulses is sent through the transmission medium and is reflected by an object kept at specified distance.

The acoustic emitted signal may find an obstacle or not. If an obstacle is found, the acoustic signal will be bounced back from the obstacle. This backbounced signal is called “echo”. The echo is received by the receiving transducer and is converted into electrical signal. Usually this signal is amplified, filtered and can be converted into digital form Using microcontroller. A Specified Programme As per Required For Adaptive Head Light Control Give to the Microcontroller.The elapsed time between transmission and reception, the distance between the UltraSonic system and object can be calculated. It can detect objects that are within a range of 2cm – 100cm

Servomotor receives Input signal from controller and rotate at an angle 106 degree either clockwise or anticlockwise as per the signal. Battery of 6V 2.5 Amp gives Electrical Supply to the Controller, Sensor & Servo motor.

Adaptive Head Light Control

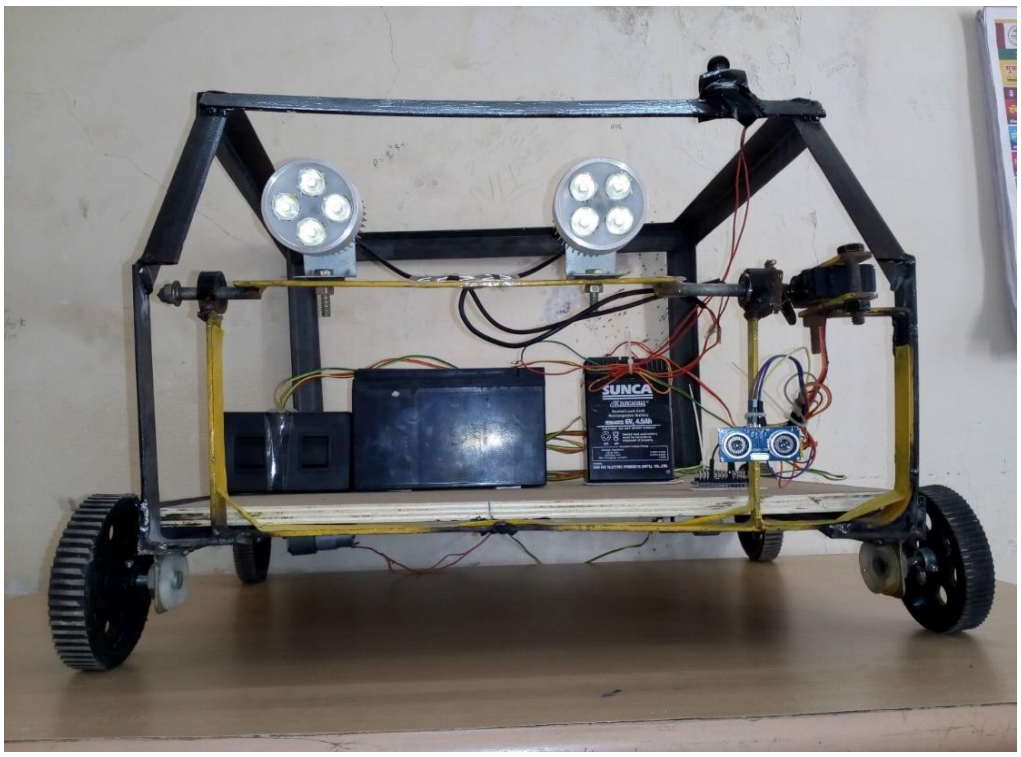

Figure:- 1 Model of Project.

In this work, distance of the object is measured through ultrasonic distance sensor and the sensor output is connected to signal conditioning unit and after that it is processed through Arduino Microcontroller (ATmega328). This application is also used to find the obstacles detection and the exact distance can also be obtained gives the input to the Servo Motor in the form of Electrical Signal & Servomotor as per the Microcontroller Signal. A remote controller is used to move forward & reverse as well as take turn right / left.

4. COMPONENTS USED

4.1. Ultrasonic Sensor :-

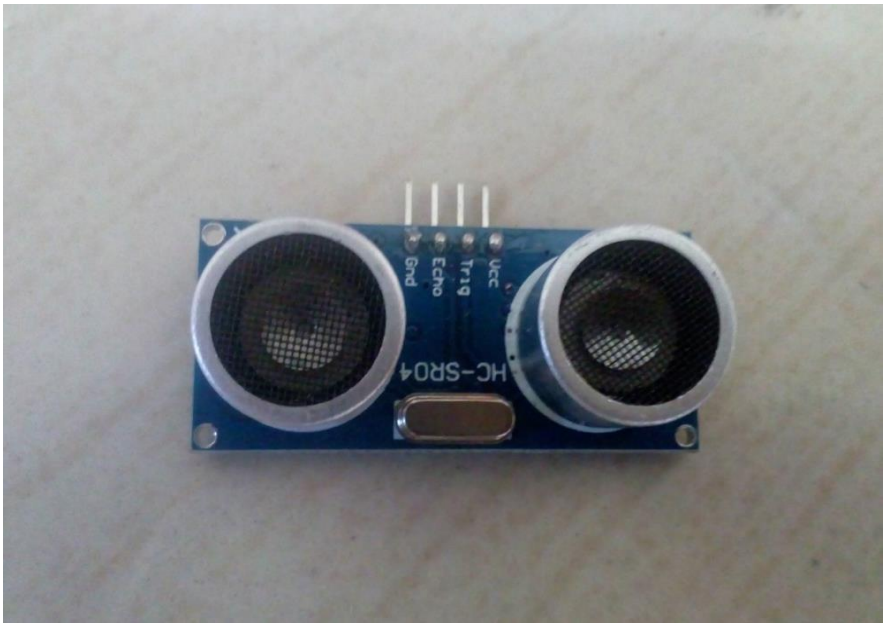

Fig:-4.1.Ultrasonic Sensor

This is the techniques of distance measurement using Ultrasonic Sensor. The time taken for the pulse to propagate from transmitter to receiver is proportional to the distance of object. For contact less measurement of distance, the device has to relay on the target to reflect the pulse back to itself. The target needs to have a proper orientation that is it needs to be perpendicular to the direction of propagation of the pulses. The amplitude of the received signal gets significantly attenuated and is a function of nature of the medium and the distance between the transmitter and target. The pulse echo or time-of-flight method of range measurement is subject to high levels of signal attenuation when used in an air

medium, thus limiting its distance range. The Ultra Sonic sensor works as a burst signal is transmitted for short duration (is emitted) by the emitter. After that there will be a silent period. This period is actually called “response time” and is the time waiting for reflected waves.

This application is based upon the reflection of sound waves. It emits an ultrasound at 40,000 Hz which travels through the air and if there is an object or obstacle on its path.It will bounce back to the module. the medium for the sound waves is air, and the sound waves used are ultrasonic, since it is inaudible to humans. Assuming that the speed of sound in air is 1100 feet/second at room temperature.

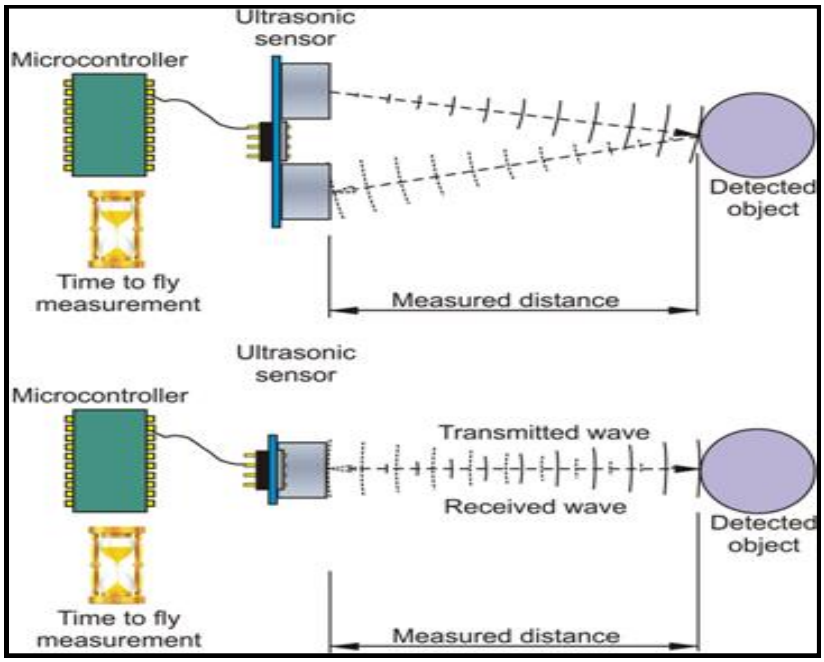

Fig.4.2 Working diagram of Ultrasonic sensor

4.2. Microcontroller :-

ATmega328 8 bit Controller

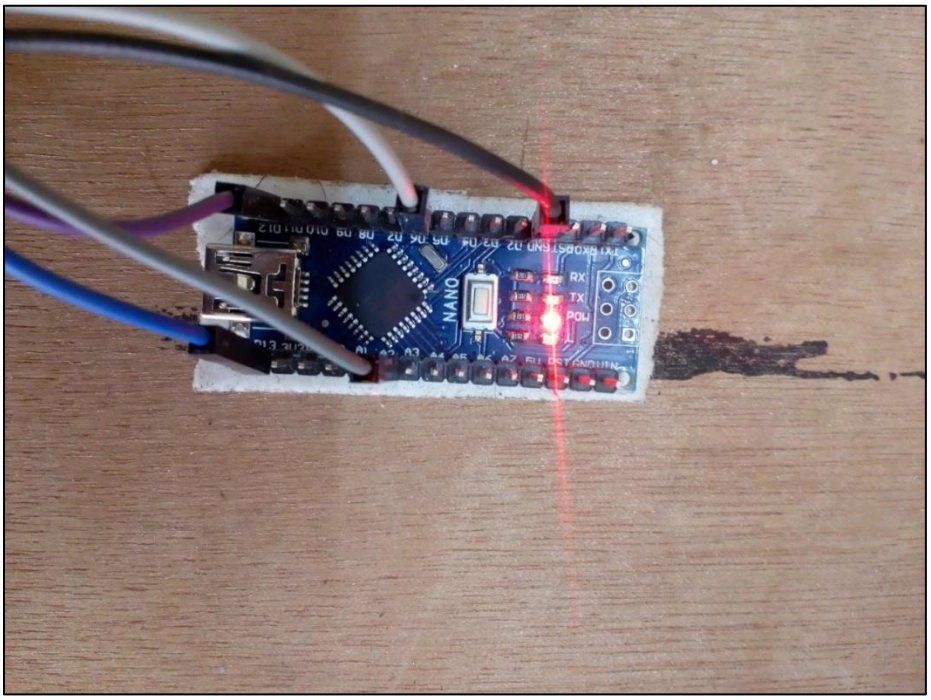

Fig 4.3 Arduino-ATmega 328 Microcontroller.

The Arduino Uno is an open-source microcontroller board based on the ATmega328. It has 14 digital input/output pins and 6 analog input. It contains everything needed to support the microcontroller, and it can be simply connected to a computer with a Universal Serial Bus (USB) cable to get started. The Arduino Uno can be programmed with the Arduino Integrated Development Environment (IDE). The C-based simple program code for the Arduino is referred to as a sketch. The Arduino can

be programmed upto 32 KB memory. Arduino can function autonomously without being connected to a computer, or alternatively programmed to respond mainly to commands sent from the computer via various software interfaces or to the data acquired from the input channels.

4.3. Servo Motor :-

Fig.4.4 Servo motor

A servomotor is a rotary actuator / linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotor. The motor is attached with the sensor to find the distance range around the sensor up to 1m. The measured distance

is calculated using Arduino controller within a predefined time interval. The analog output read from the sensor module is transferred to Servo motor through serial port via Arduino. The motor is controlled and interfaced with Arduino microcontroller to rotate in clockwise and anticlockwise direction.

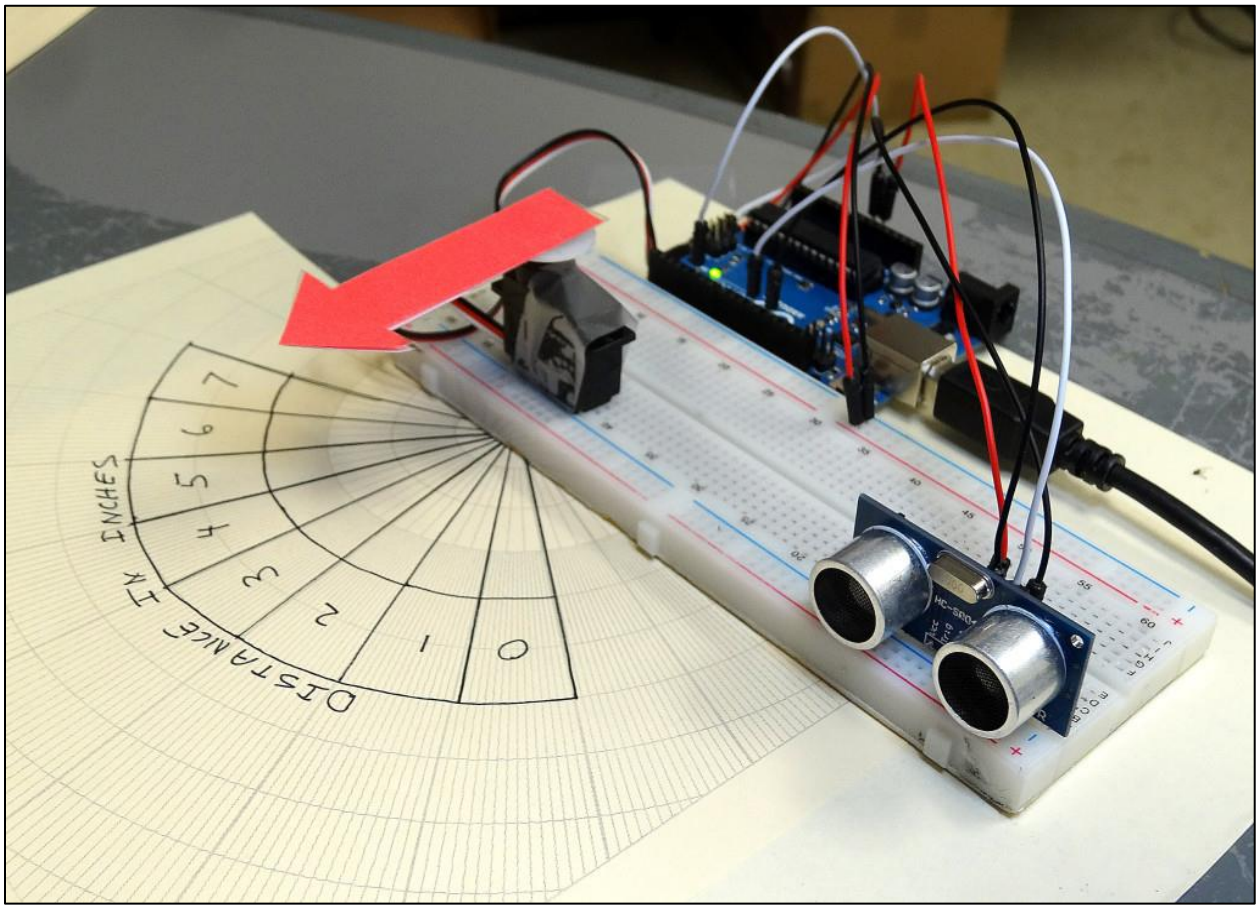

Fig.4.5 Working of Servo Motor

4.4. Head light :-

Fig.4.6 Headlights

Head lights are used for lightning purpose at night time driving. 2 Head Lamps are used of 12 V 500mA. Headlight is as shown in fig. It is mounted on a shaft with the help of Nut & Bolt. Load bearing are used at the both end of shaft to avoid friction as well as give smooth operation. Input Current is given to head light by the battery of 12 V 7.5 AH.

Push to ON push to OFF switch is Used to ON /OFF the head light of the car. Both Head Lights operate at a time when switch ON, lights ON and when switch OFF, lights is OFF. Headlight

Shaft connected to Servo motor which gives angle of rotation about 0-106 degree that a Servomotor operates as per Ultrasonic Sensor. Headlights should project sufficient light far in advance of the vehicle so that steering and braking can be taken in time, while not causing excessive glare to oncoming drivers. While driving, it is necessary to illuminate the rod ahead of the automobile so as to reveal objects ahead from a safe distance but improper lighting arrangements of the vehicles on road cause difficulty in driving at night.

4.5. Push to ON Push to OFF switch :-

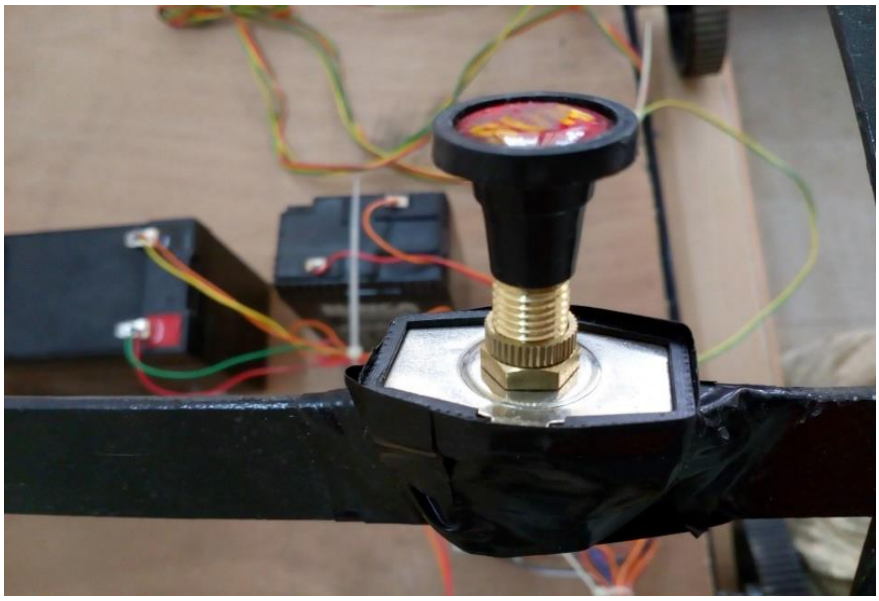

Fig.4.7 Push to ON Push to OFF Switch

Adaptive Head Light Control

A Push-button or simply button is a simple switch mechanism for controlling some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed. Buttons are most often biased switches, although many un-biased buttons (due to their physical nature) still require a spring to return to their un-pushed state. Terms for the pushing of a button include pressing, depressing, mashing.

A push button is a momentary or non-latching switch which causes a temporary change in the state of an electrical circuit only while the switch is physically actuated. Its input is connected to battery and output to the head lights. When Switch is on Electrical current flows from battery to switch to the Headlight its going to ON and when Switch is OFF the the current stop to Flows and Head light is OFF.

4.6. DC motor :-

Fig.4.8 DC motor

An electric motor is a device using electrical energy to produce mechanical energy, nearly always by the interaction of magnetic fields and current carrying conductors. The reverse process, that of using mechanical energy to produce electrical energy is accomplished by a generator or dynamo. Traction motors used on vehicles often perform both tasks.Electric motors may be operated by direct current from a battery in a portable device or motor vehicle, or from alternating current from a central electrical distribution grid. Two DC motors (200rpm 5 kg torque) for Drive the Vehicle. DC motors gives electrical current from battery of 12 V 7.5 AH.

Two Motors Are connected to Rear Wheel of the vehicle which gives speed and torque for the wheel to run the car.

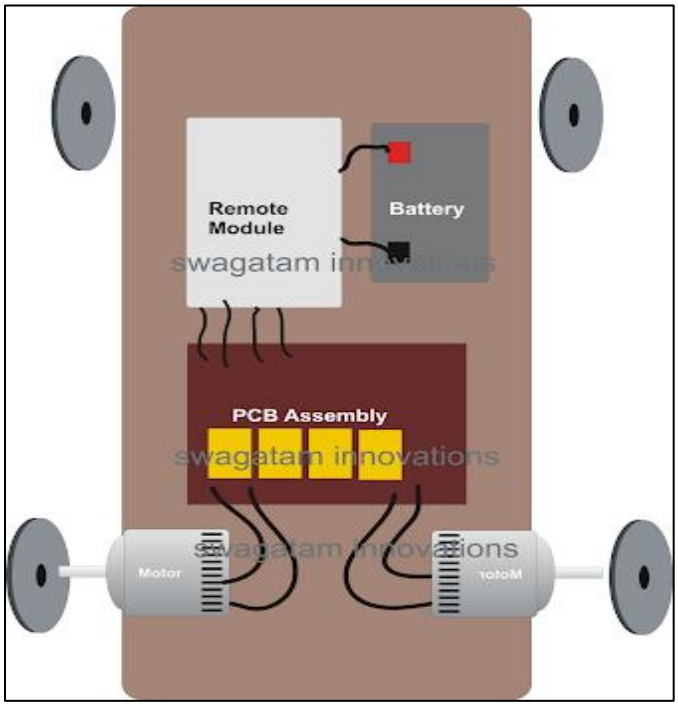

Fig.4.9 Construction of DC Motor

4.7. Remote Controller :-

Fig.4.10 Remote Controller

A remote control vehicle is defined as any vehicle that is teleoperated by a means that does not restrict its motion with an origin external to the device. This is often a radio control device, cable between control and vehicle, or an infrared controller. A remote control vehicle or RCV differs from a robot in that the RCV is always controlled by a human and takes no positive action autonomously.

4.8. Battery :-

Fig.4.11.1 Lead-Acid Battery

Battery are used to storage electrical energy Batteries seems to be the only technically and economically available storage means. Since the both the photo-volatic system and batteries are high in capital cost. It is necessary that the overall system be optimized with respect to available energy and local demand pattern. To be economically attractive the storage of electricity required a battery with particular combination of properties.

1. Low cost
2. Long life
3. High reliability
4. High overall efficiency

5. Low discharge
6. Minimum maintenance

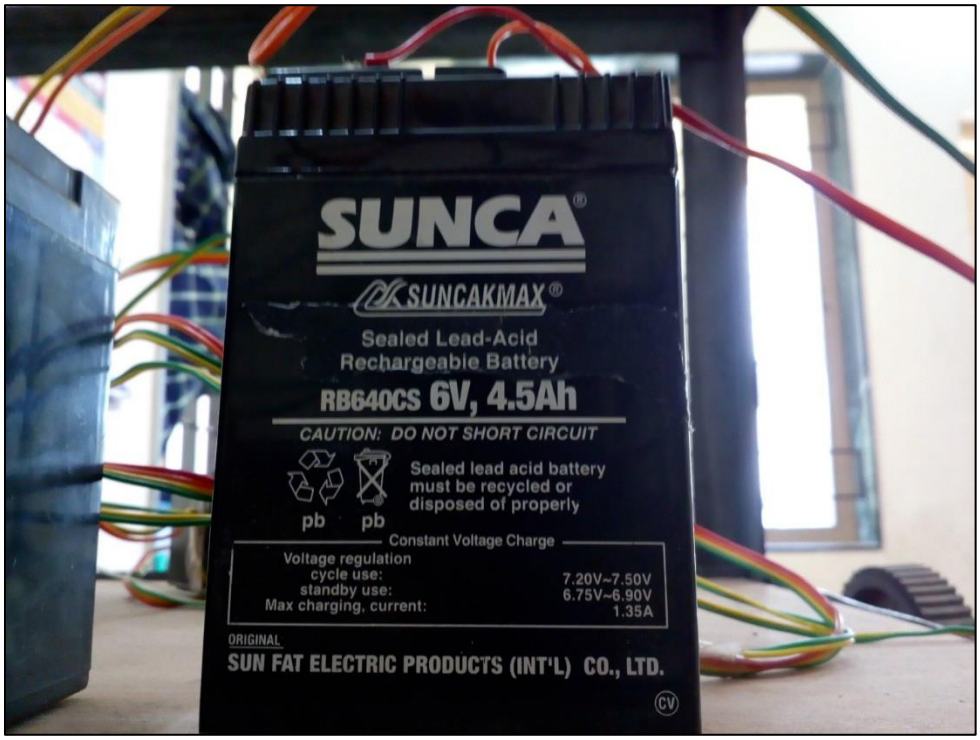

Fig 4.11.2 Lead-Acid Battery

Two Lead-Acid batteries are used 1st is 12 V 7.5 AH and another is battery of 6 V 4.5 AH. 1st battery connection is given to two DC Motor and the two Headlights. 2nd Battery connection is given to Sensor, Microcontroller, Servo motor.

5. PROGRAMME OF THE MICROCONTROLLER

```
1  #include <Servo.h>  //Load Servo Library
2  int trigPin=13; //Sensor Trip pin connected to Arduino pin 13
3  int echoPin=11;  //Sensor Echo pin connected to Arduino pin 11
4  int servoControlPin=6; //Servo control line is connected to pin 6
5  float pingTime;  //time for ping to travel from sensor to target
6  and return
7  float targetDistance; //Distance to Target in inches
8  float speedOfSound=776.5; //Speed of sound in miles per hour
9  when temp is 77 degrees.
10 float servoAngle; //Variable for the value we want to set servo
11 to.
12 Servo myPointer;  //Create a servo object called myPointer
13 void setup() {
14  // put your setup code here, to run once:
   Serial.begin(9600);
```

```
15  pinMode(servoControlPin, OUTPUT);
16  pinMode(trigPin, OUTPUT);
17  pinMode(echoPin, INPUT);
18  myPointer.attach(servoControlPin); //Tell arduino where the
    servo is attached.}
19
    void loop()
20
     {// put your main code here, to run repeatedly:
21
     digitalWrite(trigPin, LOW); //Set trigger pin low
22
     delayMicroseconds(2000); //Let signal settle
23
     digitalWrite(trigPin, HIGH); //Set trigPin high
24
     delayMicroseconds(15); //Delay in high state
25
     digitalWrite(trigPin, LOW); //ping has now been sent
26
     delayMicroseconds(10); //Delay in low state
27
     pingTime = pulseIn(echoPin, HIGH);  //pingTime is presented
28  in microceconds
29
     pingTime=pingTime/1000000; //convert pingTime to seconds
30  by dividing by 1000000 (microseconds in a second)
```

```
31  pingTime=pingTime/3600; //convert pingtime to hourse by
    dividing by 3600 (seconds in an hour)
32
    targetDistance= speedOfSound * pingTime; //This will be in
33  miles, since speed of sound was miles per hour
34  targetDistance=targetDistance/2; //Remember ping travels to
35  target and back from target, so you must divide by 2 for
36  actual target distance.
37  targetDistance= targetDistance*63360; //Convert miles to
    inches by multipling by 63360 (inches per mile)
38
     Serial.print("The Distance to Target is: ");
    Serial.print(targetDistance);
    Serial.println(" inches");
    servoAngle = (106./7.) * targetDistance + 37; //Calculate Servo
  Angle from targetDistance
    myPointer.write(servoAngle); //write servoAngle to the servo
    Serial.println(servoAngle);
    delay(100); //delay tenth of a  second to slow things down a
  little.}
```

6. DISTANCE MEASUREMENT CALCULATION

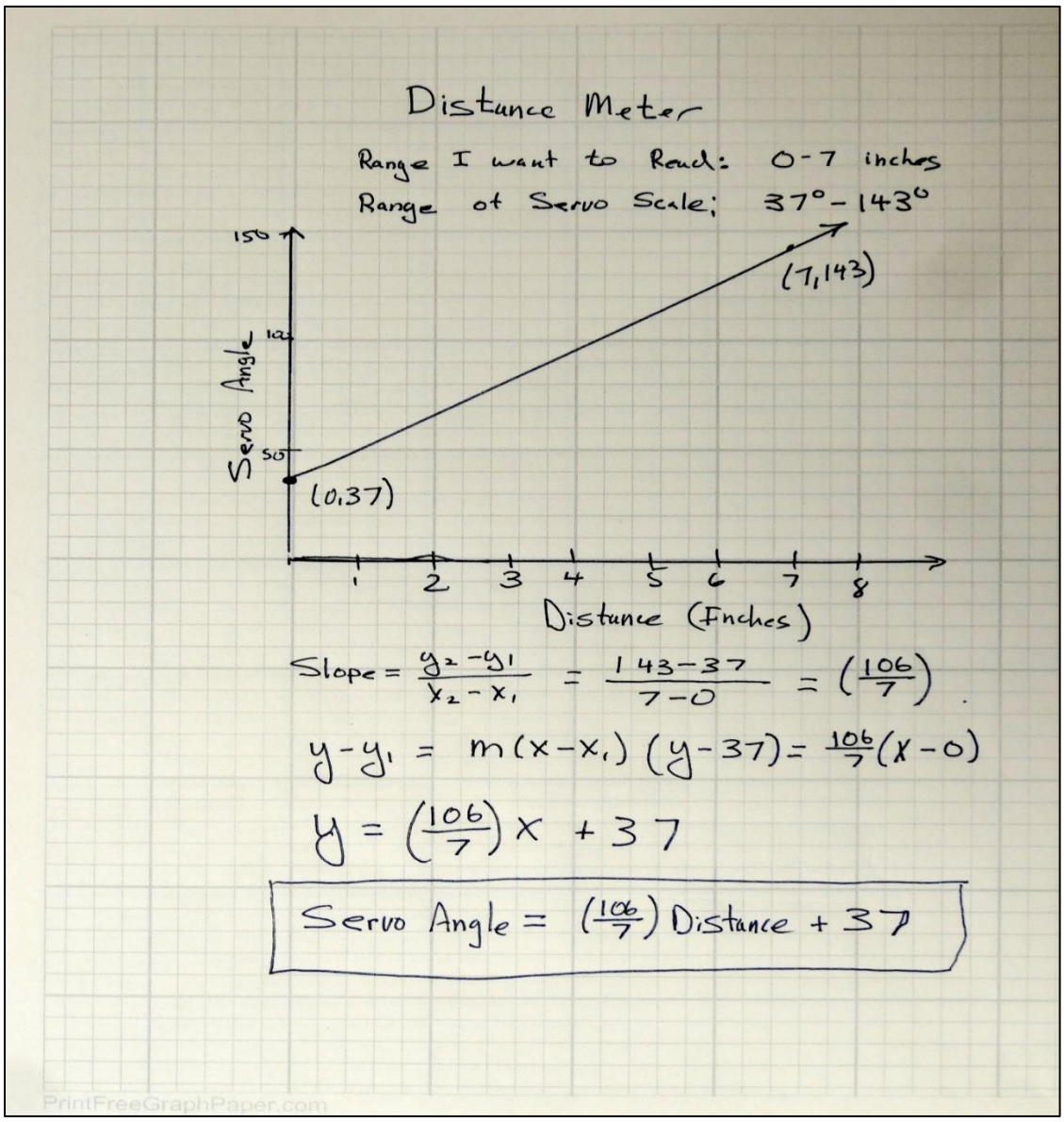

Fig.6. Distance Measurement Calculation Graph

7. ADVANTAGES AND DISADVANTAGES

Advantages :-

- Increased active safety when driving at night made.
- Reduce the rate of accident.
- Better Visibility to driver at night.
- Driver behavior like speeding, fatigued driving, or distracted driving can reduce the beneficial aspects of adaptive headlights.
- To Enhance the existing functionality.
- Increase Safety for drivers & pedestrians.

Disadvantages :–

- Rainy or wet weather could lose traction.
- Comparatively high price.

8. FUTURE SCOPE OF PROJECT

Adaptive headlights are an active safety feature designed to make driving at night or in low-light conditions safer by increasing visibility around curves and over hills. When driving around a bend in the road, standard headlights continue to shine straight ahead, illuminating the side of the road and leaving the road ahead of you in the dark. Adaptive headlights, on the other hand, turn their beams according to your steering input so that the vehicle's actual path is lit up. Similarly, when a vehicle with standard headlights crests a hill, the headlight beams temporarily point upwards towards the sky. . This makes it difficult for driver to see the road ahead and for oncoming motorists to see the driver approaching. In contrast, adaptive headlights use a self-levelling system that points the light beam up or down, according to the position of the vehicle. In future Adaptive headlights can be implemented in two ways, by providing additional Stepper motor. First for up-down movement for headlight and Second for left-right movement of headlight. For using this technology we have to change the our car front lightning system.

9. LIST OF MATERIALS

Table 1. List of Materials

SR. NO.	NAME OF THE PART	MATERIAL	QUANTITY
1	DC Motor	-	2
2	Battery	Lead acid	2
3	Servo motor	-	1
4	Headlight	-	2
5	Wheel	Rubber	4
6	Frame	MS	1
7	Sensor	-	1
8	Microcontroller	-	1
9	Switch	-	1
10	Bearing	Aluminium	2

10.MATERIAL COST

Table 2. Material Cost

SR. No.	NAME OF THE PART	QUANTITY	AMOUNT (RS)
1	DC Motor	2	1600/-
2	Battery	2	1450/-
3	Servo motor	1	650/-
4	Headlight	2	460/-
5	Wheel	4	200/-
6	Frame	1	350/-
7	Sensor	1	255/-
8	Microcontroller	1	480/-
9	Switch	1	40/-
10	Bearing	2	480/-
11	Other material	-	610/-
TOTAL			=6575/

11. CONCLUSION

This project work has provide us an excellent oppournity and experiences to use our limited knowledge. We get lot of practical knowledge regarding planning, purchasing, assembling, and machining while doing this project work. We feel that the project work is a good solution to bridge gap between the institution and the industries.

We are proud that we have completed work with limited time successfully. The actual working of adaptive head light control is satisfactory complete. We are able to understand the difficulties in maintaining the quality. We have done best of our ability and skills making maximum use of available facilities.

In conclusion remarks of our project work let us add few more lines about our impressive project work. Thus we have developed a “ADAPTIVE HEAD LIGHT CONTROL.” Which helps to know how to achieve simple automatic active mechanism. So for in future the same project will be remolded and design to carry out adaptive head light control.

REFERENCES

1. K. J. Ayala, 8051 Microcontroller, Architecture, Programming & Applications, Second Edition, Penram International Publishing (India), Mumbai, 1998.
2. Machine design practice
   R.s Khurmi
3. Theory of machine
   R.s. Khurmi & J.K. Gupta.
4. Production engineering
   P. C. Sharma.
5. https://youtu.be/rTM5gZxBPmY
6. http://www.toptechboy.com/arduino/lesson-18-distance-meter-using-ultrasonic-sensor-and-arduino/.

Adaptive Head Light Control