Implementation of Automatic Light and Speed Controllers for Automobiles

Anija Maria Jose[1], Minu Philip[2], Niveditha Ramakrishnan[3], Shalu Raj V R[4], Binsa Mathew[5]

B.Tech Student, Dept. of ECE, HKCET, Pampakuda, Ernakulam, Kerala, India[1,2,3,4]

Asst. Professor, Dept. of ECE, HKCET, Pampakuda, Ernakulam, Kerala, India[5]

ABSTRACT: Automatic Light and Speed Controlling system in automobiles is implemented using Arduino Uno board. In this paper, we propose indicator controlling using speech recognition and automatic light dimming and speed control. Arduino Uno is the core of this system. Wireless data transmission is used for accepting voice commands. Converting voice commands to control codes, indicators can be controlled. Light dimming is done based on the intensity of light falling on light sensing element and speed is controlled automatically using ultrasonic sensor.

KEYWORDS: Obstacle detection, Voice recognition

I. INTRODUCTION

Accidents are increasing day by day in our country. Drivers do not follow traffic rules properly. Drivers are not ready to use indicator while driving and they do not dim light properly during night. And high speed driving also leads to accidents. So our project is to avoid accidents by putting an end to above problems. This system consists of an indicator controlling section, light dimming section and a speed controlling section. System can accept inputs from all sections at a time. Speech recognition is used for controlling indicators where as analogue data like light and sound waves are used for light dimming and speed controlling.

II. LITERATURE SURVEY

Echeverry-Correa et al. [3] proposes an efficient method for automatic speech recognition system. For efficiency of this system, linear interpolation and k-means algorithm were used. Jung and Lee et al. [4] designed a health check system using body signals with wireless network of Zigbee. This is somewhat similar to usage of Bluetooth module in proposed system.
Headlights of vehicles always cause danger while night driving. Chilla et al. [5] implemented a light dimmer circuit using fuzzy logic. A fuzzy sensor is used for identifying the incoming light. Sensor will check the whether the received light is in acceptable level. Defuzzifyng output is generated from microcontroller. MATLAB is used for generating defuzzifyng output. Calculating distance between vehicles and intensity of light, system converts received light
Leena Thomas et al. [6] designed a speed control system using RFID. RFID tag is placed in each speed limit zone with a 12 digit code. Vehicles having RFID reader when enters in to this zone will receives a 12 digit code. Database associated with vehicles will have 12 digit code for RFID tag of each zone. If any of this 12 digit code is comparable with the incoming code, speed will automatically adjusts to the speed to be maintained in that zone. PWM module is used for speed control.

III. PROPOSED METHODOLOGY

For cost effective automation, proposed system is introduced. Proposed system will replace manual effort by speech. Instead of controlling indicators manually, speech recognition software is used for indicator controlling in vehicles. This will reduce human effort. For light dimming and speed control low cost components like LDR, ultrasonic sensors are used.

A. Block Diagram

Proposed project have 3 main sections: indicator controlling using speech, automatic light dimming and automatic speed control. Voice input is given to voice recognition application and is converted to control codes. These control codes are given to microcontroller using Bluetooth module. Input from the LDR is also given to microcontroller for controlling dimming of light. Speed control is done by using ultrasonic sensor. It will sense the obstacle at a particular distance and controls the speed.
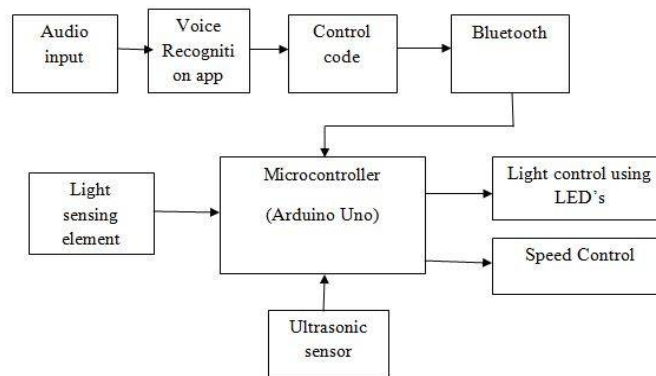

Fig. 1. Block diagram

Arduino is the core part of project. Arduino Uno is used in proposed project. Program code for Arduino Uno is less complex compared to other controllers. Controller can accept all inputs at a time. It can produce output corresponding to each input. Control codes from android application are given to controller via Bluetooth. Control codes are generated corresponding to each voice input. For light dimming, a light sensing element is placed in vehicles. Depending on intensity of light falling on light sensing element, light dimming is done.

Speed control is done with aid of ultrasonic sensor. Ultrasonic sensor will identify an obstacle by sound waves from sensor. Time taken by waves to come back to receiver of sensor after striking obstacle is calculated and motor speed is controlled if obstacle is in the range defined in program. Either motor can be stopped or speed can be controlled by PWM module when obstacle is identified.

IV. HARDWARE IMPLEMENTATION

A. Circuit diagram

Arduino Uno board is interfaced with LED and ultrasonic sensor. For transmission of control codes Bluetooth is used. Transmission pin of Bluetooth is connected to reception pin of Arduino. We can give supply from Arduino or can be given externally. Trigger and echo pins of ultrasonic sensor are connected as specified in program. LDR is connected between an analog input and 5V supply. Light dimming is done using LDR.
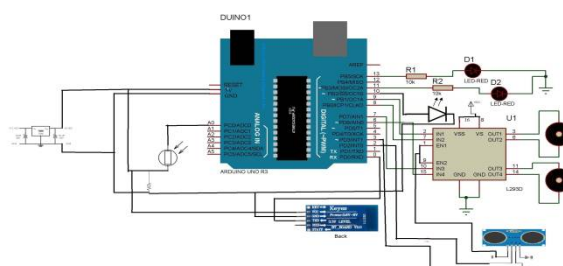

Fig. 2. Circuit diagram

Power supply is provided using LM7805. Using that, 5V and 0V can be generated. 12V is taken from main supply using an adapter. 12V, 5V and 0V are taken from 3 pins of LM 7805. 12V is directly given to Arduino board. But numbers of pins are very limited for Arduino. So for providing supply to all components LM7805 is used. Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input or output pins, 6 analogue inputs. It contains everything needed to support the microcontroller. The Arduino software includes a serial monitor which allows data transmission to and from the Arduino board. In proposed project Arduino control all input signals and provide necessary output. Light Dependent Resistor (LDR) is light sensitive device. They are used for light dimming. For communicating with controller HC 06 Bluetooth module is used. An Ultrasonic sensor is used to find by using sound waves. L293D is a Motor driver which is used to drive a DC motor. DC motor is used for showing demonstration of speed controlling.

B. Software

- *Language Used*

Arduino software (IDE) is used for programming. The Arduino Integrated Development Environment contains a text editor section, a message area, a toolbar with common functions and a series of menus. It connects to Arduino Uno and helps to upload program to controller.

- *Algorithm*

System has 3 inputs. One is obstacle coming opposite to vehicles. Second one is voice recognized for indicator controlling. Third one is light coming from opposite vehicles. All these sections are working parallel. Flow chart for each module is as follows. It shows the path for data flow. Once an input is received, system works in an infinite loop.

Algorithm for voice recognition section
Step 1: Start
Step 2: Input voice to voice recognition application.
Step 3: Compare generated control code with control code specified in program.
Step 4: If generated code matches with codes specified in program, perform corresponding action, else maintain same state.
Step 5: Continue steps from 2 to 4.

Algorithm for Light dimming section
Step 1: Start
Step 2: Read value on sensor.
Step 3: Compare generated value with value specified in program.
Step 4: If sensor value is less than or equal to a value specified in program (any value), reduces brightness, else maintain same state.
Step 5: Continue steps from 2 to 4.

Algorithm for speed controlling section
Step 1: Start
Step 2: Identify distance between vehicle and obstacle.
Step 3: Compare that distance with distance specified in program.
Step 4: If distance is less than or equal to a value specified in program (any value), reduces speed, else restart motor.
Step 5: Continue steps from 2 to 4.

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: **www.ijircce.com**

Vol. 5, Issue 3, March 2017

V. RESULTS AND DISCUSSION

The system has 3 inputs. If speech recognition system receives any voice input, Arduino checks the input received. Output varies as received code varies.

Table 1. Results

Code Received	Required Motor Movement	Required Indicator
1	Right	Right Indicator On
2	Left	Left Indicator On
3	Forward	Indicators are off
4	Stop	Indicators are off

Above table shows result of voice recognition section. Motor movement shows the movement of wheels of vehicles. When code '1' is received, right indicator gets turn on and motor moves to right direction. When code '2' is received, left indicator gets turn on and motor moves to left direction. When code '3' is received, indicators gets turn off and motor moves in forward direction. For stopping vehicles, code '4' is used. Control codes for voice recognition can be varied by changing control codes in program.

If distance between obstacle and proposed system is less than or equal to 50cm, motor stops. If intensity of light falling on LDR is less than or equal to a defined range, light gets dim. Range of light intensity and distance between vehicle and obstacle is defined in program.
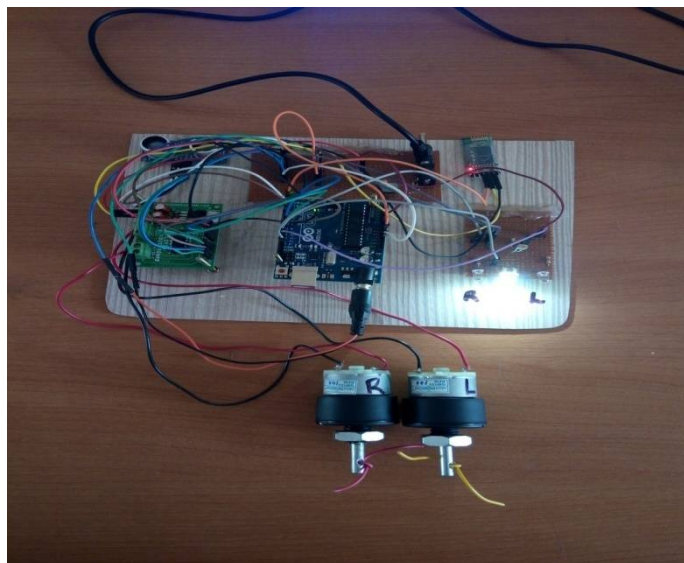

Fig. 3. Final prototype

Above figure shows the final prototype. There are two motors for controlling movements of wheels. Two indicators are used controlling indicators and another one is used for light dimming. LDR and ultrasonic sensor is used for light dimming and obstacle detection.

VI. CONCLUSION

This prototype is introduced to help drivers. It deals with automation in light dimming, voice based indicator controlling and obstacle detection. By introducing this system in vehicles, accident rate can be decreased. Voice recognition application can accept any number of inputs.

REFERENCES

1. H. Goutham, M. A. Arun Shrivasan, K. Arun Kumar, R. K. Praveen, "Smart eye using Ultrasonic sensor in Electrical vehicles for Differently Able", IOSR Journal of Electrical and Electronics Engineering, Volume 9, Issue 2, pp. 01-06,2014.
2. Preeti Saini, Parneet Kaur, "Automatic speech recognition: A Review", International Journal of Engineering Trends and Technology, Volume4, Issue2, pp. 132-136, 2013.
3. J.D. Echeverry-Correa, J. Ferreiros-López, A. Coucheiro-Limeres, R. Córdoba and J.M. Montero, "Topic identification techniques applied to dynamic language model adaptation for automatic speech recognition", Expert Systems with Applications, 42(1), pp. 101-112, 2015.
4. J.Y. Jung and J.W. Lee, "ZigBee Device Access Control and Reliable Data Transmission in ZigBee Based Health Monitoring System", ICACT 10th International Conference on Advanced Communication Technology, Phoenix Park, Korea, pp. 795-797, 2008.
5. Devashree Chilla, Manasi Joshi, Sanjyot Kajale, Seema Deoghare, "Headlight Intensity Control Methods", International Journal of Innovative Research in Computer and Communication Engineering, Volume 4, Issue 2, pp. 1140-1146,2016.
6. Leena Thomas, Swetha Annu James, Seril Joseph, Arya K B, Tedik Narah, Obang Pangu, "Automatic Speed Control of Vehicles using RFID", International Journal of Engineering and Innovative Technology, Volume 3, Issue 11, pp. 118-120,2016.
7. Wei-Bin Wu, Chun-Liang Hsu, Sheng-YuanYang, "Smart Wearable Device Design for Bicycle Lights Direction Control with Speech-recognition Function", International Symposium on Computer, Consumer and Control, pp. 53-56, 2016.
8. N.Maheswaran, K.Thamilan, P.S.Vijayakumar, D.Vadivel, "Automatic Light- DIM and DIP Control for Automobiles", International Journal of Engineering Trends and Technology (IJETT), Volume 29, pp. 41-45, 2015.