

VOICE ASSISTED DASHBOARD SYSTEM

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ABSTRACT Due to the speedy advances of knowledge associated automobile technology, speech recognition in automobile is an acquainted and accessible conception in today's world. Voice recognition based mostly home automation has long been explored in varied which offers a lot of product and solutions for those that have an interest in an exceptionally easier or manageable lifestyle. The automation focuses on recognition of voice commands and uses EasyVR voice recognition modules together with a microcontroller. Voice recognized dashboard system is a very useful application for the drivers, who are not able to do various activities efficiently when they are travelling in a difficult road condition. This paper presents a most useful voice recognition system for the automobile drivers who are unable to do the basic task of operating electronic components like windshield wipers, indicators, headlight etc. All of these systems can be controlled using one concept, i.e. by using the Arduino based voice module which will control the dashboard system using the voice of the driver. It will reduce the effort of the driver which will let them concentrate on the traffic and let them drive freely.

Keywords – Arduino Mega, Voice Recognition, EasyVR shield 3.0, Arduino IDE, Automobile Dashboard, Future Technology.

I. INTRODUCTION

Voice recognition-based vehicle dashboard system is one of the key emergent industries that can amend the way people live. The goal of the reported voice recognized vehicle dashboard system is to provide those with special needs with a system that can respond to voice commands and control the on/off status of electrical components, such as headlamps, wiper speed, indicators etc. in the automobile. The number of a road accident also increasing in parallel with the rapid increment of elderly people in India. It is very important to ensure the caring and support of these people by providing automated vehicle dashboard system. The main aim of voice assisted dashboard system for the drivers is to provide voice recognition automobile dashboard to control the on/off status of electrical components, such as wiper, headlight, indicator etc.

Since the early 1980s, smart home technology has been explored when the "intelligent building" model was cast-off. The model anticipated an intelligent implementation of consumer electronic devices, electrical equipment, and security devices. It aimed for the automation of domestic tasks, easy communication, and human-friendly control, as well as safety [1].

Humanoid Robot is a robot shaped in the form of a human. A Humanoid robot is used in many different fields such as education for young children, on field marketing for companies, research and development tool, entertainment and for tasks that are unsafe to be done with real people so humanoid robots are a tool for human luxury and safety.

This paper describes a simple and easy hardware for implementation of Face, Object and speech detection and recognition. And for the purpose of Voice identification we use and EasyVR module attached to Arduino Mega. The system is programmed using Python programming language for object and face recognition and for controlling the mechanism of the robot we write the program in Arduino. All these data are given to the Robot such that when an person or object is identified the robot speaks the name of the person or the object and then it can be controlled by using voice commands. This Robot can be used in real time in automated systems [2].

Voice controlled robot (VSR) is mobile robot whose motion can be controlled by the users by giving specific voice commands. The speech is received by a microphone and processed by the voice module using voice command. Proposed design supports voice activation system for physically handicapped person incorporating manual operation [3].

Voice controlled wireless smart home system has been presented for elderly and disabled people. The concept of controlling home appliances using human voice is interesting. The proposed system has two main components, they are (a) voice recognition system, and (b) wireless system. This system to control home appliances uses a voice controlled android application. By the increasing use of PC (personal computers), internet, mobile phone and wireless technology, it makes it easy for a user to remotely access and control the appliances. Generally, home automation research targeted many needs like applications that provide the luxury and smart requirements. The aim of the report

“Arduino Based Voice Controlled Home Appliances Using Bluetooth” is to furnish a system that can respond to voice commands and control the ON/OFF status of electrical devices, such as lamps, fans, television etc., in the home. The system should be reasonably cheap, easy to configure and easy to use [4].

The project come up with a new system called Arduino based home automation using Bluetooth. This system is super-cost effective and can give the user, the ability to control any electronic device without even spending for a remote control. This project helps the user to control all the electronic devices using his/her smartphone. With the help of this system, control the home appliances from the mobile phone. Turn on/off the home appliances within the range of Bluetooth. The home automation which would give the facility of controlling tube lights, fans and other electrical appliances at home using remote control [5].

II. SYSTEM OVERVIEW

The voice assisted dashboard system is an incorporated device to hit upon and understand human voice instructions on English voice command as an input to control the electrical components of automobile hands freely. The electrical components that may be completely operated based on voice instructions that are carried out by EasyVR module. Arduino mega is embedded with atmega2560 microcontroller. Which enables to control various components of dashboard. By integrating EasyVR voice module with Arduino mega operations are executed. Microphone is attached to the dashboard to sense the voice and convert it into analogue form. Eight channel relay modules is used to trigger the switches. Hence desired output obtained.



Fig. 1: Flow of commands

The framework gets actuated when any the predefined voice command is given. At the point when the user says a specific voice command, it enters the microphone of the Easy VR 3.0 at first and afterward the Arduino mega at the transmitting end gets it. The Arduino embedded with ATmega2560 microcontroller will transmit a specific command to the relay device at the transmitting end. Relay device activated by the digital output of the Microcontroller unit and it allows the components to turn ON or OFF as per the HIGH or LOW voltage output.

Hardware Design and Implementation

ARDUINO MEGA MICROCONTROLLER CARD

Arduino, a ready-to use electronic card, has the main microcontroller, pins to connect control units, and communication ports. The Arduino mega is a microcontroller board based on the ATmega2560. There are 54 digital input/output pins, and 6 of them can be used as a PWM output. Also, it has 16 analog input pins, a 16 MHz crystal oscillator, a USB input, a power input, and reset button. The card consists of the necessary things to support microprocessor [6].

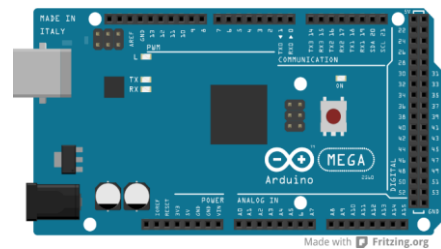


Fig.2: Arduino mega board

EASYVR SHIELD 3.0

EasyVR 3 is a multi-purpose speech recognition module designed to easily add versatile, robust and cost-effective speech recognition capabilities to almost any application. The EasyVR 3 module can be used with UART interface powered at 3.3V – 5V, such as PIC and Arduino boards. Some application examples include home automation, such as voice controlled light switches, locks, curtains or kitchen appliances, or adding “hearing” to the most popular robots on the market [7].



Fig. 3: EasyVR Shield 3.0

III. WORKING PRINCIPLE

Voice recognition module works on principle of voice matching with pre-registered voice commands. A multi-level voice recognition system is used in voice assisted dashboard dash board system which can hear and recognize various kind of voice commands. Voice recognition module EasyVR creates a voltage deflection whether commands match or not. This deflection in the voltage is sensed by the analog port of the Arduino mega microcontroller. Arduino is programmed using Arduino programming language Arduino IDE. It controls all the electronic components of the vehicle. Voice commands are pre-installed into the voice module and assigned with proper task. Voice recognition uses a neural net to “learn” to recognize human voice. As you speak, the voice recognition software remembers the way you say each word. This customization allows voice recognition, even though

everyone speaks with varying accents and inflection. Microphone in dashboard sense the voice and convert it into analogue form. These voice signals are sent to the EasyVR voice module for processing the signal and match with library commands. Matched signals produce a high voltage output, which is sent to the Arduino for controlling the operations. Arduino senses the high voltage from the voice module and it operates the relay. Arduino signals will activate the relay by allowing the current to pass through it, thus executing the tasks assigned.



Fig.4: Block diagram

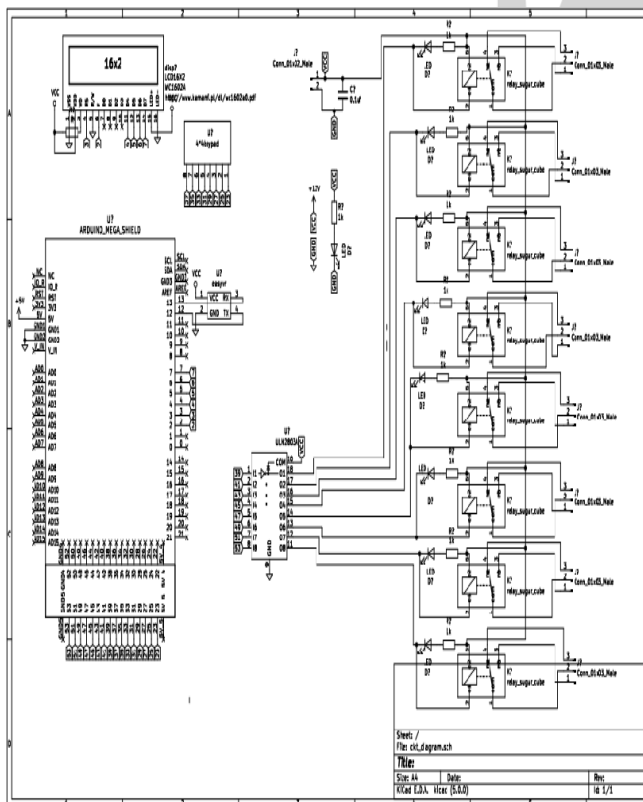


Fig. 5: Circuit diagram

After programming the Arduino microcontroller unit EasyVR is subjected to series of voice training process. Voice training for EasyVR is done using an application called EasyVR commander. In EasyVR commander certain groups are specified, these groups are having its own function. For example, group 1 is used to wake the device or it store the trigger word, and group 16 has the password. These groups are having its own sensitivity level. Group 16 which contains the password has the highest security level.

Which will be sensing the exact pitch of the voice which is prerecorded in training session. Voice might be mismatched in the noisy environment which can be rectified using a noise cancellation unit.

IV. METHODOLOGY

PROGRAMMING

One of the major advantages of the Arduino products is they are very easy to be programmed, Arduino IDE is a software developed by Arduino manufacturer which is user friendly. Sub programmes required to assist the main programme is available in the form of library functions, these can be called directly or it can be added if any modification has to be carried out. EasyVR is one of the voice recognition devices which is compatible with Arduino microcontroller. Programming Arduino has three parts: declaration, execution and printing out the result. Declaration section contains the predefined functions and variables required for the program. Here index is used as an identifier for different groups of EasyVR voice module. These index numbers are called whenever a command is approved by the voice recognition module. These group of commands are used to send voltages in the form of high and low voltage. Digital I/O pin of Arduino is connected to the relay module.

FABRICATION

Fabrication of model is minor part of this project. Fabrication is done in order to mount all the electrical components in a frame made of mild steel. Frame material is of angular cross-section having a thickness of 3mm. Frame is made by joining the mild steel angular plates by a welding joint. A plywood is carved with various components dimensions are fitted using screws.

ASSEMBLY

All the electrical components are fixed on the plywood which is mounted on a frame. Frame has a horizontal platform at its lower end which is utilized by the Arduino board and voice recognition module. A SMPS (switch mode power supply) is placed in the horizontal platform and screws are used to fasten it. SMPS is connected to the 250 V AC supply. Outputs of SMPS go to the various channels of the relay module. EasyVR is mounted on the Arduino Mega using an EasyVR shield. Digital pins of the Arduino are connected with the signal input pins of the relay module.

TESTING

First stage of testing process is checking the voice recognition module for different commands and its security levels. It is done by using voices of different people. Each command is spoken by different people with different voice modulation and recorded the result. EasyVR module will not recognize the unauthorized speech. Hence it provides a better security environment.

Second stage of testing involves recording the result of the device. Commands are given by an authorized person and checked for working of commands in different working conditions for the various electronic components.

V. RESULT AND ANALYSIS

As the voice assisted dashboard is a driver feasible system, which helps the driver to operate the all-electronic components of dashboard by voice command. In this system we have considered 14 different commands to operate 4 various electronic components like headlight, indicator, wiper and parking. The microphone is used to give command to the module, the different test is done in different noisy and normal condition. Various test results are obtained by placing microphone at different distances.

Voice commands were given multiple times to check the accuracy of the system and recorded results were plotted on a bar graph and a table below.

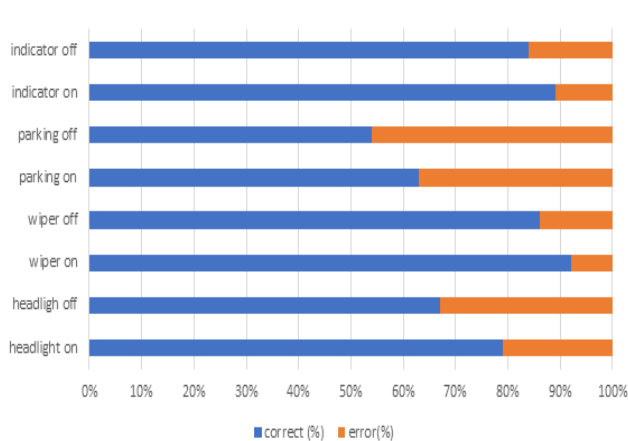


Fig. 6: accuracy test of components

Test command	No of trials	Accurate	Error
Headlight on	20	16	4
Headlight off	20	13	7
Wiper on	20	18	2
Wiper off	20	17	3
Parking on	20	12	8
Parking off	20	10	10
Indicator on	20	18	2
Indicator off	20	17	3

Table. 1: Test result

VI. FUTURE SCOPE

To manufacture dashboards of a car controlled by voice of humans is an innovative concept. In order to reduce the manual work automation is adopted. It is known that almost every technology in modern world is to help the user to reduce his/her effort. In this project a new concept of voice recognition in car is introduced. This uses the speech recognition algorithm to bring down the unnecessary distraction like ON/OFF of headlight and wiper etc. while driving the vehicle. The user will command through microphone installed in the dashboard of car. The signal is commanded in analogue form which needs to be converted into digital form by using electronic circuits. Eliminating of mechanical switches can improve the driver concentration on the road, which may result in preventing unnecessary road accidents caused by driver distraction.

VII. CONCLUSION

Voice Assisted dashboard system will be a very good alternative to the current manually operated dashboard switches like headlights, indicator and wipers. The programming mainly has the ability of controlling the wiper speed, ON/OFF headlight and dim/dip control, using the hazard indicator and the direction indicator, which mainly are controlled by the driver while driving the car. The voice assisted dashboard system will be helpful to drivers at night during traffics and other road problems. During the rain, the driver can control the speed of the wiper using his/her voice depending upon the amount of rainfall. Similarly, the hazard indicator will be voice commanded, which can be useful while travelling in foggy roads. And also, the headlights can be voice commanded to ON/OFF, and can be controlled for using dim/dip headlight. It will reduce the driver effort and the driver can concentrate in the traffic.

VIII. ACKNOWLEDGEMENT

The completion of this Project could not have been possible without the participation and assistance of so many people whose names may not all be enumerated. Their contributions are sincerely appreciated and gratefully acknowledged.

Our special thanks and gratitude to our guide Mr. Srinidhi Kukkila, Assistant Professor, Automobile Department for his generosity, co-operation and superb guidance that helped us in completion of our project.

We are very grateful to Mr. Jerome Anthony, Associate Professor Automobile Department for his support throughout.

we are grateful to Dr. Ramakrishna N Hegde, Professor and Head of Department of Automobile Engineering, Srinivas Institute of Technology for his support in this project which helped us to gain very essential knowledge and experience for our career.

It gives us immense pleasure in thanking Dr. Srinivasa Mayya D Principal, Srinivas Institute of Technology, Valachil for permitting us to participate in this project which helped us to gain very essential knowledge for our career.

Our special thanks to officials and editors of IJREAM (international journal for research in engineering application and management) for allowing us to publish our paper in their journal.

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