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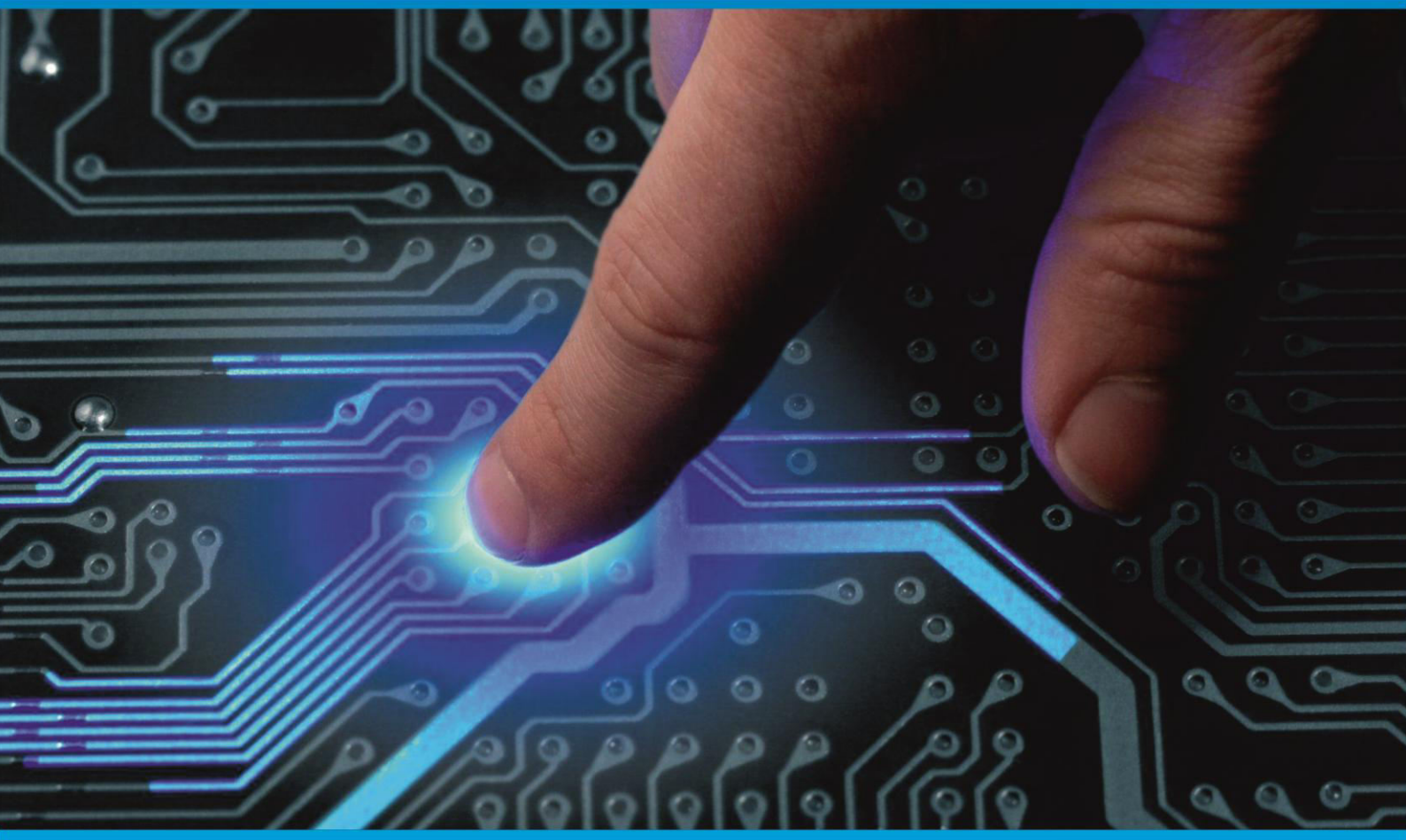

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IOT Enabled Arduino Based Voice Controlled Locomotive Neobot

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ABSTRACT: This works aim is to make up a private assistant by utilizing Arduino as a process chip and underlying material. It showcases the substitution of screen based mostly interaction by victimization the close technologies like artificial intelligence and IoT by connecting it with the physical widget. It's composed of elements like IR sensors, Pi camera, Mic and Motor Driver. It's a voice controlled personal assistant whose movements are going to be controlled through voice directional commands. It's the capability to try to as per the content from footage then communicate the reminiscent of the shopper by utilizing the built-in speaker. It will facilitate the visually disabled to attach with the globe by giving them the access to informative sources like Wikipedia, calculator so on by victimization their voice because the command. The proposed system is better than the existing systems and it overcame the disadvantages faced in the other systems by making it a standalone personal assistant that can be associated exclusively through the client's voice. Furthermore, which perform different errands like perusing content from a picture, controlling movement through voice based indicated directions, and so forth. This system is a model for an assortment of employment.

KEYWORDS: Arduino, Pi camera, IR sensing element, Optical Character Recognition, Open CV.

I. INTRODUCTION

Today, it's become terribly rare to search out a person while not interacting with a screen, no matter whether or not it's a computer or mobile. A screen that may be a postcard-sized surface has somehow become a barrier and escapes the route in social things, gripping our gaze and taking the United States of America elsewhere. Soon, with the increasing proliferation of the net of Things {IoT}, we are going to enter the amount of screen-less cooperation or Zero wherever we are going to finish up with additional screens, everything is going to be a screen. Zero-UI may be a technology that utilizes our movements, voice, and even musings to form a system that reacts to the United States of America through our conditions. Rather than operating it through clicking, composing, and sound, purchasers can presently enter information by means of voice. Interactions are going to be the emotional differences from telephones and PCs into physical gadgets that we'll speak with. This all possible by utilizing artificial intelligence or IoT. Artificial intelligence is that the branch of technology that manages the event, design, operation, and application of robots. Our assistant is made by artificial intelligence, which controls through the preset voice directions. It gets a regular signal from the IR sensing element thus on find the constant manner for a run. It makes use of the Pi camera module for typical written or written content from the image and articulates or utters it to the shopper by utilizing an inherent speaker. It will perform Arithmetic calculations with voice commands and giving back the solution through a voice with more intuitive queries by the assistant.

II. RELATED WORKS

[1]The net of things {IoT} is that the network of physical devices, vehicles, buildings, and alternative things embedded with physics, software, sensors, actuators, and network property that modify these objects to collect and exchange information. The IoT permits objects to be perceived and controlled remotely across existing network infrastructure, making opportunities for extra direct integration of the physical world into computer-based systems, and resulting in improved potency, accuracy, and economic profit. Once IoT is increased with sensors and actuators, the technology becomes an instance of the extra general category of cyber-physical systems that additionally encompasses technologies like sensible grids, sensible homes, intelligent transportation, and sensible cities.

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This system is additionally accustomed lift heavy weights which humans can't with their arms, which are more accurate, easy to observe, the work envelope is that the area a machine's arm can reach within its medium range of motions. Maximum payload is that the highest amount of weight a robot arm can safely carry and work with it. It includes the load of any additions to the robot arm, including the tooling. The robot lacks capabilities to retort to emergencies which sometimes makes this method most inefficient in nature. Losing security and privacy. These are a number of the key points to be noted before functioning on a project.

[2]Since auditory communication plays a critical role in many HRI scenarios, it's desirable that robots can also communicate through this medium. However, despite the important role it plays robot designers and HRI practitioners have attended pay relatively little consideration to the voices used on robots in HRI experiments. to check this assertion, we contacted a sample of first authors from papers involving spoken interaction that was published ultimately year's HRI conference. Eighteen of the twenty-five contacted authors responded, and that we learned that: six had used the NAO robot built-in voice; seven had used a voice generated with a Text-To-Speech (TTS) system, with the motivation that it absolutely was freely available or that it had been the voice that the robot came with; three had prerecorded the voice using actors, and two provided the outline of how the voice. Thus, it seems that a unifying, agreed-upon standard criterion or choosing a robot voice is lacking which in many cases robot voices are chosen out of convenience. Indeed, human voices contain an expensive amount of data. additionally, to communicating explicit speech content, they supply information per the background of the affective state, and identity. Research has also revealed that voices can provide clues on factors regarding the speaker's perceived attractiveness, personality, sexual orientation, intelligence, and health. thanks to these complex phenomena's this method have been considered to be in a very developing state.

[3]As the most natural and expressive means of communication, speech could be a suitable choice for human-robot interaction. Applying speech in robot control would be very convenient. Speech control robot system has potential for application in somewhere auditory communication plays a vital role. The operator only has to speak the command to the robot to form it achieve the task. The robot would be easily operated by a person's operator, who has limited knowledge about robots or computers.

A speech recognition system is to produce an analysis of the human's voice so as to see what action the robot has to be taken to satisfy the operator's request. the method of speech commands controlling is complicated. Oral commands are processed into a structure of features. These features may include signal characteristics like energy or frequency response. The features would be analyzed and compared with the info within the database.

We could see that noise is that the key factor that affects the popularity performance. So far, it's still one of the foremost difficult tasks to cut back the noise influence to automatic speech recognition.

[4]Everything from lights related to gas stoves to a garage door is controlled employing a central panel within the house or through wireless devices victimization an application or perhaps voice commands. it has been an oversized advancement in technology, wherever it proves terribly helpful in massive homes or for the otherwise abled like for the blind etc. Home automation could also be a replacement and relatively broad construct that encompasses an oversized array of varied technologies. Home automation isn't solely a luxury, apart from bound demographics rather like the mortal, the older and so the otherwise abled, it's of nice help.

Modern home automation is accustomed lock and unlocks the doors in an exceedingly very house. It's obvious that if the system isn't designed attentively on security this may well be a major threat to its householders. Also, if the system works on a wireless network, it's imperative to create sure that the channel is secure before any transmission is distributed.

A major issue that decides however victorious a home automation system is that the value the user has to incur. A system could have all the foremost recent bells and whistles, however, if the user cannot afford it, he merely won't decease. Price includes however the initial price of the merchandise moreover thanks to the worth of installation and long-run maintenance. Associate automation hub could seem to be low-cost however once you're taking under consideration the worth of all the additional appliances you would like to buy for along with the hub, the worth adds up. Also, if the system is wired, the worth of labor that's required for installation must be unbroken in mind.

[5]Today, robots are used as partners, assistants, and companions for various purposes. With the arrival of robots within the existence of humans, the way robot interacts with humans becomes important. This interaction should meet human expectations. There are different approaches to human-robot interactions like keyboard, mouse, touch-screen, and joystick, but using speech is that the most accepted approach, given the similarity to the human-to-human communication.

In this paper, a voice command recognition system supported by the hidden Markov model is meant and implemented on the SCOUT robot. the system consists of two main parts: The command detection system and also the robot system. The command detection system is intended in a very mat lab using the hidden Markov model. The robot system is operated by using the ARM microcontroller. The decoded command is shipped to the microcontroller via Bluetooth

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Module and converted to proper robot motion. additionally, the Persian speakers (non-native) are intended to use the voice command detection system. System performance will decrease if it's trained by native speech data. Therefore, a nonnative database is recorded and ready. It consists of 10 English commands. Test results of the system have shown a suitable detection rate. Overall objectives of this study are achieved and therefore the movement of the both mobile platform and two arms of the SCOUT robot is controlled by designed voice command detection system successful. The voice command system spells every word correctly. It spells every word it recognizes correctly. Typically, it recognizes 5–20% of words incorrectly. It cannot recognize homonyms.

[6]To control a robotic car using our voice we an awfully simple approach 1st all the human commands get converted into text and for this, we use Google's speech to text converter, it's all implemented within the android app that we are using next to the text kind of the command is being transmitted to the Bluetooth module of the robotic car. This Bluetooth module act as a bridge between the micro-controller of the car and therefore the android app for data transmission. After the text command is received by the micro-controller, it controls the movement of the robotic car accordingly. it's an awfully low-cost micro-controller, thus, making it very effective easily available, and extremely common to search out in day-to-day appliances. , this technology also requires lots more development. Thus, expanding its applications farther where at the moment we can't consider.

[7]The mobile robot system is controlled by two computers; one is attached to the mobile system and also the other is employed because the static system to manage by the user sitting in one fixed place. Both of the computers are connected via WLAN. a hard and fast computer (PC1) is connected with the microphone, which receives the voice signal from the speaker and transfers it to the mobile system computer (PC2). The speech recognition module detects the voice commands, and therefore the robot executes the action per the given voice command.

To extend the robot can move multiple locations if there are multiple orders at the identical time like" GO TO ROOM TWO ZERO FOUR then visit SENSOR LAB".

A voice system is implemented and tested in real-time on a mobile robot. The voice system shows good lead to different performed experiments and recognizes the voice of a speaker and executes the task consistent with the speaker's commands. The system is demonstrated efficiently in real-time conditions.

[8]To make human-robot communication natural, it's necessary for the robot to acknowledge voice even while it's moving and performing gestures. for instance, a robot's gesture is taken into account to play a vital role in natural human-robot communication. additionally, robots are expected to perform tasks by physical actions to form a presentation. If the robot can recognize an individual's interruption voice while it's executing physical actions or making a presentation with gestures, it might make the robot more useful. during a noisy environment, the accuracy of the speech recognition would be reduced distinctly.

III. PROPOSED SYSTEM

Instead of clicking, composing, and tapping, clients can enter data by means of voice. Intercommunication will be moved away from telephones and PCs into other physical gadgets which can communicate with.

The proposed system is with the final goal that it can surpass the disadvantages of the current framework by making it a standalone personal assistant that can be executed exclusively through the client's voice. Furthermore, which perform different requests like following content from a photo copy, controlling movement through voice based indicated directions, and so on. This system is a model for an assortment of employment.

IV. METHODOLOGY

The implementation of the obstacle avoiding spy robot, which can be operated manually as per the operator wants to take control of the robot himself, it also can be autonomous in its actions while intelligently moving itself by detecting the obstacles in front of it by the help of the obstacle detectable circuit. In manual operating conditions the user will have a radio transmitter (TX) via which the user will send signal to the radio receiver (rx) present inside the robot which then pass on the signal to the microcontroller board, and as per the coding of the signal signatures embedded inside the microcontroller chip and the robot will complete its movements.

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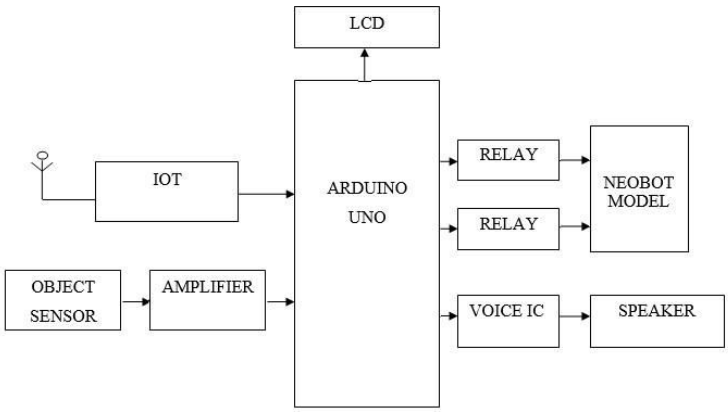

HARDWARE, SOFTWARE REQUIREMENTS

ARDUINO UNO

In Arduino uno based on Atmega328p board basedthe microcontroller has been designed. the 14 digit I\O pins of which 6 can be used as PWM output,6 analog input, a 16MHZ quarts crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller, by simply connecting it to a computer with a USB cable we can work with it.

LCD DISPLAY

A liquid-crystal display (LCD) could be a flat-surfaced display or another electronically modulated device that uses the light properties of liquid crystals combined with polarizers. Liquid crystals don't emit light directly, rather than employing a backlight or reflector to supply images in color or monochrome. LCDs are employed in a good range of applications, aircraft cockpit displays, and indoor and outdoor signage. Small LCD screens are common in LCD projectors and portable consumer devices like digital cameras, watches, digital clocks, calculators, and mobile telephones, including smartphones.

MOTOR DRIVER

Motor Driver circuits are current amplifiers. They act as a bridge between the controller and therefore the motor during a motor drive. Motor drivers are made up of discrete components which are integrated inside an IC. The input to the motor driver IC or motor driver circuit may be a low current signal. The function of the system is to convert the lower current signal to a higher current signal. This higher current signal is then provided to the motor. The motor will be a brushless DC motor, brushed DC motor, stepper motor, other DC motors, etc.

VOICE IC

Up to 7 sorts of operating modes: MP3 mode, one to at least one key mode, parallel mode, one record one play key mode, Audio-book mode, two-wire serial mode, and three-wire serial mode supports MIC and LINE -IN recording, plug-in 64M bit SPI-FLASH, recording time up to 1600 seconds, upload and download voice via USB, playback the high -quality voice which downloaded from a computer, Can record up to 252 segments voice (including fixed voice), With the function of power-down data protection, Support sound recording at 10 kHz or 14 kHz sample rate, Adopt a separate document management system, recording without debris, more reasonable distribution of SPI-FLASH space, Support key and MCU control, 8-level controllable volume, Operating voltage: DC2.6 ~ 3.6V, sleep current: 10uA (typical), Module package: DIP28, is defined, reference value: 18.30mm * 36.00mm, WTV-SR using SPI-FLASH store voice messages, the present version supports the most important of 64M. Specific because the following table, the table data is from sound recording at 10KHz sample rate (unit: sec)

SPEAKER

A speaker is an electroacoustic transducer that converts an electrical signal into sound waves. The speaker moves in accordance with the variations of an electrical signal and causes sound waves to propagate through a medium such as air or water. After the acoustics of the listening space, loudspeakers are the most variable elements in a modern audio system and are usually responsible for most distortion and audible differences when comparing sound systems.

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DC MOTOR

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Here in this application the tires are attached with the DC motors and through the voice commands the neobot can be moved to the desired direction.

RELAY

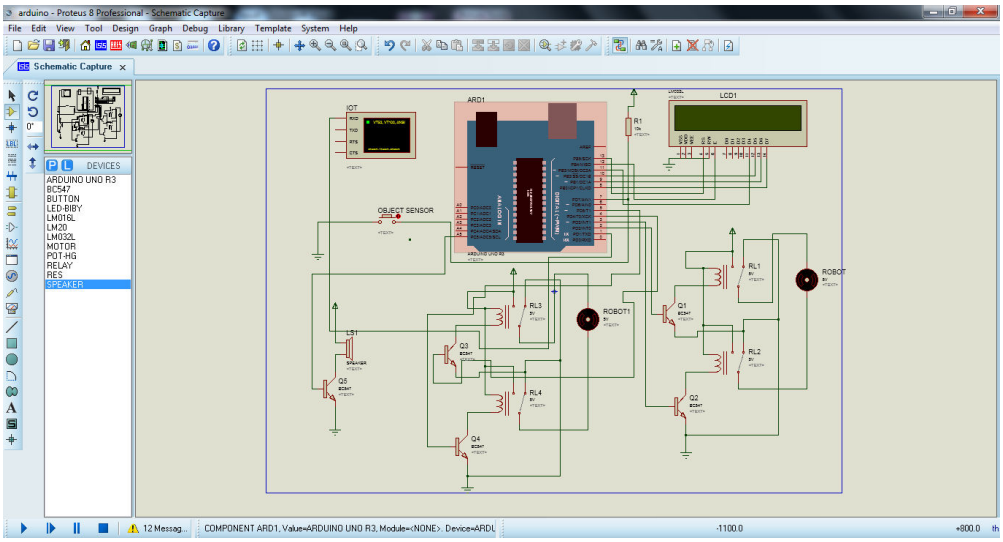
A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and switches the switch contacts. The coil current can be on\off so relays have two switch positions and they are doublethrow (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example, a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

ARDUINO IDE

The Arduino IDE(Integrated development Environment) is a software which is like a workspace we use to write codes to any kind of application for Arduino to connect the Arduino with the other hardware which helps the system to operate and which also has a virtual toolbar in which it contains lots of tool to customize and optimize the system, through this software we can insert required functions to the system.

V. RESULT

The Voice controlled personal assistant has many working modules, for example, Voice Control, Character recognition, and Virtual Assistant. After several runs and tests, our features have worked proficiently and then all the features are effectively integrated into this assistant and contributes towards the better working of the unit. Hence the project has been effectively devised and examined. Combined with AI and propelled data analytics utilizing Google Assistant API, the assistant develops the capability customized association with the clients. The proposed Arduino based voice-operated personal assistant brings more comfort and simplicity for the debilitated individuals.



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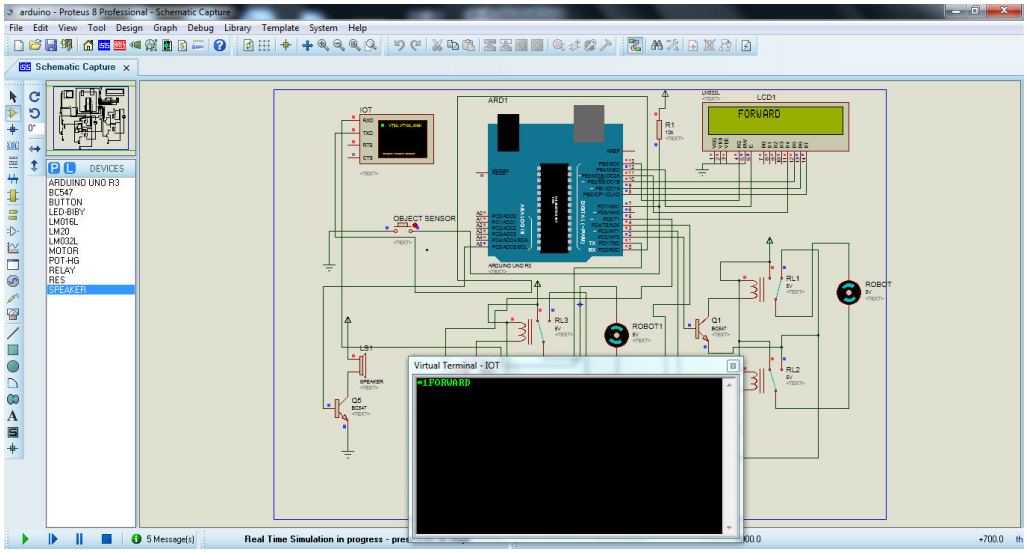

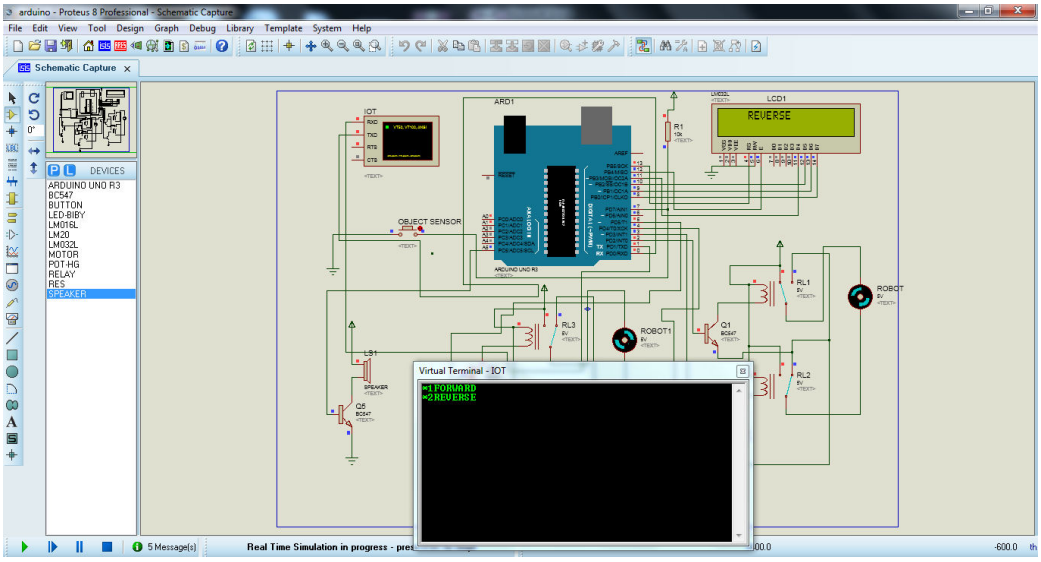

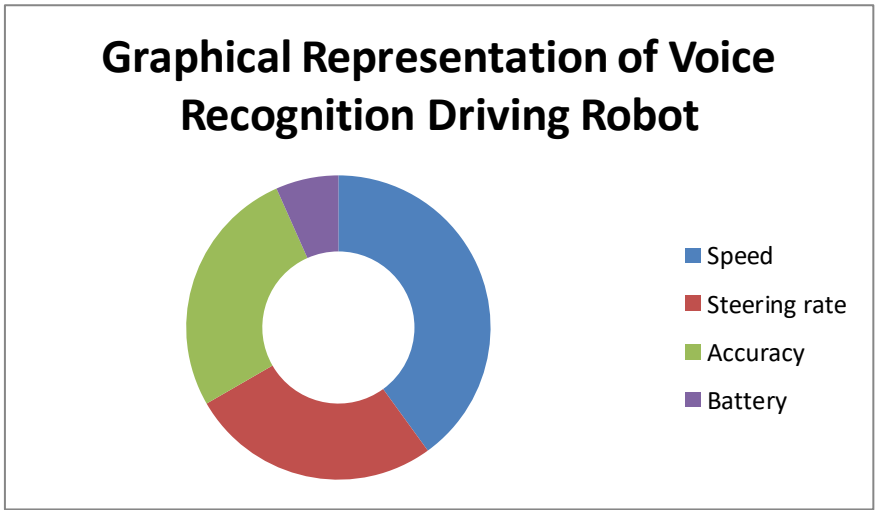

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VI. CONCLUSION

The aim of this article is to provide a system that enables individuals to use their voice to control robots or other home machinery. The mobile phones nowadays are growing more and more powerful devices, which have the capacity to interact with other appliances through Bluetooth, Wi-Fi, etc. Bluetooth being a cheap mode of communication but also, provide a powerful mode of connection. After all our research and projects about controlling devices using voice pay off and finally leads us to the conclusion that Yes, it is possible for human beings to control their day-to-day appliances just by their voice.

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