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Home Automation System Based on Voice Recognition

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Abstract— *This paper introduces the outline of the minimal cost voice home automation system based on voice recognition to control the different home machines and can activate the bed height just by the voice orders as indicated by their need and solace. The proposed system comprises of a voice recognition module, Arduino uno microcontroller, transfer circuit to and a flexible bed. The voice recognition module should be prepared first before it can be utilized to perceive charges. Upon effective recognition of voice command the Arduino drives the relating load with the assistance of the transfer circuit. The flexible bed height can be set to the three unique modes according to the client solace and need. The precision of voice recognition module is likewise estimated in various conditions. The test comes about approve the elements of the proposed system. The outcomes demonstrate the system can give extraordinary right hand to the physically challenged individuals with no third individual's assistances.*

Key Words: **Voice Recognition, Home Automation System, Physically Challenged People, Adjustable Bed Motorized Jack, Arduino Uno**

1.INTRODUCTION

The home automation systems are picking up popularity step by step because of their usability and wide tasks capacities. Coordinating voice recognition innovation to home automation systems make the system more easy to use and simple to work. Some require home automation system to fulfill their necessities and solace while for physically challenged people it can give great help.

There have been a few researches and improvements on the home automation systems. The voice recognition-based home automation system [1] utilizes the Microsoft speech API running on PC to perceive the voice commands. The RF transreceiver is utilized to send these orders to the controller to control the different electrical gadgets. The utilization of PC makes this system more costly and hard to deal with.

Home navigation framework for hindered and elderly individual [2] proposed a framework which uses voice recognition module SR-07 for the discourse acknowledgment process, an Arduino controller, a wheel seat and a navigation module. The Arduino gets the charge from the voice recognition module and move the wheel seat likewise subsequently disposing of the need of any third person's help.
The voice recognition based home automation system [3] utilizes Lab VIEW to perform speech recognition and Zigbee module with a controller is utilized to control the gadgets remotely. The Limitation of the system [1] [3] is the utilization of the PC which makes system more costly.

[4]Proposed a home automation system which contains a DSP processor for the voice recognition work, a microcontroller and transfer module for the machines control work like turning lights on-off and so forth. Zigbee remote module is utilized which takes out the need of extra wiring required for the flag transmission.

[5]Proposed a home automation system for elderly and physically tested individuals which can control the home machines by two strategies by voice commands or by utilizing portable as remote controller. The voice recognition is finished by the android application and in this manner given to the controller to control the gadgets.

The home automation system [6] proposed two different ways to control home apparatuses that are by utilizing clock or by utilizing the voice commands. The product condition is created on Virtual Basics 6.0 on PC and gadgets are controlled utilizing PC parallel ports.

[7]Proposed a Bluetooth based home automation system which includes a remote controller interfaced with microcontroller which is furthermore interfaced with the Bluetooth module to give remote control of the apparatuses. At the point when key on the remote controller is squeezed the controller sends the charge by means of Bluetooth module to the collector and relating activity on the recipient side is taken.

[8]Proposed system which utilizes PC to change over the voice commands to content and send this changed over content to the cell organize by means of cell phone, on beneficiary side the content is gotten by another cell phone and this order is perused by the microcontroller and comparing control move is made.

[9]Proposed a system which can control gadgets from the substantial separation. The client voice commands are changed over into the images and they are sent to server PC over WI-FI arrange. The PC contains the voice recognition application created on Microsoft VisualBasic.net. At the point when the given summon is perceived this data is exchanged

to the control circuit through PC parallel port and the relating gadget is turned on or off.

[10]Proposed a voice recognition based automation system for the business which utilizes HM2007 voice recognition module for the voice recognition work which gives support specialist and handicapped person in the business to work the heaps effectively and serenely.

2. SYSTEM OVERVIEW

The voice recognition based home automation system is a coordinated system to encourage the elderly and physically tested individuals with an effortlessly worked home automation system that works completely on voice commands.

The speech contribution from amplifier is given to the voice recognition module where the speech flag is contrasted and the already put away prepared voice tests. Upon fruitful recognition of voice summon the Arduino microcontroller incites the relating electrical gadget like turning on lights, and changing bed rise utilizing the transfer module. The information from the brightening sensor is prepared in Arduino controller and in view of a set point esteem the programmed control move is made to turn off the lights to spare vitality. The bell sounds when impaired person require is calling for help or when he needs some individual's help.

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3. HARDWARE IMPLIMENTATION

A. Microphone and Voice Recognition Module

The microphone used to get voice commands to the voice recognition module is a basic neckline compose microphone with 3.5 mm jack. Elechouse voice recognition module v3 is utilized for the voice recognition process as appeared in Fig.1. The voice recognition module should be prepared before it can be put to really perceive the voice commands. The speech contribution from the microphone is given to the voice recognition module and there the info speech is contrasted and the already prepared voice commands and if there is a match at that point control activity through control circuit is taken. The voice recognition module v3 can stockpile to 80 commands of 1500ms each in its library and out of 80 just 7 commands can be stacked into recognizer for the recognition procedure. In this way just 7 commands are successful at once and to include another 7 commands recognizer should be cleared first. The module has two different ways of controlling Serial Port, General Input Pins. General Output Pins on the board could create a few sorts of waves while comparing voice order was perceived. Module has a recognition exactness of 99% under perfect conditions.

Fig. 1 Voice Reognition Module v3

B. Arduino Uno

The controller utilized for the proposed system as appeared in Fig. 2 is Arduino Uno microcontroller. The Arduino stage was gives a reasonable and simple path for understudies and experts to make gadgets that interface with their condition utilizing sensors and actuators. Arduino accompanies basic incorporated advancement condition (IDE) which keeps running on a PC and enables client to compose programs for Arduino in C or C++ dialect. The Arduino microcontroller depends on the ATmega 328. It has 14 computerized input/yield pins (Out of these 14 pins 6 can be utilized as PWM yields) and 6 simple information sources. Ardunio chips away at 5V D.C and has clock speed of 16 MHz.

Fig. 2 Arduino Uno microcontroller

C. Light Sensor

Light needy resistor is use to detect the enlightenment inside the room with the goal that the system would shutdown be

able to the lights when there is adequate sunshine to see anything around to preserve vitality.

D. Buzzer

Signal is principle markers of the composed system through which the gatekeepers of the impaired individuals can be alarmed to check crippled person when bell makes a sound and take essential care. On the off chance that the patient needs any assistance at that point by voice charge he or she may turn on the signal for help.

E. Relay Circuit

To control the Home machines transfers are utilized with the Arduino. .The transfers utilized as a part of the system are 5V-5 stick hand-off as appeared in Fig. 3. The transfer stays in regularly shut state. At the point when hand-off loops are empowered the transfer changes from ordinarily shut to regularly open state because of electromagnetic acceptance .The typically open state (N.O) of transfers is utilized as a part of the home automation system. Fig. 3 demonstrates the signal, brightening sensor and transfer on installed on the broadly useful PCB.

Fig. 3 Relay Circuit, Buzzer and Illumination Sensor

F. 12V, 5A Power Supply

Every electronic circuit work just with low dc voltage. It needs a power supply unit to give the fitting voltage supply. The power supply necessities for the home automation system are 5V for the transfer circuit and 12V 5A for the engine of the jack that impels the bed rise. The 5V supply necessity can be satisfied from Arduino board itself yet for the 12V 5Asupply we require extra supply circuit. A Center tap transformer of 15-0-15 V is utilized here. After that a Bridge rectifier Circuit is utilized which changes over the A.C to D.C. The D.C after change isn't sans swell in this manner capacitor C1= 3300µF and C2=0.33 µF are utilized to get swell free. To manage the voltage LM338K Voltage controller is utilized which gives a directed voltage of 12V and steady current of 5A. The capacitor C3= 100µF is utilized to dispense with the swells from the yield voltage and the diode D3 is utilized to ensure the circuit when the capacitor C3 releases. Fig. 4 demonstrates the circuit outline of the 12V, 5A control supply and Fig. 5 demonstrates the installed circuit of intensity supply on PCB. Fig. 6 demonstrates the total get together of the electronic circuit of the voice recognition based home automation system.

G. Buzzer

Ringer is principle markers of the planned system through which the watchmen of the handicapped individuals can be alarmed to check crippled person when bell makes a sound and take important care. On the off chance that the patient needs any assistance at that point by voice order he or she may turn on the ringer for help.

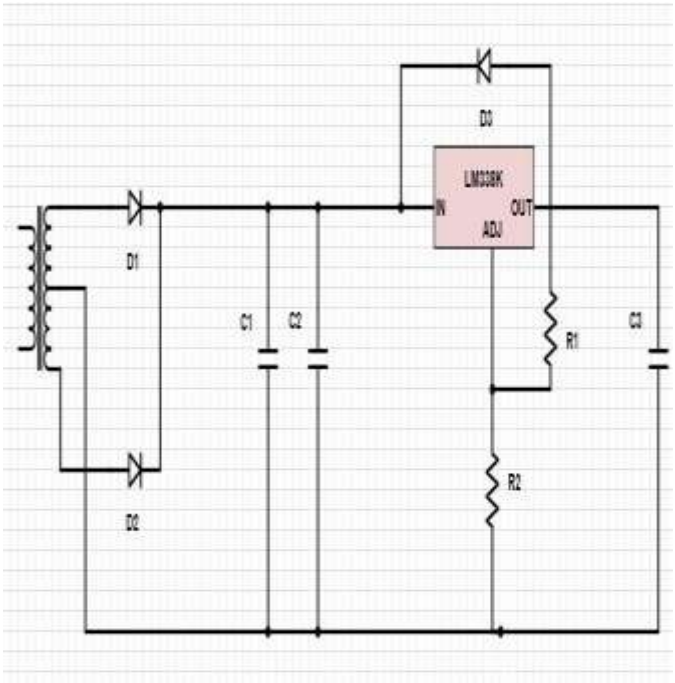

Fig. 4 12V, 5A Power Supply Circuit Diagram

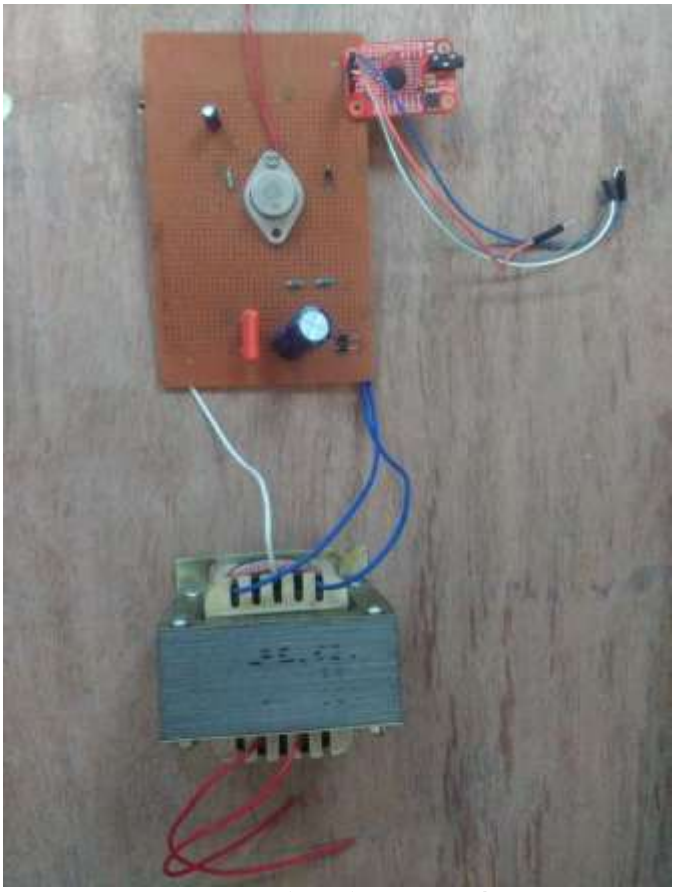

Fig. 5 12V, 5A Power Supply

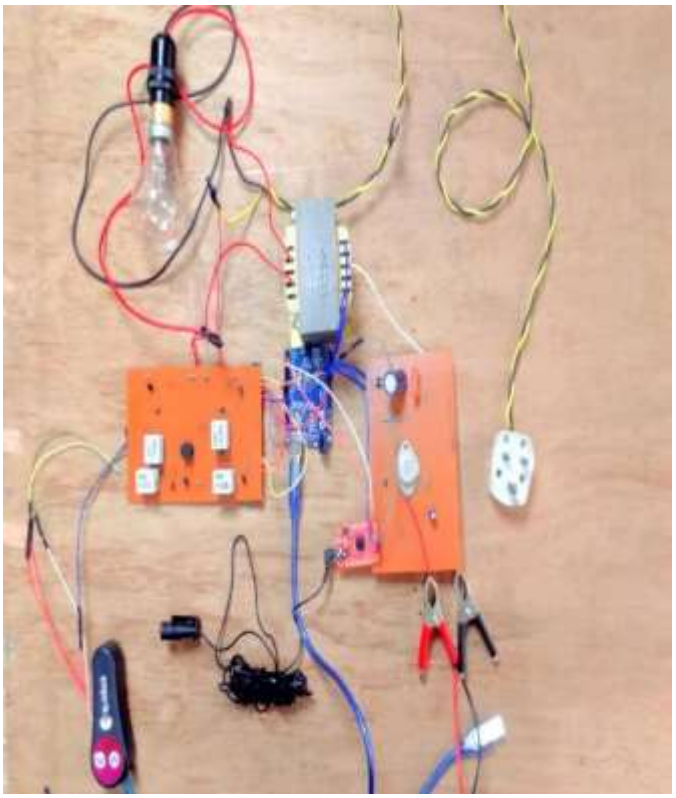

Fig. 6 Complete Assembly of the Electronics Circuit

H. Bed Modeling and Elevation Control Mechanism

The bed for home automation venture is utilized alongside a mechanized jack. The mechanized jack is utilized to lift up the bed or cut it down. Rather than utilizing a metal suspension as utilized as a part of economically accessible beds here a wooden bed is displayed which utilizes less time and less cash to manufacture. The aggregate length of bed is 6 feet out of which 2.5 feet length is made moveable with the assistance of connectors and the rest 3.5 feet is kept stationary. The width and tallness of the bed is 2 feet. Underneath the portable piece of bed there is a crate write structure on the highest point of which mechanized jack is settled which will lift the bed moveable part up or down and in the case structure the home automation system hardware. The Emporis Motorized Jack is worked on 12V dc with 10A most extreme current and can lift the weight up to 1500kg. The lifting scope of the jack is from 12cm to 35 cm which is equivalent to 1feet roughly. The jack likewise has the farthest point switches which stop the engine when certain stature is come to or jack is brought down to a specific point. The jack utilizes the engine for lifting up the overnight boardinghouse back to ground position and the engine course is controlled by the transfers. The engine utilized as a part of jack is a 12V dc engine.

Fig. 7 Adjustable Bed

4. SOFTWARE IMPLEMENTATION

The product usage part of voice recognition based home automation system actualized utilizing the Arduino controller. It comprises of preparing of voice recognition module. The voice recognition module should be prepared first with the voice commands before it can be put to perceiving capacity. The voice recognition module preparing program is stacked into the Arduino and afterward prepared with the voice commands. Fig. 8 demonstrates the preparation procedure of voice recognition module utilizing the Arduino IDE. The primary code for the home automation

system is composed in C++ dialect in Arduino IDE. Upon fruitful recognition of voice summon the control activity comparing to that charge is taken.

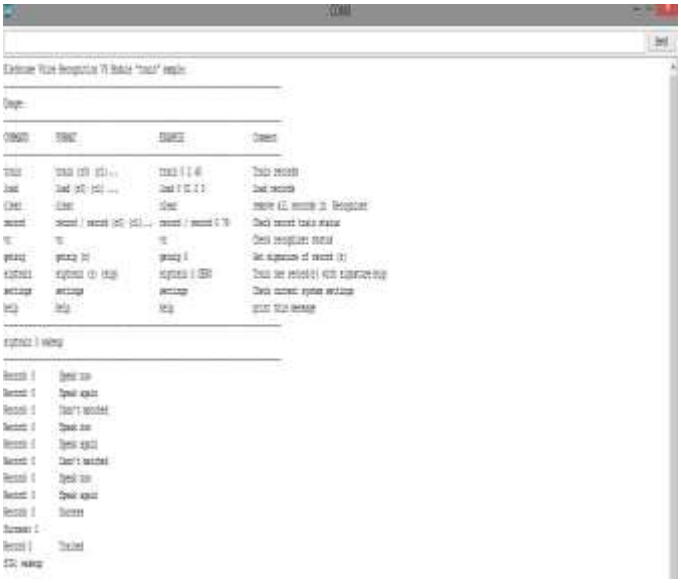

Fig 8 Voice Recognition Module Training using Arduino

5. RESULTS AND DISCUSSIONS

The fundamental goal of this undertaking is to outline a voice recognition based home automation system for controlling machines and model a flexible bed which can change the height as per the voice commands given by the client. The perceived voice order does Arduino to switch the transfer and alter the course of engine because of which raise lifts the bed or convey back bed to bring down height edge, kill on the lights and sound the ringer when debilitated person require help. The Illumination sensor kills the lights consequently when characteristic light is adequate to see around. The customizable bed offers three height positions rest position, rest position and sitting position. The resting position is where bed is at 180 degree height to the ground as appeared in Fig. 11. The person can rest serenely in this position. In the rest position the bed is lifted at 150 degree to the ground and a person can easily unwind in this situation as appeared in Fig. 12. In the sitting position bed rise is relatively equivalent to 135 degree and almost the person is in sitting state as appeared in the Fig. 13. Table 1 demonstrates the current drawn by the engine while lifting the bed up or letting down at various weights. The Fig.14 speaks to the correlation chart between the current drawn by the engine at various weights. The examination chart demonstrates that the engine draws more present when higher weights are lifted by the jack yet dropping the go to sleep the current drawn by the engine nearly stays steady. The no heap current of the engine is 1.050 Amperes when jack is opening and when jack is shutting the current is 0.710 Amperes. Table 2 demonstrates the rundown of commands and the capacities performed by each summon.

6. CONCLUSION

The voice recognition based home automation system was assembled and actualized. The system is exceptionally intended for the general population experiencing loss of motion and furthermore for the elderly individuals. A wooden movable bed fitted with mechanized jack is displayed as opposed to building a mechanical base with straight actuators which is ended up being exceptionally monetary. The customizable bed offers three height positions rest position, rest position and sitting position and as indicated by one's solace he or she may pick position by voice commands. The utilization of voice commands takes out the need to remote controllers and other electronic gadget and makes it simple to associate with the system to perform automation and control electrical gadgets. Bell enables incapacitated person to tell the gatekeepers at whatever point the person require help. The brightening sensor consequently kills the lights when daylight is sufficient to see things around additionally a period delay is added that if client neglected to kill lights or any gadget the will be naturally killed to preserve vitality.

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