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Research paper

Elevator Control Using Speech Recognition for People with Physical Disabilities

Andriana[1*], Olly Vertus[1], Riyanto Setiyono[1], Zulkarnain[1] , Pamungkas[1]

1Electronics Departments of Langlangbuana University (UNLA)
Jl. Karapitan No.116, Bandung 40261, Jawa Barat-Indonesia
**Corresponding author E-mail: andriana6970@gmail.com*

Abstract

This research will make the design of elevators that can be helpful for persons with disabilities, namely elevators controlled by voice. Disability is someone who does not have a complete hand organ or hand organs but does not function properly, but the person can still use voice to control the elevator. The research combines speech recognition technology with electronic control technology used to make the elevator control equipment that can be controlled by voice. Speech Recognition is a system that functions to convert spoken language into the input data. The system input is human speech. The system will identify spoken words to input data for control equipment. Control of this equipment requires a simple word and can only recognize some words. These systems are usually more accurate and more easily trained, but could not recognize words that are beyond vocabulary ever taught. This system uses a sensor device sound which call Easy Voice Recognition for the training process and the minimum word recognition and for control system using arduino Uno. The word can be trained for a maximum of 32 words. The test results stated all words can be recognized as a command to control the elevator.

Keywords: *Arduino uno, speech recognition modul, elevator, word*

1. Introduction

Someone who does not have a complete body organs do not have both hands in particular will have problems if he uses the existing elevator system as it is today. The person must push buttons for a destination floor number or keypads are available at the lift panel room. Based on the author'idea of how we can make an elevator system with voice control, point by way of stating the number of floors in the heading so that the elevator can lead people to the floor on the go.

1.1. The Human Voice

The human voice is the energy of the Audio Frequency (AF), with a frequency range from 300 Hz to 3500 Hz. The definition of a frequency of 1 Hz is one wave per second and 1 kHz is equal to 1000 Hz or a thousand waves per second, this standard has been known since Alexander Graham Bell first transmit voice signals over the power cord [1,3]. If we speak into a microphone connected to the oscilloscope, then on the oscilloscope screen appears circuit electric wave audio. Whatever we say it is composed of several dozen basic sounds called phonemes. This phoneme can be identified later by a computer program.

1.2. Sound Sensor Speech Recognition

Speech recognition is a navigational aid which functions to interact between humans and computers by voice or words of men. Humans have been dreaming of a system that can be operated by voice commands can now be made possible because of the computer as we know it the first time it has been very grown very rapidly and sophisticated. Science fiction has described a future in which users communicate with a computer through voice, and has grown to a new generation that is expected to speak or communicate with the computer. The function of the speech recognition module is able to change and process the analog signal into a digital electrical signal is then translated into words or exact phrase. Speech Recognition is also called voice recognition engine which contains driver software that converts acoustic signals into digital signals and convey the words known as the text is then converted into an application. Most recognisers familiar sound continuously, which means we can speak naturally into the microphone at a normal speed human conversational.

1.3. Arduino Uno

The Arduino Uno is a microcontroller module that using ATmega328. The function of Microcontroller in general is the control center of the system work a tool to follow the command of a program that has been received. The Arduino Uno Rev3 Microcontroller has a 14 pin digital inputs / outputs, where there are 6 pins that can be used as PWM outputs, 6 analog inputs, 16 MHz crystal oscillator, a USB connection, electric jack type ICSP header, and there is a reset button. All pins are needed to support the microcontroller performance. Ar-

duino Uno Rev3 can only be accessed by a computer via a USB cable. Arduino Uno Rev3 is different from all previous modules in that it does not use the FTDI USB driver chip - to-serial. Where ATmega 8U2 features programmed as a USB converter - to-serial. "Uno" means one in Italian and is named to mark the launch of Arduino 1.0. Uno version 1.0 will be the reference version of Arduno, which will continue to be developed. Arduino Uno Rev3 is the latest in a series of USB Arduino board, and a reference model for the Arduino platform.

1.4. Drivers Motor DC 2-way type IC L293D

IC L293D a controller IC that serves as a work of bidirectional DC motor. This IC receives input signals control the DTL or TTL level and capable of working on an inductive load such as a relay solenoid, DC motors, and stepper. To simplify use, the system created a bridge with the enable input input to activate the circuit inside the IC L293D. Separate supply voltage input to the IC's, plus there is mounting an internal clamp diode to the system if there is a backflow protection on inductive loads. IC L 293D can also be used for switching applications up to 5 KHz frequency. This IC has a 16 foot by 4 foot ground connected together with characteristics beikut: Output reaches 600mA per channel, available facilities eneble (activator), protection against excessive temperature, logic "0" until the voltage 1.5V (high noise immunity), internal Clamp diode. L293D IC contains four push-pull, every two push-pull can be used as a strand H-bridge and can be enabled with the enable signal. IC is capable of operating at a voltage of 4.5 V to 36 V. The amount of current that can be drawn is 600mA DC in normal conditions as well as the peak current of 1.2 A (instantaneous). Examples of its application in moving or rotating the two motors in round two directions. Voltage inputs 1-2 and inputs 3-4 a DC input voltage that determines the direction of rotation of the DC motor.

1.5. 7 Segment Display

7 Segment (seven segment) is a display device that can display a decimal number and is generally used in electronic watches, electronic meter, digital display panels and other tools that display numeric data. Seven segment has 7 segments that can be controlled individually to display the digits 0 through 9 or letters A through F correspond combination desired segment. Some seven segment may also have an extra dot element used to indicate the decimal point.

1.6. DC Motor 2 Direction

Mechanism of action of DC motors in general, namely:

1. An electric current in a magnetic field will exert a force
2. If the current carrying wire is bent into a loop / loop, then both sides of the loop, ie at right angles to the magnetic field, will get a force in the opposite direction.
3. The pair of forces produce rotary power / torque to rotate the coil.
4. motors have several loops on the armature to provide a more uniform torque and magnetic field generated by the electromagnet arrangement called field coils.

A dc motor is an electric machine serves as a driver in the event of the conversion of electrical energy into mechanical energy in it. DC motor is a motor that requires a supply voltage of the coil in the direction of the anchor and field coils to be converted into mechanical energy. Based on the characteristics, direct current motor has a wide area round setting compared with alternating current motors, so that is still widely used in factories production machines require extensive round setting. In a DC motor, the field coils electrified will produce a magnetic field that surrounds the coil anchor in a particular direction. Good energy converter electrical energy into mechanical energy (motors) or otherwise of the mechanical energy into electrical energy (generator) takes place through the medium of a magnetic field. The energy is converted from one system to another, while the medium is stored pad magnetic field for energy is then released into other systems.

1.7. Opto Switch

Opto switches are electronic switches working groups based on infra-red light emitted by the LED infra existing in the component. Infra red light will be received by the photo transistor as the light data processor with a distance of approximately 5 mm from the light source. If the infrared light captured by opto transistor is in the opto switch the collector barrier emtor be great again seems to be a switch that opens (open). Conversely, if the infra-red light is not caught by the photo transistor, the collector emitter barrier it becomes little seems to be a switch that is being shut down (Close). Changes in the value of the collector emitter barrier which is equated with open-close switch due to a change of light then later be used to control the work process of Microcontroller or as a source of instruction.

1.8. Ultra-Sonic Sensors

Ultrasonic sensors are electronic devices that can change the ability of the electrical energy into mechanical energy in the form of ultrasonic sound waves. The sensor consists of a series called Ultrasonic transmitter and receiver ultrasonic transmitter called the receiver. This tool is used to measure the ultrasonic waves. Ultrasonic wave is a mechanical wave that has a characteristic longitudinal and usually has a frequency above 20 kHz. Waves of Utrasonic can propagate through solids, liquids and gases. Ultrasonic waves are waves of energy propagation and mechanical momentum that propagate through the third element as the interaction with molecules and the nature of the medium enersia path. There are several explanations of ultrasonic waves. The nature of ultrasonic waves through the medium causes vibration aplitudo particles with the same medium with the longitudinal direction of propagation resulting medium particles that form a density or so-called strain and stress are commonly called strees. Further process that causes the density and strain in the medium caused by the vibration of particles periodically during other ultrasonic waves. Ultrasonic waves propagate through the air at a speed of 344 meters per second, about the object and bounces back to the ultrasonic sensor. As commonly known, the ultrasonic waves can only be heard by certain creatures like bats and whales. Bats use ultrasonic waves to hunt at night while whales use it to swim in the dark depths of the ocean. There are 3 working principle of ultrasonic sensors, namely, the signal emitted by the transmitter ultrasonic waves. Trans-

mitted signal will propagate as sound waves at the speed of sound ranging from 344 m / s. And the last signal has been received will be processed to calculate the distance.

2. Methods

In the design of the hardware simulator elevator control We can demonstrate this in accordance with the following block diagram see figure 1.

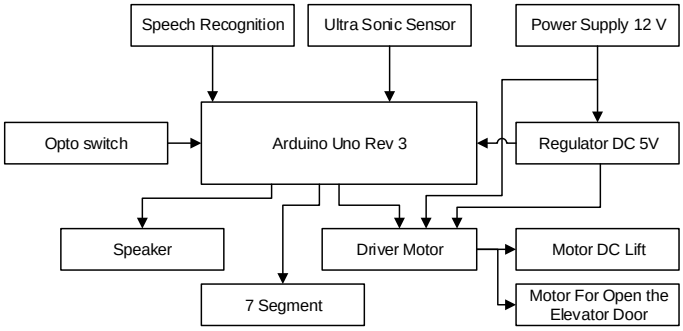

Fig 1: Block Diagram Simulator Controller Elevator

From the block diagram above, we are required to know the specifications of each sub-block diagrams in order to cooperate with each other. Next we create a voltage or current source that is compatible with the hardware that we will use, with attention also needs at pin port to be used and are available from the microcontroler that we use.
Ultra sonic sensors will detect the presence of people in front of the elevator doors. Furthermore, the Arduino uno rev 3 module as the control center provides sound cues issued through the speakers and states that the system has detected someone in front of the elevator doors. The person will mention the floor to be on the go using voice commands via speech recognition module. The control system will read the position of the elevator space. If the elevator room is not on the floor, then the control will order the elevator room to move to the calling floor and after the elevator to the floor that can be known from the sensor opto switch, then the control will command the door motor to open the elevator door. And if the elevator room is on the person's calling floor then the system orders the door motor to open the elevator door. When the elevator door is open, the person enters immediately to the elevator room, then within 5 seconds the elevator door will soon be closed and the system will command the DC lift motor to drive the elevator to the destination floor. Upon reaching the destination floor, the elevator door opens immediately. After people get out of the elevator room, the elevator door immediately closed again and the elevator ready to receive the next command from the control system.

3. Results and Discussion

The measurement process is performed on the DC voltage parameters are out of the Power Supply. The first DC voltage measurements in the idle state (stand-by), and a second measurement in the active circuit conditions. Function 5 volt DC voltage to energize liatrik DC on Mikrokontrol arduino and ultra sonic. Voltage DC 12 V is applied to the entire block of opto sensor switches. The measurement results as follows:

Table 1: The Output Voltage of The Power Supply when the Lift is Actived

Object Measurements	DC Voltage	
	Stand by	Active
Input Voltage	225 Vac	225 Vac
Output +DC Voltage	+13,7 Vdc	+12,4 Vdc
Output +DC Voltage	+12,3 Vdc	+12,1 Vdc
Output +DC Voltage	+5,2 Vdc	+5,1 Vdc

The output voltage of the power supply when the lift is active will tend to decrease due to the increase in the load when the elevator is moving.

To test the software (program) has made the testing of the simulator elevator.Tests include elevator controller functions without using sensors and sound. Start Position Sensor Ultra Sonic On Floor Purpose Specification voice input interrupt Results

Table 2: Tests Elevator Controller Functions

Floor	Active Ultrasonic Sensor	Floor Destinations	
1'st Floor	2'nd Floor	2'nd Floor	succeed
2'nd Floor	3'rd Floor	3'rd Floor	succeed
3'rd Floor	4,th Floor	4,th Floor	succeed
4,th Floor	2'nd Floor	2'nd Floor	succeed
2'nd Floor	1'st Floor	1'st Floor	succeed

Level 2 Level 1 Successfully Some People shout Due to the voice recognition is used in the form of modules so, then we assume to perform the tests as above and compare it with the existing theory, the speech recognition technique with template-based approach. Voice

recognition does not compare the sound module per syllable, or per phoneme, but per word. Matching technique using a template-based approach.
Commands uttered by persons with disabilities can be recognized by the speech recognition module and used as input data by control to control the elevator space.

4. Conclusions

From the test results it can be concluded that the voice recognition techniques in voice recognition module with Arduino Uno as device control can work well to control elevators, with a memory capacity of 32 command command depends on duration and intonation. The elevators will be useful for people with disabilities who do not have a complete limb or having limbs but does not function properly, but the person is still able to use his voice.

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