

Use of Gesture Recognition for Differently Abled Persons

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Abstract

There are nine billion dumb people in the world. The communication between dumb people and normal people is always a challenging task. One of the key technologies to afford reality is usual interaction between human and objects or living-things in the implicit world created in a computer. Disabled persons are an important part of our society. With the advent of science and technology, efforts are being made to develop certain systems that make them feel and act normally. Especially hearing impaired people interact through hand gestures or signs. It is difficult to find a well experienced translator for the sign language conversion every time and everywhere.

INTRODUCTION

Human-computer interaction system can be installed and can be used anywhere possible. Gestures are basically the physical action form performed by a person to convey some meaningful information. Hand gesture is a technique of non-verbal communication for human beings for its freer expressions. In fact gesturing is so deeply rooted in our communication that people often continue gesturing when speaking on the telephone. There are diverse signs which express complex meanings and recognizing them is a challenging task for people who have no indulgent for that language. Hand gestures can be classified into two categories. Static hand gestures which depend only on the information about the flexure angles of the fingers and dynamic hand gestures which depends not only on the fingers flex angles but also on the hand trajectories and orientation.

In recent times, there are more number of people prone to disabilities due to various factors. To alleviate the life of differently abled people, we propose a project which uses hand gestures to operate devices in the surrounding. The need for human assistance is reduced which also reduces the financial burden on the patients. We have used the concept of computer vision to recognize hand gestures and perform the function of operating devices. Each hand gesture is assigned with a predefined function to execute a certain task.

LITERATURE REVIEW

EXISTING SYSTEM

In the existing system it is completely manual and requires experienced translator for the communication which is huge draw back in order to overcome this draw back we are going for proposed system.

Gesture recognition systems for differently-abled persons typically use a combination of hardware and software to track and interpret human movements. Here is an overview of the theory behind an existing system for gesture recognition:

Hardware: Gesture recognition systems require sensors or cameras to capture human movements. Depending on the application, different types of hardware can be used, such as wearable sensors, depth-sensing cameras, or RGB cameras.

Image Processing: Once the hardware captures the movement data, it is processed using computer vision algorithms to extract relevant features from the images or video. This processing step typically includes pre-processing, feature extraction, and dimensionality reduction techniques.

Gesture Classification: The feature data is then used to train machine learning algorithms to recognize different gestures. Commonly used algorithms include decision trees, support vector machines, and neural networks.

Control Signals: Once the gesture is recognized, the system generates a control signal that can be used to control different devices, such as prosthetic limbs, wheelchairs, or computers. The control signal can be transmitted wirelessly or via a wired connection, depending on the application.

Overall, the theory behind gesture recognition systems involves capturing human movements using hardware, processing the data using computer vision algorithms, and using machine learning to recognize and classify different gestures. The resulting control signals can be used to control different devices, providing differently-abled individuals with an alternative means of communication and control.

PROPOSED SYSTEM

In this proposed system we will be using multiple different gestures which are taken with the help of webcam and stored in database for training. And the test data will be taken at runtime, Image Acquisition is the first step in image processing because without get the images we cannot perform any operation. The Toolbox make easy to acquire images and video from cameras and frame grabbers directly into PYTHON. In this work, the webcam is used to capture a video as input. Dynamic hand gesture is captured using the workspace and convert the video into frames for further processing. After the frame splitting, the frames are stored in working directory.

Gesture recognition technology has become an increasingly popular research area in recent years, with the potential to be used in a variety of applications, including assisting differently-abled individuals. In this project literature survey, we will discuss the use of gesture recognition for differently-abled individuals.

Gesture recognition technology involves using sensors or cameras to track and interpret human movements, enabling users to interact with devices and applications without physically touching them. This technology has the potential to benefit differently-abled individuals by providing them with an alternative means of communication and control.

GESTURE RECOGNITION SYSTEMS

Gesture recognition systems can be categorized into two types: wearable and non-wearable systems. Wearable systems include sensors that are worn on the body, such as gloves, armbands, or eyewear, that track hand or body movements. Non-wearable systems use cameras or sensors to detect hand or body movements without the need for physical contact.

Applications of Gesture Recognition for Differently-Abled Individuals

Gesture recognition technology has the potential to benefit differently-abled individuals in a variety of ways, including:

Communication: Gesture recognition technology can be used to translate hand or body movements into text or speech, providing an alternative means of communication for individuals with speech impairments or hearing loss.

Mobility: Gesture recognition technology can be used to control mobility devices, such as wheelchairs or prosthetic limbs, using hand or body movements.

Education: Gesture recognition technology can be used to create interactive educational experiences for differently-abled individuals, enabling them to learn and explore using hand or body movements.

Entertainment: Gesture recognition technology can be used to provide entertainment experiences for differently-abled individuals, such as gaming or virtual reality experiences.

Challenges and Limitations

While gesture recognition technology has the potential to benefit differently-abled individuals, there are also several challenges and limitations that need to be addressed, including:

Accuracy: Gesture recognition systems need to be highly accurate to be useful for differently-abled individuals, as even small errors can result in misinterpretation or miscommunication.

Cost: Wearable gesture recognition systems can be expensive, limiting their accessibility for some individuals.

Complexity: Gesture recognition systems can be complex to set up and use, requiring technical expertise and training.

Customization: Gesture recognition systems may need to be customized for individual users, based on their specific needs and abilities.

Conclusion

Gesture recognition technology has the potential to benefit differently-abled individuals in a variety of ways, including communication, mobility, education, and entertainment. However, there are also several challenges and limitations that need to be addressed to make this technology more accessible and useful for individuals with disabilities. Further research and

development in this area can help to overcome these challenges and make gesture recognition technology a valuable tool for differently-abled individuals.

Block Diagram

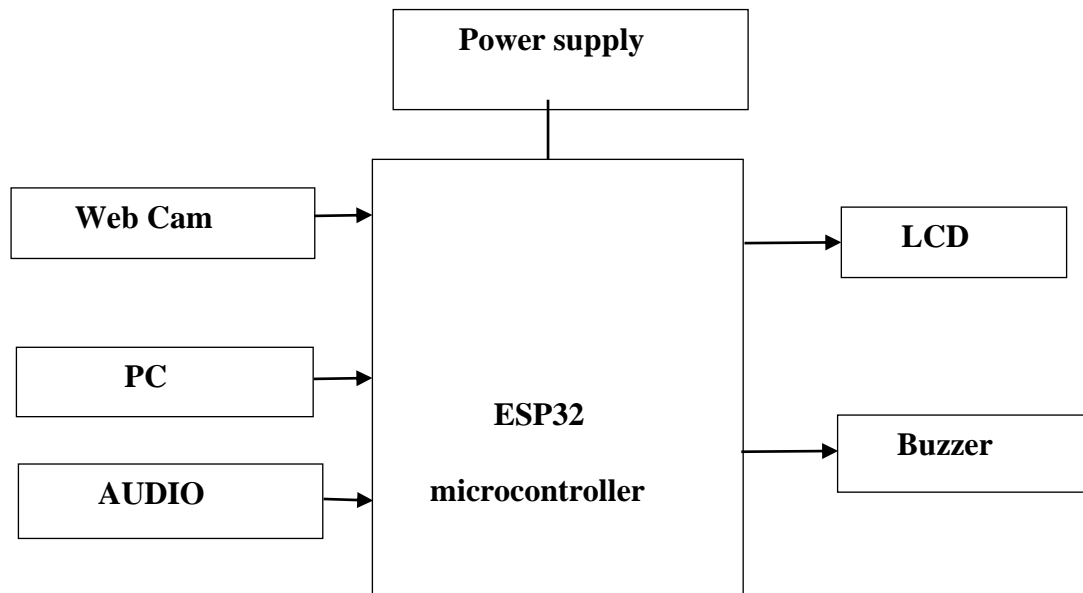


Fig 1.Block Daigram of IOT based smart cart with automatic billing and anti-theft.

HARDWARE COMPONENTS

Power Supply

The power supply section is the section which provides +5V for the components to work. IC LM7805 is used for providing a constant power of +5V. The ac voltage, typically 220V, is connected to a transformer, which steps down the ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit removes the ripples and also retains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.



Fig 2.Block diagram of power supply

Esp32 Module

The ESP32 module is a low-cost, low-power system-on-chip (SoC) microcontroller with integrated Wi-Fi and Bluetooth capabilities. It is manufactured by Espressif Systems, and is designed for use in a variety of applications, including Internet of Things (IoT) devices, wearable electronics, and other embedded systems. The ESP32 module features dual-core processors running at up to 240 MHz, as well as a variety of built-in peripherals, including

touch sensors, analog-to-digital converters, and pulse width modulation (PWM) controllers. It also includes support for a wide range of communication protocols, including Wi-Fi, Bluetooth, and Ethernet.

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Fig 3. Esp32 Module

RFID Reader

An RFID (Radio Frequency Identification) reader is a device that is used to read and write RFID tags. RFID technology uses radio waves to communicate between the reader and the tag, which contains a small integrated circuit and an antenna. The RFID reader sends a radio signal to the tag, which powers the tag and allows it to transmit its unique identification number back to the reader.



Fig 4. RFID Reader

LCD (liquid crystal display)

The most commonly used Character based LCDs are based on Hitachi's HD44780 controller or other which are compatible with HD44580. The most commonly used LCDs found in the market today are 1 Line, 2 Line or 4 Line LCDs which have only 1 controller and support at most of 80 characters, whereas LCDs supporting more than 80 characters make use of 2 HD44780 controllers. Most LCDs with 1 controller has 14 Pins and LCDs with 2 controller has 16 Pins (two pins are extra in both for back-light LED connections).

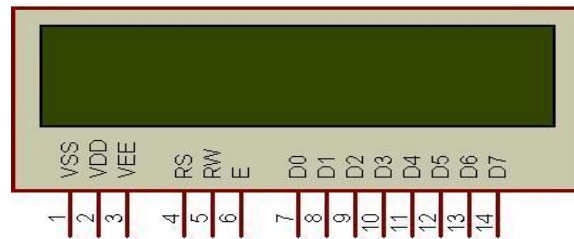


Fig 4.LCD type HD44780 pin diagram

Buzzer

A buzzer is an electronic device that produces a sound or tone when an electrical current is passed through it. It consists of a small electromechanical component called a piezo buzzer that converts electrical energy into sound energy.



Figure 6.Buzzer

PCB BOARD

PCB (Printed Circuit Board) is an essential component in modern electronic devices. It provides a foundation for mounting and connecting electronic components together to form a functioning electronic circuit. A PCB is a thin board made of a non-conductive material, usually fiberglass, with conductive tracks or pathways etched onto its surface. The etched tracks are used to connect various components, such as resistors, capacitors, transistors, and ICs (Integrated Circuits) together to create a functional electronic circuit.

Web cam

A webcam is a digital camera that is connected to a computer or network and can be used to capture images or video. It is commonly used for video conferencing, online meetings, remote learning, and social media.



Result

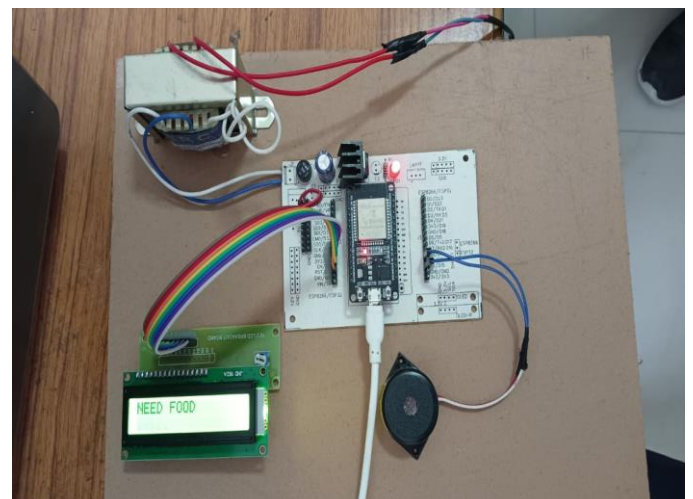
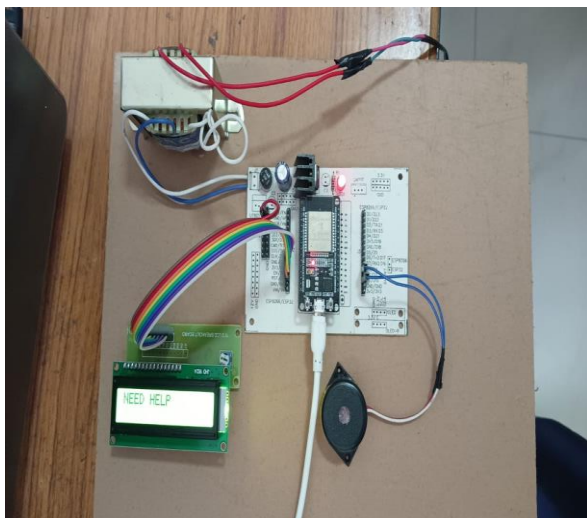
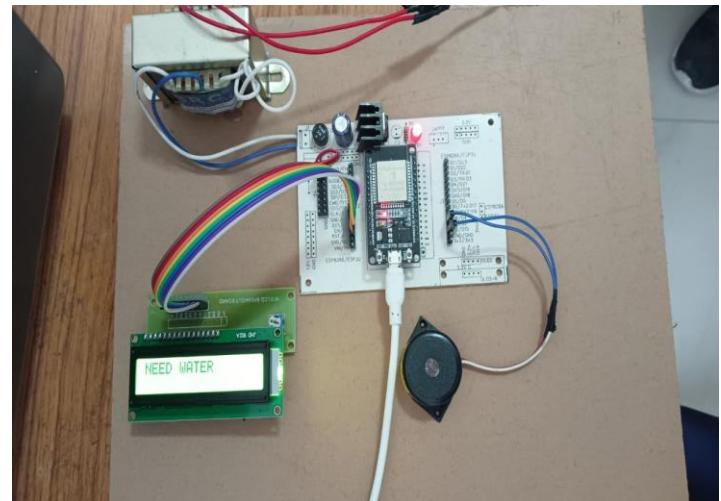
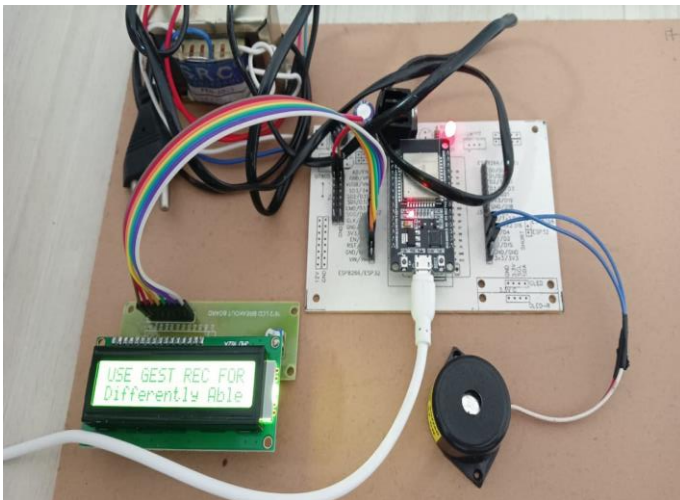
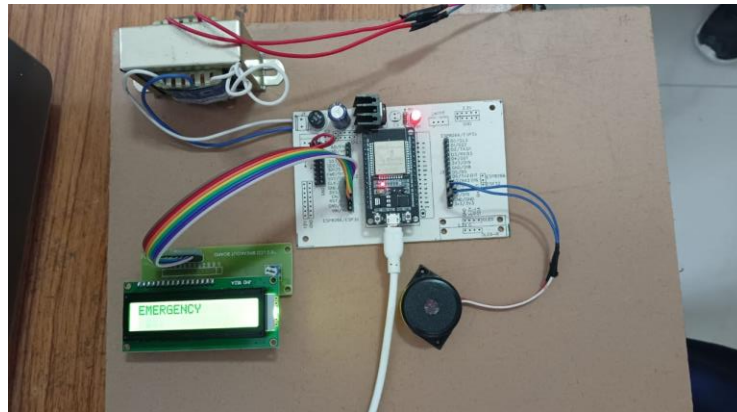


Fig 7.Hardware kit



CONCLUSION

The project “Use of gesture recognition for differently abled people” has been successfully designed and tested. It has been developed by integrating features of all the hardware components used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly using highly advanced IC’s and with the help of growing technology the project has been successfully implemented.

FUTURE SCOPE

1. Integration with other technologies
2. Expansion of gesture vocabulary
3. Customization for individual users
4. Development of new applications
5. Improved accessibility
6. Integration with wearable devices
7. Expansion to global communities

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9."Gesture Recognition System for Disabled People Using Kinect Sensor" by C. Guo, X. Zhang, and J. Wang. This paper presents a gesture recognition system that uses the Kinect sensor for controlling various devices, including wheelchairs, for individuals with physical disabilities.

10."Gesture Recognition Using Wearable Sensors for Assistive Technology" by A. Khan, A. Hussain, and S. Lee. This paper presents a wearable sensor-based gesture recognition system for assistive technology, which can be used by individuals with physical disabilities to control various devices.

11."Hand Gesture Recognition for Assisting Disabled People Using Deep Learning" by S. K. Saha and S. Saha. This paper presents a deep learning-based hand gesture recognition system that can assist individuals with physical disabilities in performing daily activities.

12."A Review of Gesture Recognition Techniques for Rehabilitation and Assistive Technology" by H. A. Rahman, T. M. T. Sembok, and N. B. Hamzah. This review paper provides an overview of gesture recognition techniques that can be used for rehabilitation and assistive technology, including their potential applications for differently abled individual.

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