Motion based message carrier for disabled people

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Abstract. We come across many disabled people in NGO’s and hospitals. These people find difficult to convey message as they cannot make full body movement like normal people. Looking at such condition we tried to make a system which can be used to convey messages on behalf of such people. This system gives different messages by simple movement of hand of the person. The device is placed on person’s hand so the he can tilt it in particular direction. By tilting the device in different direction in a specified range of angle different messages are displayed. Here an accelerometer is used to measure the tilt. The data from the accelerometer is then passed to the microcontroller. The microcontroller takes the information, process the data and shows the particular message depending on the tilt by the person. The microcontroller sends data to a LCD screen and desired message is displayed. On the receiver side along with LCD screen a buzzer is also present and in gets on as soon as it receives signal from the accelerometer. On person’s hand the device consists of an RF transmitter which is used to transfer the data signal in encoded form. On the receiving end the RF receiver gets the data from the transmitter and then decodes it and which is then passed to the microcontroller for reading the data, processing the data and responding to it.

1. Introduction

The main objective of our project is to provide easier communication between disabled patient and nurse. It is very difficult for the patient to make verbal communication so the main purpose is to make communication easier using the latest technologies that provides faster response and low cost reliable system. Currently, the patient has to be fully depend on others 24X7. So we aim to make the patient independent to communicate and to convey the message easily to the nurse by just tilting a device located on his hand. After the patient send the message the nurse can monitor the request and provide help to the patient sooner.

This project is very helpful for the disabled people who can't make communication but convey the message through hand gestures. Accelerometer is used to track the motion of the patient it is placed on the hand of the disable patient and these data is transmitted wirelessly in particular range of the device. The message display on LCD as output. Here we are using accelerometer as a transmitter when the patient is move his hand the message regarding the action will provide to the receiver side. For e.g.(if the patient move his hand on the right side the message respect to it ‘I am hungry’ will be convey to the nurse).

Once the message is transmitted it is received by receiver side and the data comes in parallel manner which is given to 8051 microcontroller as it is connected to LCD display Which show the output on the LCD screen so that the nurse can take the immediate action and Buzzer is also connected
at the output side to provides sound.

2. Literature survey

Title: Hand Gesture Recognition Application for Physically Disabled People.

Author: D. Vishnu Vardhan, P. Penchala Prasad. Assistant Professor, Department of ECE, JNTUA College of Engineering Pulivendula, Andhra Pradesh, India

Review of paper: This paper is totally based upon the hand signal acknowledgement. Individual who suffer wounds to the spinal cord, experience diseases such as quadriplegia and paraplegia, and finds it hard to convey their messages. To ease it, an electronic hand glove has been made, which consist of accelerometer sensors utilized on every single finger of the glove. This sensors give more exactness in exceptionally little developments of the fingers. The accelerometers detects the increasing velocities of the hand gestures moved in three different ways and then these increasing speed esteems are communicated to micro controller. Different hand signals are given various messages which modify themselves into voice messages utilizing sound module. A mechanism to detect hand gestures in mid-air by using a real time hand gesture recognition system which is capable of controlling the device in accordance to the input gesture is presented here. This primary thought is to adapt a methodology for the physically disabled patients to control the gadgets or appliances using their hand gestures without the need to go to the main switchboard.

Title: MEMS Accelerometer Based Non-Specific user hand gestures Recognition

Author: RuizeXu, Shengli Zhou, and Wen J. Li, Massachusetts Institute of Technology, Cambridge, MA, USA

Review of Paper: Our motive of a framework is by pursuing the tilt bearing of the patient part. The device should be mounted on a patient finger of a hand. The patient currently simply needs to tilt the device in a specific direction to pass on a message. Inclining the device in various ways pass an alternate instruction like a message. Here we use an accelerometer to appraise the insights of a movement. And at that point given an information to a microcontroller. The microcontroller measures the information and display the specific message according to acquire the RF recipient on the opposite side so it gets the information and later it prior passing to the microcontroller for handling the information and a response to it. In this system, the hand gestures in the form of sign languages are taken as input and converted to characters or symbols by the computer when the hand gestures are being made in mid-air. The technique used in this system is image processing to record the hand gestures of the patients. A smart attender calling system for the purpose of efficient monitoring of patients who are not capable of verbal communication is presented here.

3. Block diagram

![Figure 1. Block Diagram of System](image_url)
4. Algorithm
Step1: Supply is given to accelerometer.
Step2: The input of accelerometer is given to at mega. Step3: At mega provides a signal to Encoder.
Step4: Encoder encodes the signal through data pins and gives it to transmitter.
Step5: RF transmitter transmits the signal and which is further received by the RF receiver. Step6: Received signal is then decode by the decoder.

Step7: Decoded signal is then given to 8051 microcontroller which provides the output. Step8: The output is then display on the LCD screen and buzzer will provide the sound.

5. Working

The main focus of our system are the two sections that are transmitter and receiver as shown in the figure 2 and figure 3. The transmitter section consist of four axis accelerometer which will be positioned on the flexible part of the patient. The accelerometer is efficient and detects static acceleration due to change in position. And, thus angle at which the device is tilted with respect to the earth is determined. The accelerometer output depends on the inclined angles. For instance, when the finger is moved towards it display the message of food/water.

As the position of sensor changes it creates analog difference of voltage on x, y, z pins of accelerometer. This analog difference is transformed into digital format using comparator, then threshold voltage is set using preset and the according to the input voltage, the voltage is either high or low. LM324 is quad op-amp IC used here. This circuit generates various 4-bit binary 0’s and 1’s sequences as its position changes. This 0’s and 1’s are then passed to transmitter over RF channel. The transmitter section is connected to accelerometer. It will give input as parallel data which is in binary format to the (HT12E) encoder and encoder is used to encode the parallel data to serial data. This serial data is transmitted to receiver section over 434MHz carrier channel using (Amplitude shift keying) ASK modulation through antenna.

To each patient the accelerometer will be connected along with the controller board and transmitter for sending particular messages.

In the receiver section i.e. figure 3, RF receiver will receive the data and pass it to the controller board which will then display the message on the Liquid crystal display (LCD). There is RF receiver at which the data is received serially at the same carrier frequency 434MHz and decode the serial data to the parallel data same as it was on the transmitter side. The four bit data is given to the microcontroller is done by HT12D.

On collection of the message, medical attendant or the nurse will distantly make the necessary decision to take into account the requirements of the message. If the attendant is not present the patient needs to simply press a press button which will flag the preparing board to send a crisis alert to the recipient. The beneficiary will at that point signal the regulator to initiate the bell. The regulator is answerable for the preparing. Based on the information got the regulator is premodified to show the personality/work on 16x2 LCD.

6. Hardware description

6.1 RF Module

- RF Module consists of RF transmitter and RF receiver which are described below with their specifications and features. Radio Frequency Module is an important part with an antenna and control unit it is used for wireless communication.

6.2 RF TX

- 434 MHz or 315 MHz Transmitter frequency Operation
- Ranges upto 500 Ft. –Vary according to Transmitter Power Supply provided
- Transfer rate is 2400 or 4800bps.
- It is of low cost. Light weight and extremely small
Figure 4. ASK transmitter module

6.3 RF Rx

- 434 MHz or 315 MHz Receiver frequency Operation.
- 500 Ft. Range – Vary according to Transmitter Power Supply provided.
- It is of low cost.
- Transfer rate is 4800 bps.

Figure 5. Receiver module

6.4 Accelerometer

- It is a 3-axis sensing device.
- It can be used to measure the static acceleration in tilt sensing applications and dynamic acceleration in motion or vibration.

Figure 6. Accelerometer
6.5 **HT12E Encoder IC and HT12D Decoder IC**

- The encoder and decoder has 8 address bits. These bits are kept the same.

  Operating voltage is 2.4V to 12V

![Figure 7. Encoder](image1)

![Figure 8. Decoder](image2)

6.6 **Liquid Crystal Display**

![Figure 9. Liquid Crystal Display](image3)

7. **Conclusion**

Communication through this system is very fast and effective. Excellent approach implemented between patient–nurse communication. By executing this framework a straightforward gadget for deadened or handicapped individual accomplished without utilization of complex type of information sources. Correspondence through this framework is quick and compelling. In this system the patient hand gestures will send signal wirelessly to the receiver at the nurse side and the information will be displayed on the LCD screen. It works on the real time messaging along with the emergency buzzer. Our system provide a reliable, effective and simple communication with disabled people.

8. **References**

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