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Voice for the Paralytic Victims

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ABSTRACT

Disability is something that is a physical or mental condition that limits a person's movements, senses or activities. One such disability in which a person loses muscle function in part of your body is called Paralysis. According to the study, there are nearly 1 in 50 people living with Paralysis which is 5.4 million people in the whole world population and technical advancement in the fields where they concentrate on disabilities in communication is nil. This application helps in providing communication between patient and the caretaker/nurse. A patient can easily send messages by just small movements of accelerometer which takes the angle of tilt as the input and decides which messages to be sent based on that. Arduino is used for detecting the input as per the programming done for the direction of accelerometer and output will be displayed on the LCD screen. Along with the real time reminders, an emergency buzzer is added to simplify the work of the nurse. So, this project is simple yet an effective way to solve the communication issue of disabled people.

Keywords : Patient Communication, Arduino Nano, Accelerometer, Real time Reminders, RF Communication

I. INTRODUCTION

India ranks second position for the population in the world. The number of disabled people who account to this population is also really high. According to NSO Survey of 2018, almost 2.2% of population are disabled. The survey also announced that physical disability is the second highest type of disability observed in people of India. This was one of the soul reasons for us to take up this topic.

Though there is a lot of advancement done in the medical sector, but only quite a few will actually concentrate on overcoming the paralytic patients with disabilities to communicate. Though there are numerous monitoring systems which are making the doctors work easier in observing patient's vitals, but there aren't many options for actual verbal communication for paralytic/disabled patients. Such patients face a lot of problems in their daily activities. In the present-day scenario, such patients usually depend on any of the family member or nurse constantly for 24*7 assistance.

The main purpose of this paper is to eradicate the traditional method of communication between patient and the nurse/caretaker by replacing it with modern technology which is faster and reliable in communication.

Figure 1. Paralytic Patient with the Nurse

This application's main purpose is to act as the voice for the paralytic victims who are abandoned from speech. The objective includes making the patient convey messages independently by just small movements of the body. The angle of tilt of all these movements will be considered. This not only helps patient but also makes the work of the nurse/caretaker easier. As a single nurse is responsible for several patients, the time needed for each one of them to visit every patient to meet patient's needs will be saved. Here the motion of the device is used for sending real time messages. After the patient sends a message, nurse can immediately take action for the same and help with the same without any delay. A buzzer is an additional feature which will be placed on the receiver side. This buzzer will be used only in the case of some emergency. So, all these concepts are grouped together to form an efficient solution which will further help in reducing the issues that are being faced between nurse and the patient during communication.

II. RELATED WORKS

In [1] the author has designed a system to control household devices like TV, radio, lamp, etc. This also included commercially available environmental controls and communication devices that are growing rapidly.They used power control section which is connected to monitor and an actuator for the paralyzed/disabled people. Monitor is also used to show the current devices that are used by patients. These syatems also represent the initial technological thrust developed by engineers to aid the physical rehabilitation community.

In [2] paper, author has briefly explained about the hand gesture recognition. In the proposed model, communication system converts the signals shown by dumb people. This is specially for people suffering from neuro muscular disorders. An electric hand glove will be made for the physically disabled/paralytic patients. This glove totally consists of 5 accelerometer sensors, microcontroller and different message will be fed for the movement of each finger. An automatic gesture recognition algorithm is built for recognising the gestures in sequence. According to the given gesture respective commands will be played through speaker using voice clip.

The [3] paper has briefly explained how motion of the patient is used for the communication. Here accelerometer is used as main component for the purpose of communication. Angle of tilt is considered and sent to the controller which in turn initiates the communication. Here they have included a speech module and GSM apart from accelerometer and Arduino. This will help to alert the doctor or concerned person by sending SMS in case of emergency. Instruction shown on the LCD will also be sent out through speech module to make sure that they have sent the right instruction. GSM is used for emergency alert to the registered number. Communication through this is very fast and effective.

The paper [4] tells about a communication system which converts the signal languages of dumb people. Here they have mainly concentrated on proposing the communication link using vestigial organs. Vestigial organs are the organs which are no more functional. This is helpful for the people with neuromuscular disorders. Here they use a hand gesture recognition technique which has an accelerometer and will be controlled by microcontroller. This application will be an efficient solution for all disabled and the people

who struggle to communicate during their daily activities too.

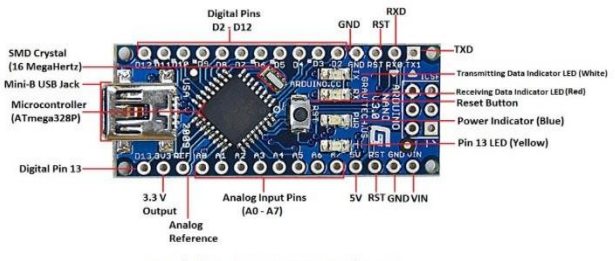
III. PROPOSED SYSTEM

To overcome the above-mentioned drawbacks and meet the requirements, this application proposes a system which consists of transmitter and a receiver section. Transmitter section consists of accelerometer which mainly takes motion into account and helps in sending the messages to the receiver section. The output of the accelerometer depends on the tilt angles and is read by the controller. Output will be displayed on LCD display screen. A buzzer facility is also provided, which can be used in the emergency time. The system proposed is completely user defined, so that nurse/caretaker can change the timetable according to the needs as and when the patient changes.

IV. METHODS AND MATERIAL

There are 4 main components which are included in the implementation. They are:

1.Arduino Nano: As the name suggests it is a compact, complete and bread-board friendly microcontroller board. This weighs around 7gms. Nano is inbuilt with the ATmega328P microcontroller and in total has 32 pins. The extra 2 pins of Nano serve for ADC Functionality.

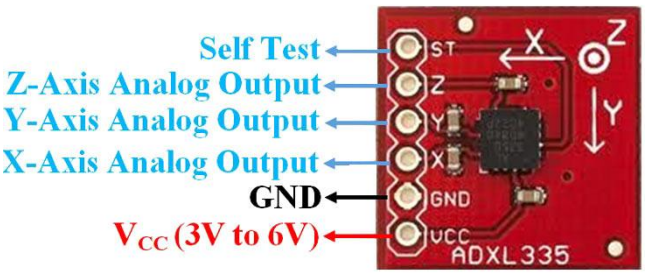


Arduino Nano V3.0 Pinout

www.CircuitsToday.com

2.LCD Display: LCD is a flat panelled optical device that uses the light modulating properties of liquid crystals. The 16*2 LCD has total 16 pins in which eight are data pins, two are for power and ground, three are used for controlling the operation of LCD and one for adjusting the brightness.

3.ADXL335 Accelerometer: It is a small low power, complete 3 axis accelerometer with signal conditioned voltage outputs. It is used for measuring the static acceleration of gravity in tilt-sensing applications and the dynamic acceleration resulting from motion, shock etc. It has 6 pins, and which is small, cheap and easily available component.



4.RF MODULE: An RF Module is a small electronic device used to transmit and receive radio signals between any 2 devices. In an embedded system it is desirable to communicate with another device wirelessly.This kind of communication may be through optical or RF communication.

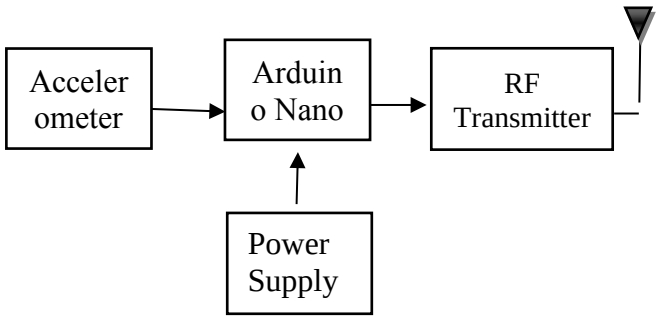
The implementation process is divided into 2 modules:

1.Transmisson Module

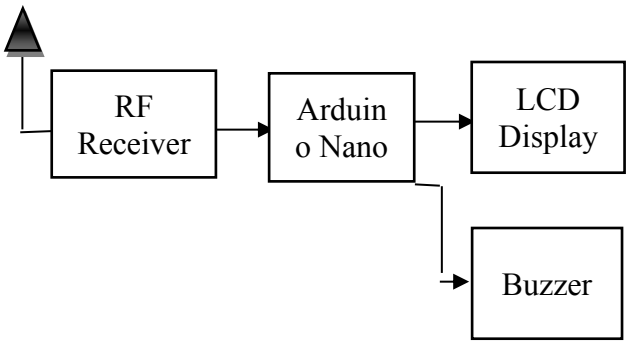
2.Receiver Module

1.Transmission Module: According to the proposed methodology, the above block diagrams were

proposed to meet the requirements of the system. The main component of the system is the accelerometer. Accelerometer is capable of measuring the static acceleration due to gravity and thus find the angle of tilt. Accelerometer can be 2 axis, or 3 axis static accelerometer connected to the analog inputs of the controller. The controller is the second stage of the transmitter. Controller maps the input voltages between 0 and 5 volts into integer values between 0 and 1023 as analog data from the range of 0-1023. This range provides a lot of sensitivity and a slight shift can lead to change in value. To reduce the complexity and provide a simple way for the patients, we reduced its sensitivity by mapping it to 0-5 volts and then provided a range for front, back, forward and backward. These directions can be easily understood and used by any person using his/her thumb or any part of the body capable of moving in these directions. The controller processes the data from the accelerometer and transfers the data to the next stage which is transmitter. Here we have used RF Transmitter for better and efficient work. The RF transmitter becomes active when a message is sent from the controller for transmission. RF transmitter and receiver work on the frequency of 434 MHz the accelerometer will be connected to each patient and each patient will have a controller board and transmitter for sending his messages. Another button will be provided on the transmitter which is for the buzzer in case of any emergency.



a. **Transmitter end**



b. Receiver end

2.Receiver Module: The receiver side includes RF Receiver whose work is to receive the messages and sending over to the controller. All these transmitters can be connected centrally to one RF receiver which works on the same frequency as the transmitter. Thus, the proposed system will provide a many to one communication. At the receiver side, RF receiver will receive the message and send it to the controller board on the receiver side which will then display the message on the LCD. And these messages can be modified based on the need of the patients by the nurse.

V. RESULTS AND DISCUSSION

The simplicity of message transport is the primary preferred standpoint of this framework. A basic framework for paralyzed or disabled individuals can be accomplished without the utilization of complex type of information sources. The proposed system is fully automated, reliable and convenient. This project is made to display 4 messages, and which are being transmitted successfully. For Example, if patient tilts the accelerometer to right “NEED FOOD” and left, it ll be “WASHROOM”. By this proposal we can easily fill the gap that exists in the traditional method of communication between patient and the nurse without choosing hard path and keeping it simple.

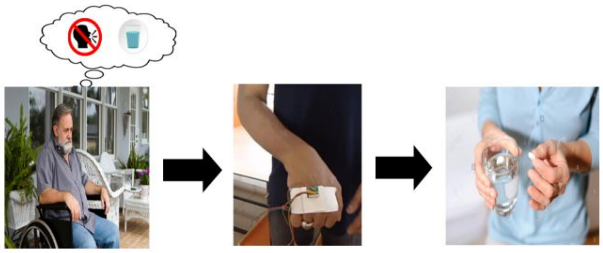


Figure 2. Demonstration example

VI. CONCLUSION

The proposed system has made conveyance of the message possible wirelessly just by the simple gestures of the body. The ease of the message conveyance is the main advantage of the system. By implementing this system, a simple device for paralyzed or disabled people can be achieved without using any complex form of inputs. The prototype which we have made is operational for small area. Hence, system successfully proves that this is one of the excellent approaches that can be implemented at hospitals to make patients and nurse communication faster and easier.

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