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MOTION BASED MESSAGE CONVEYOR FOR DISABLED PATIENT

Ekta Pandey
Department of ECE
Buddha Institute of Technology,
GIDA, Gorakhpur, India

Shubhashini Gond
Department of ECE
Buddha Institute of Technology,
GIDA, Gorakhpur, India

Archana Kannaujiya
Department of ECE
Buddha Institute of Technology,
GIDA, Gorakhpur, India

Kanchan Nishad
Department of ECE
Buddha Institute of Technology,
GIDA, Gorakhpur, India

Sachchidanand Jaiswal
Department of ECE
(Asst. Prof., E&C Deptt.),
Buddha Institute of Technology,
GIDA, Gorakhpur, India

Abstract---During a search we found the statistics of disability population in our country. So, we came to know that the count of physically disabled people is very high. That's why we decided to do this as our project. The main aim of the project is to implement a low-cost reliable system which will help to establish communication between disabled patients and a nurse. We are using an accelerometer as the main part of our project. It is the device which is used to detect the motion. We will put the accelerometer on any movable body part of person who is physically challenged. If he got some problem, he will move the body part which contain accelerometer in particular direction as per the programming. Device will detect the motion and will give an output signal to the Arduino Uno. Arduino will detect input as per the programming done for the direction of accelerometer. After detection of motion it will give output on LCD display as per the program. People nearby the disabled one will come to know the problem and will try to solve it. Our project provides a reliable, effective and simple yet important solution to various issues faced by nurses in traditionally communicating with disabled patients.

Keywords--- Patient communication, Accelerometer, Arduino Uno, RF communication.

I. INTRODUCTION

Among the large number of advancements done in the medical sector, very few actually focus on helping patients with disabilities to communicate.

Although monitoring systems make it easier for doctors to collect and observe a patient's vitals, there aren't many options for actual verbal communication for disabled patients. Here we propose a simple yet effective way to solve this age old problem. The main purpose is to replace the conventional approach of patient-nurse communication with modern technologies that provide a much faster and reliable way to do so. In the current scenario, the patient has to be dependent on a family member or mostly a Ward boy both of which have to attend to the patient constantly. Our objective is to make such patients independent to communicate with the nurse by the simple task of tilting a device located on his finger or any other part of the body that is capable of movement. This will not only help the patient but also ease out the nurse's job. As a single nurse is responsible for a number of patients, the time required for each nurse to visit every patient to meet his needs will be saved.



After the patient sends the message the nurse can remotely monitor their requests and provide assistance without any further delay. A buzzer located at the nurse's desk will alert the nurse in case of an emergency. To make the system more dynamic and decisive a real time medicine reminder is implemented to assist the nurse in her daily routine by providing time and medicine for each patient. All these ideas together thus focus on building a smart system to make patients self-sufficient, and assist the nurses at the same time.

II. SYSTEM DESIGN AND ARCHITECTURE

2.1 Arduino Uno Board

The Arduino UNO is an open-source microcontroller board based on Microchip ATmega328P microcontroller and developed by Arduino.cc. Arduino Uno board is used as microcontroller. In Arduino Uno the programming can be done in C language. It can provide output as per programming. It acts as brain of robot. The movement of robot is decided by microcontroller or the Arduino Uno.



Fig 1: Arduino Uno

2.2 RF Module

An RF module (radio frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical communication or through radio frequency (RF) communication.

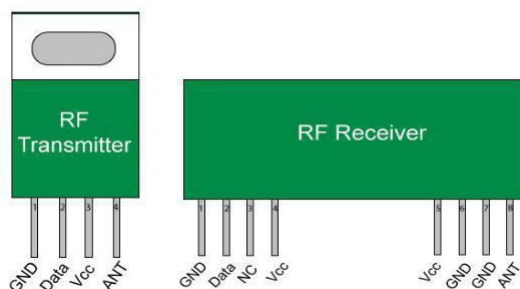


Fig 2: RF Transmitter & Receiver

Table 1- Specifications of RF Transmitter & Receiver

Parameter	Value
Working Voltage	3.3V to 5V DC regulated power supply
Current Consumption	25 mA
Frequency of Operation	2.4 GHz
Serial Baud rate	9600 bps or 115200 bps depending on jumper setting
Baud rate format	8-N-1; 1 Start bit, 8 Data bits, 1 Stop Bits, No Parity
RF Bit rate	250 kbps
RF Power Output	0 dbm
RF range	50-70 meters
On Board controller	STM8S003F3
RF Chipset	nRF24L01+ Enhanced version

3: Specification of RF Tx & Rx

2.3 LCD 16*2 Display

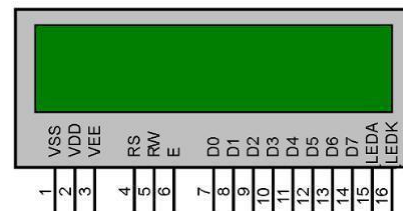


Fig 4: 16x2 LCD

LCD (Liquid Crystal Display) screen is an electronic display module and finds a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi-segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations.

2.4 Accelerometer (ADXL 335)

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ± 3 g. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. The user selects the bandwidth of the accelerometer using the CX, CY, and CZ capacitors at the XOUT, YOUT, and ZOUT pins. Bandwidths can be selected to suit the application, with a range of 0.5 Hz to 1600 Hz for the X and Y axes, and a range of 0.5 Hz to 550 Hz for the Z axis. The ADXL335 is available in a small, low profile, 4 mm \times 4 mm \times 1.45 mm, 16-lead, plastic lead frame chip scale package (LFCSP_LQ).

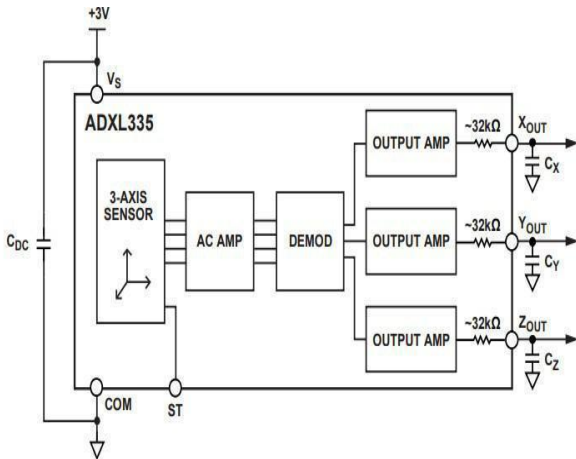


Fig 5: Functional Block Diagram of AXDL335

III. BLOCK DIAGRAM

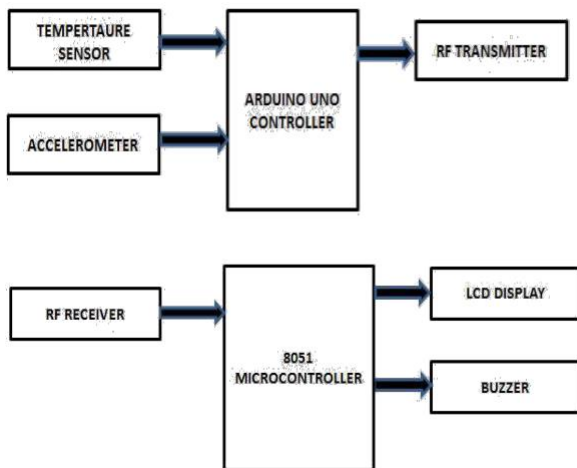


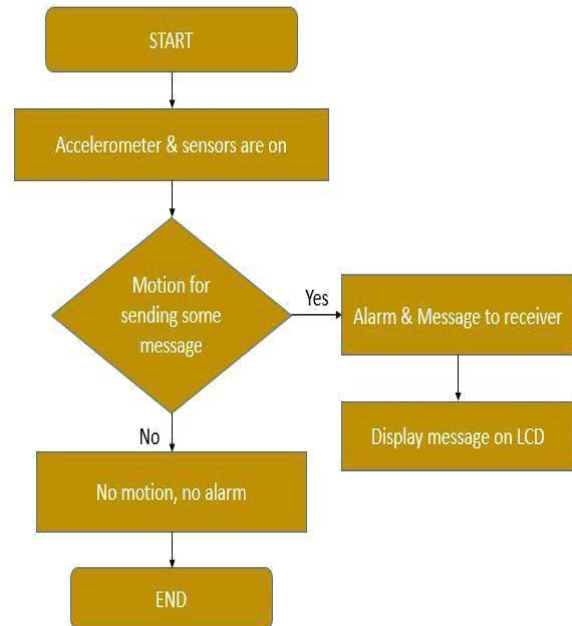
Fig6: Block Diagram of Tx & Rx Circuit

As we observe in the block diagram, first one is the transmitter of our device which contains four blocks, which are as follows:

Arduino Uno, accelerometer, temperature sensor and RF transmitter. Arduino Uno plays an important role in our device, as it is the microcontroller used to control the various actions performed by our device. We are using a 3-axis accelerometer which will gather the readings of changing angle of the device and convey a message as per the programmed instructions.

On the receiver side the RF receiver is used to catch the signal and give to the 8051 microcontroller. This microcontroller will read the signal and display the message on the LCD display.

IV. FLOW CHART



As shown in above flowchart, the process will be as follows-

Device will be started first by giving power supply to it. All the sensors i.e. Accelerometer, temperature sensor will be on. To work the device there needs to be the motion of the accelerometer in some of the angle in any direction. There will be programmed instructions for every movement of the accelerometer i.e. for each direction. If there is motion of the device in any direction then there will be an alarm and a programmed message will be sent to the receiver which will be displayed on the LCD display connected to the receiver. If the device is steady i.e. there is no any device motion then there will be no alarm and message. So, process will end.

V. FUTURE SCOPE

GSM Technology could be incorporated to achieve greater range as RF range is limited. With the use of GSM we can send message phone of the doctor or attendant.

The project can be further developed into an automatic wheel chair where in wheel chair will be moved just by hand gesture. Also, along with only message transmission other data like body temperature, pulse rate etc. can also be transmitted to the nurse so that a real time record of all patients is maintained.

VI. ACKNOWLEDGMENT

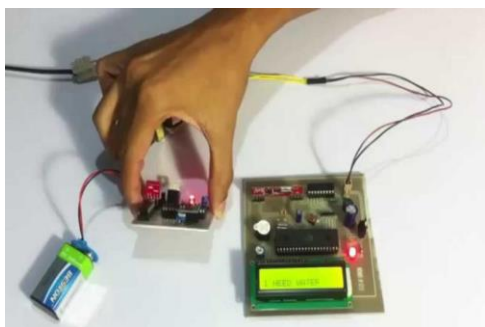
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VII. RESULT

Arduino software is employed in the simulation of project. Our framework result indicates fruitful transmission of messages from every patient.

When a tilt in some direction from the patient is detected, the buzzer sounds and a predefined message will be displayed on LCD. If the nurse is not near the receiver part, a voice message will also be heard as a substitute to make the life of both patient and nurse easy. This system can also be used for many to one communication wherein each patient will have a unique patient no. and the nurse can easily identify the patient with the help of patient no. sent along with the message.



VII. CONCLUSION

This project will definitely help the people who are not able to do the full movement of the body. This project is aiming to fulfil the communication gap between these people and the normal ones. The accelerometer we are using is of 4 axes, so it is very

accurate for very small movement also. If a person with disability is hungry, he will do some movement with the body part containing accelerometer. Buzzer will become on and a message will be displayed on the LCD.



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