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# Motion Based Message Conveyor Using Hand Gesture Recognition

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**ABSTRACT:** The project aims to implement a low-cost reliable system that will help to establish communication between paralytic or disabled patients and a nurse. A patient can easily send messages to the nurse by just tilting an accelerometer (ADXL345) connected to a body part capable of movement. This angle of tilt is sent to a central controller which then initiates communication between the patient (transmitter) and nurse (receiver) and decides which message is to be transmitted based on the tilt angle. Each patient will have such a device installed on or around his body and all such patients will be centrally linked to the receiver at the nurse side. Along with this a real-time medicine reminder and an emergency buzzer to simplify the work of the nurse were implemented. Our project provides a reliable, effective, and simple yet important solution to various issues faced by nurses in traditionally communicating with disabled patients.

**KEYWORDS:** Paralytic patient, accelerometer, tilt angle, communication, real time, effective

## 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 patients 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 nurses job. As a single nurse is responsible for several 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 nurses 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. RELATED WORK

Today the gesture recognition technologies are much advanced. Nowadays, a lot of active research is taking place in the wireless field, and very little in its public implementations. A lot of techniques have been devised for sensing the hand gestures doing the appropriate actions.

A technique based on the glove is a popular mode of recognizing hand gestures. It uses a sensor attached to a glove that detects hand movements. The user needs to have a transmitting device on his hand which consists of a sensor, i.e., 3- axis accelerometer. Movement of the hand in a particular direction will send a command to the LCD screen which will then display the information specified in the direction. The transmitting device consists of the accelerometer the input voltages of the accelerometer are encoded by the controller after that it will be transmitted by an RF Transmitter module. At the receiver end the microcontroller receives the proper data, it triggers the buzzer and displays the data on the LCD[1].

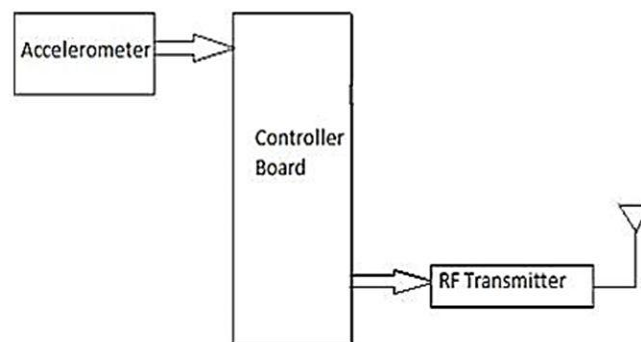
Merlo, J.L et.al, “The effect of physiological stress on tactile communication” paper introduces a communication system for common military hand and arm signals which does not require a visual connection between the transmitters and receivers. Moreover, the system instantaneously delivers the message to all recipients and can do so on a variety of output devices. Input gestures intended for transmission, are accepted through a wireless accelerometer-based input device and classified by a machine learning algorithm for subsequent delivery. Of particular importance for the gesture, delivery is the incorporation of a tactile display, an output device that emulates the gesture’s spatial qualities through a sequence of vibrations delivered via an elastic belt worn around the soldier’s waist. these tactile sequences can be made to intuitively mimic the corresponding hand signals, and research has shown that tactile communication can succeed in conveying information to a recipient even under high physiological stress[2].

“Gesture recognition system” paper introduces a novel communication system and provides detail on initial experiments and applications.it looks at embedding an accelerometer into a soldier’s gloves and porting the gesture recognition and transmission system to pocket-size computing devices.For processing input, the system centers on a computer-mediated gesture recognition system. In the biomedical sector, a wheelchair is an important device because of the recent shift in the industrial population. The demand for the physically handicapped and the aged are ever rising. The present wheelchair doesn't have the integration of technologies for their working. This paper allows the users to use human gestures of movements like hands and synchronize them with the movement of the wheelchair so that they can use it with comfort and ease on all kinds of terrains without the hurdle or fatigue[3].

J.S.Kim et.al.” Real-time hand gesture recognition for avatar motion control“ in this paper a pattern recognizing algorithm has been utilized to study the features of the hand. But this procedure is very tiring and time-consuming [4]. F.Arce et. al, In this paper a three-axis accelerometer has been used to read a different type of hand gestures. But carrying extra circuitry on the hand involves attaching several accelerometer with the hand, this irritates the user, there may be loose connections in the system result in abnormal outcomes[5].

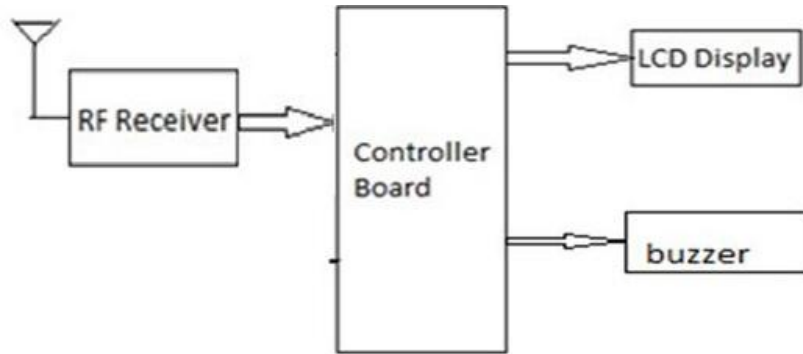
### III. METHODOLOGY

According to the proposed methodology, The heart of the transmitter unit is the accelerometer. This can be a two-axis or a three-axis static accelerometer connected to the analog inputs of the controller. It is interfaced with the controller to sense the acceleration. The controller is the second stage of the transmitter. The controller processes the data from the accelerometer and if the conditions are satisfied it sends the data to the next stage that is the transmitter. We have proposed and implemented an RF transmitter for its simplicity. Another input to the controller is from the push button which is used for emergencies.



(a) Transmitter block diagram

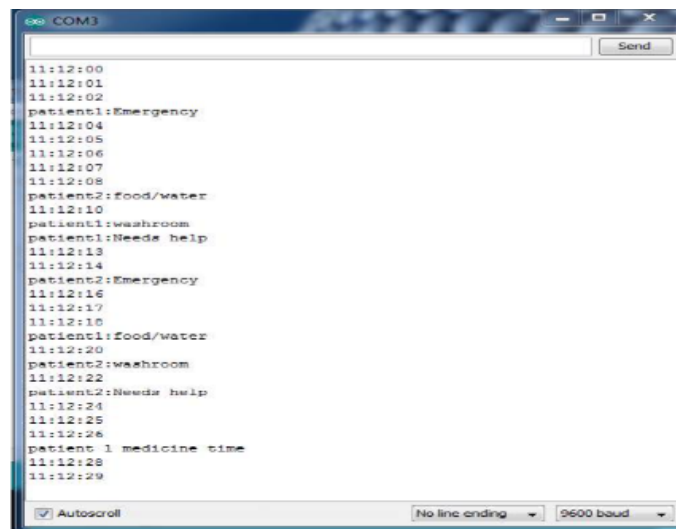
The receiver side includes the RF receiver which receives the messages and sends them to the controller. the message is to be displayed on the LCD. For this, the LCD is interfaced to the controller. RF receiver receives the modulated signal through the antenna, performs all kinds of processing, demodulation, filtering, etc, and gives out serial data it then converts to corresponding logic data. The microcontroller now displays the associated message on the LCD screen. It also sounds like a buzzer along with a message as soon as it receives a motion signal from the accelerometer.



(b) Receiver block diagram

#### IV. EXPERIMENTAL RESULT

Simulation of the project is done in the Arduino Software. The figure below shows the output in a serial monitor of the software. It shows the Real-Time Clock (RTC) implementation and the received signals from the patients. Medicine Reminder is in synchronization with the RTC. Along with that, we can see the different messages sent by the two patients. Our project result shows the successful transmission of 4 messages from each patient. This window will be present at the receiver side which is at the nurse side. When no signal is transmitted only a real-time clock will be displayed on the screen. As soon as a message due to the motion of the accelerometer is received it will be displayed on the screen. Identification of the message from different patients is made easy as the patient number is sent along with the message. The medicine reminder program will display its output at a predefined stored time.



(c) Sending messages when motion is detected

#### V. CONCLUSION

This device has made the conveyance of the message possible only by the motion of a body part. The ease of message conveyance is the main advantage of this system along with the real-time user-defined medicine alarm. By implementing this system a simple device for paralyzed or disabled people can be achieved without the use of the complex form of inputs. The prototype we have made is fully functional but restricted to a small area of operation. For a large area and transmission distance, the type of communication used has to be more effective and faster. Our system successfully proves that this system is an excellent approach to be implemented at hospitals for pn. The project can be further developed into an automatic wheelchair wherein the wheelchair will be moved just by hand gesture. 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 the patients is maintained.

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