International Journal Of Advanced Research In Engineering Technology & Sciences
ISSN: 2394-2819
Email: editor@ijarets.org March- 2015 Volume 2, Issue-3 www.ijarets.org

Motion Based Message Conveyer for Paralytic/Disabled People

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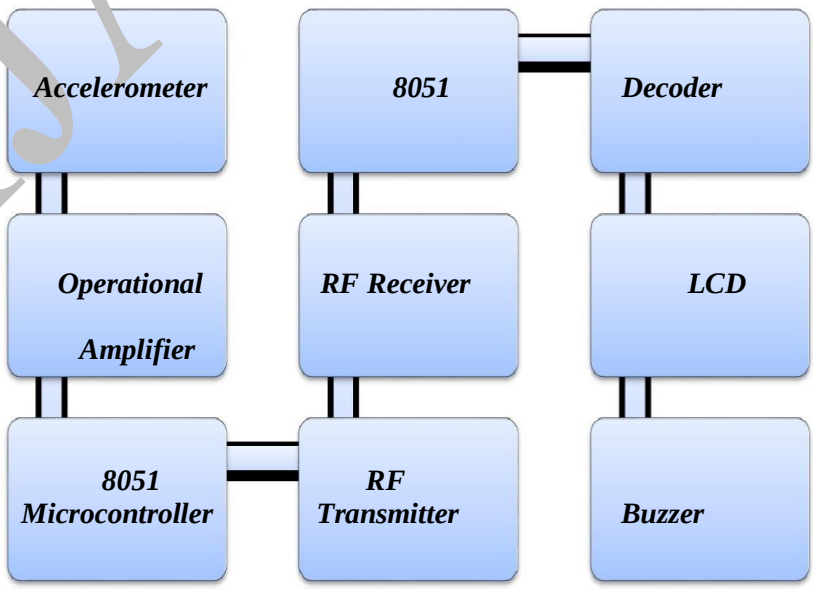
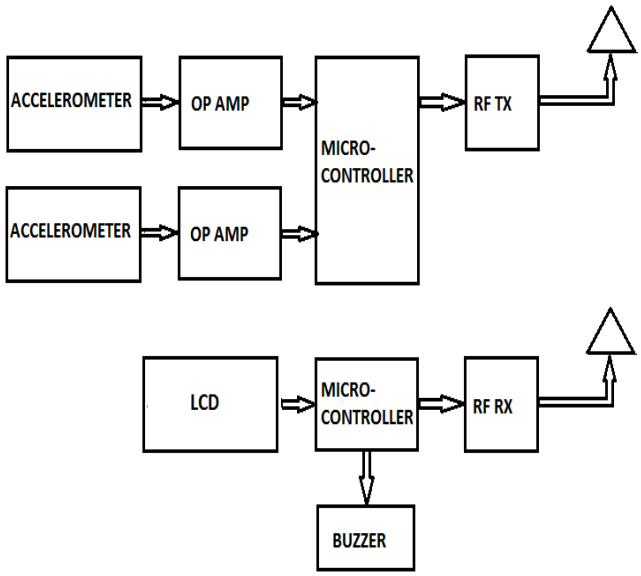
ABSTRACT
This Paper explains hand gesture controlled message conveyer for paralytic/disabled people. Its directional movements are controlled by hand trajectories. Hand trajectories are detected with the help of 3-axis accelerometer. The RF module function is to transmit the trajectory data wirelessly. At the receiver end the decoder (HT12D) and RF receiver together decode the 4 bit data and give it to the microcontroller. If the microcontroller receives the proper data, it triggers the buzzer and displays the data on the LCD.

I) INTRODUCTION

Gesture recognition technologies are much advanced in the today world. Nowadays, a lot of active research is taking place in the wireless field and very less in its public implementations. Lot of techniques has been devised for sensing the hand gestures & doing the appropriate actions. A technique based on 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 direction. The transmitting device consists of a Comparator IC for assigning proper levels to input voltages from the accelerometer & an Encoder IC whose function is to encode the four bit data & after that it will be transmitted by an RF Transmitter module.

At the receiver end the decoder (HT12D) and RF receiver together decode the 4 bit data and give it to the microcontroller. If the microcontroller receives the proper data, it triggers the buzzer and displays the data on the LCD.





1a. BLOCK DIAGRAM

1.1 ACCELEROMETER

An Accelerometer is an electromechanical device that measures forces of acceleration. These forces may be static, like the constant gravitational force acting on our feet, or they could be dynamic – caused due to the movement or vibration of the accelerometer. It is the sensor which records acceleration and gives an analog data when moves in X, Y, Z direction.

1.2 COMPARATOR IC

The comparator IC compares the analog voltage received from the accelerometer and gives a particular voltage which may be low or high after comparing it with reference voltage. The output of comparator is quite noisy and consists of various voltage levels. This IC compares those levels and gives output in the digital voltage form of 0 and 1. This process is called signal conditioning.

1.3 ENCODER IC

PT2262 is a remote controlled encoder which is paired with PT2272 utilizing CMOS technology. It encodes data into serial coded waveform which is suitable for RF or IR modulation. PT2262 has a maximum of 12 bits of tri-state address pins thus providing up to 3^{12} address codes; thereby, it reduces any code collision and unauthorized code scanning possibilities.

1.4 RF MODULE (Rx/Tx)

Radio frequency (RF) is the frequency in the range of about 3 KHz to 300 GHz. It corresponds to the frequency of radio waves, and the alternating currents which carry radio signals.
The RF module works on 315 MHz frequency and ranges from 50-80 meters.

1.5 DECODER IC

PT2272 is a remote controlled decoder which is paired with PT2262 utilizing CMOS Technology. It has 12 bits of tri-state address pins thus providing a maximum of 3^{12} address codes; thereby, it reduces any code collision and unauthorized code scanning possibilities. When no error or unmatched codes are found then it decodes input data.

1.6 MICROCONTROLLER

It is the brain and processing part of the system. It receives data from the decoder and makes decisions for further operations. We used a microcontroller for our robot to give it a decision capability. That decision directs the robot to move in particular directions.

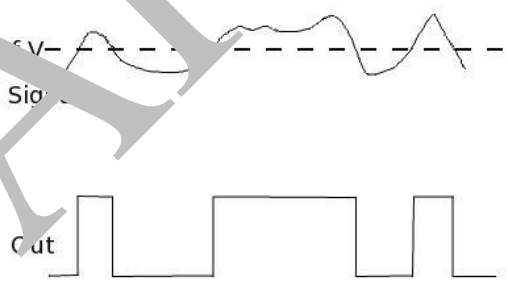
1.7 16*2 CHARACTER DISLAY

Features:

- 5*8 dots with cursor
- Built in controller(KS 0066)
- +5v power supply
- 1/6 duty cycle

II. IMPLEMENTATION

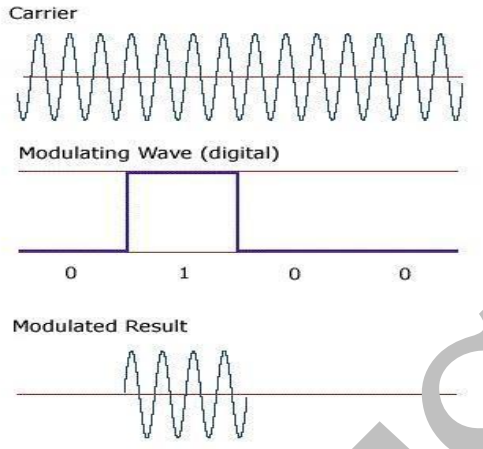
The accelerometer outputs constant analog voltage levels by recording the change in X and Y direction. These voltages are sent to the comparator IC which compares it with the references voltages that have been set via variable resistors attached to the IC. The levels can be set between any two voltages. Every voltage generated by the accelerometer is compared with these set voltages and an analog 1 or 0 signal is generated by the comparator IC.



Input and Output of Comparator IC 2(a)

The analog signal so generated is fed as input to the encoder IC .Encoder converts that parallel analog signal waveform into serial analog signal waveform which is compatible for transmission. Push button which is attached with the transmitting pin enables transmission of the signal. The coded data will be passed onto the RF module only when the button is pressed. This button helps in making sure that no data is transmitted unless required.

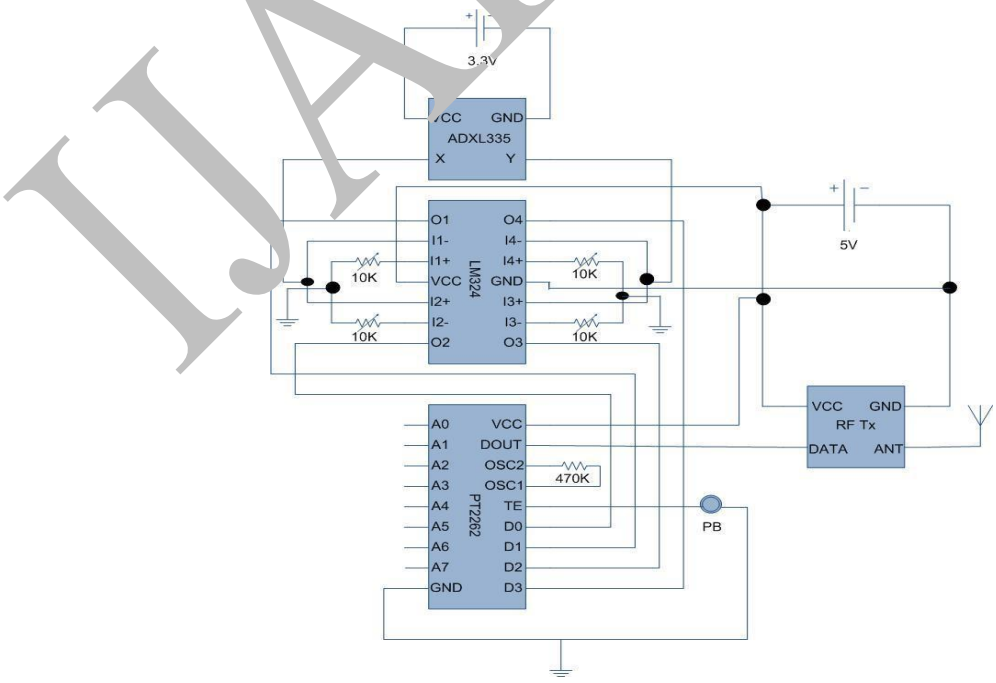
BY using Amplitude Shift Keying (ASK) modulation the RF transmitter modulates the input signal. It is the form of modulation which represents digital data as variations in the amplitude of a carrier wave.
The following figure shows the modulated output of the RF module:



ASK Modulation
2(b)

The working frequency of RF module is 315MHz. It means that the carrier frequency of the RF module is 315MHz. The RF module enables the user to have the control on the robot wirelessly and easily.
Transmission can be done by other methods also but RF Transmission is better than IF because of many reasons. RF signals travel through larger distances which makes it suitable for long range applications. Also, IR mostly operates in line-of-sight mode, RF signals travels even when there is an obstruction between transmitter & receiver. RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources.

The schematic of transmitting end can be seen below:



The receiver receives the signal from transmitter, demodulates it and passes it to decoder IC. Original data bits are recovered by decoding the signal received by the decoder. Decoder converts the serial waveform to parallel waveform which is suitable for microcontroller use. The input is a serial coded modulated waveform while the output is parallel. The pin 17 of the decoder IC is the Valid Transmission (VT) pin. A LED connected to this pin indicates the status of the transmission. The LED will blink in case of successful transmission.

The parallel binary data from the encoder is fed to the microcontroller. The microcontroller takes decision for further operations after analyzing these bits. Microcontroller compares the input bits with the coded bits which are burnt into the program memory of the microcontroller and gives resultant outputs. These output bits are forwarded to the LCD screen which displays the information based on the hand movements.

IV. APPLICATIONS

A. MEDICAL: - Gesture control can be really helpful in receiving information wirelessly
B. Through motion gesture.
C. Military: - Gesture controlled can be used for military purpose.
D. Handicap people can use this technology in their wheelchair to move from one place to another.

V. FUTURE DEVELOPMENT

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

VI. CONCLUSION

We have developed a method where we can send the signal given by patients wirelessly through the gesture movement by body parts, the information hence will be displayed on the LCD display.

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