Implementation of Advanced System for Controlling Handicap Vehicle Using PIC

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Abstract: This paper describes the wheel chair system for a physically disabled person to move around independently, the vehicle can be controlled by moving the tongue of the person. The Magnetic sensor was placed at the tongue. We are also using Obstacle detectors at front and back side of the vehicle used to stop the vehicle when there is any obstacle in the path. Pulse sensor is also used for continuously monitors the heart rate of the disable person who using the vehicle. The data generated by these sensors will be given to the microcontroller for data processing, if the controller identify any abnormality health condition of the user then it automatically sends SMS to the pre-defined number stored in it with the help of GSM technology.

Index Terms: PIC 16F877, sensors, GSM, Wheel chair, DC motor.

I. INTRODUCTION

There are different reasons for which people need an artificial means of locomotion such as a wheelchair. The number of people, who need to move around with the help of some artificial means, because of an illness or accident, is also continuously increasing. Moreover implementing a controlling system in it enables them to move without the help of another person is very helpful. This means have to be increasingly sophisticated, taking advantage of technology evolution, in order to increase the quality of life for these people and facilitate their integration into their working world. In this way a contribution may be made for facilitating movement and to make this increasingly simple and vigorous, so that it becomes similar to that of people who do not suffer any deficiencies. However, there are still important advances that can be done in this field. Here we used magnetic sensor and GSM Technology .We engage the above two technologies in a wheel chair which can help physically challenged people to control the wheelchair locomotion in an easy manner. A wheelchair is a chair with wheels, designed to be a replacement for walking. The device comes in variations where it is propelled by motors or by the seated occupant turning the rear wheels by hand. Wheelchairs are used by people for whom walking is difficult or impossible due to illness, injury or disability

II. BLOCK DIAGRAM

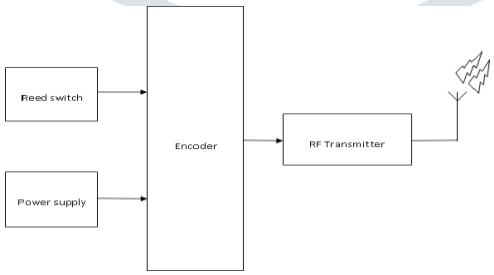

Fig 1 A Transmitter

Magnetic Sensor

In this project work we are using four reed switches that are fixed in the mouth of user. When magnet come close to reed switch its start operating. We fix the Magnet at the Tongue and fix reed Switch at the Teeth Set. Now the user moves the Magnet (that is by moving tongue) towards Reed Switch. If the user moves the tongue (magnet) towards the left side then the vehicle move to the left side. If the user moves the tongue (magnet) towards the right side then the vehicle moves to the right side. If the user moves the tongue (magnet) towards the forward then the vehicle moves to the forward direction.

Encoder

The transmitter circuit as shown in fig 1 is built using IC HT12E and TX 433.92Mhz module. IC HT12E is CMOS IC with working voltage ranges from 2.4v to 12v. The encoder HT12E has eight address and another four address/ data lines. The data set on this twelve-line (address and address/ data line) is serially transmitted when the transmit enable pin TE is taken low. The data output appears serially on the D out pin. The data is transmitted in succession. It consists of different length of positive going pulses for "1"& "0". The frequency of these pulses between 1.5 and 7 KHz depending on the resistor value between OSC 1 and OSC 2 pins. When transmit enable pin is corresponding data pin maintain low state other data pins change to high state. In our project, the data from the reed switches are transferred to the control unit via RF module. The encoder receives 0001 if the reed switch1 alone is engaged. Read switch 1 gets closed pulled to ground potential, the selected address and data are available at D out, which is fed to data in of TX 433.92.

The transmitter module sends the serial data in open space for remote operation. In HT12E data is serially transmitted, when enable signal given to TE Pin, to get this operation, by using four diodes OR Gate is formed. When we select any Address/ Data line, TE pin also get low signal and selected data's are transmitted. The 1M resistors connected across oscillator pins to produce nearly 3 KHz frequency. By using 8-address line we can create 256 different addresses to send four different data.

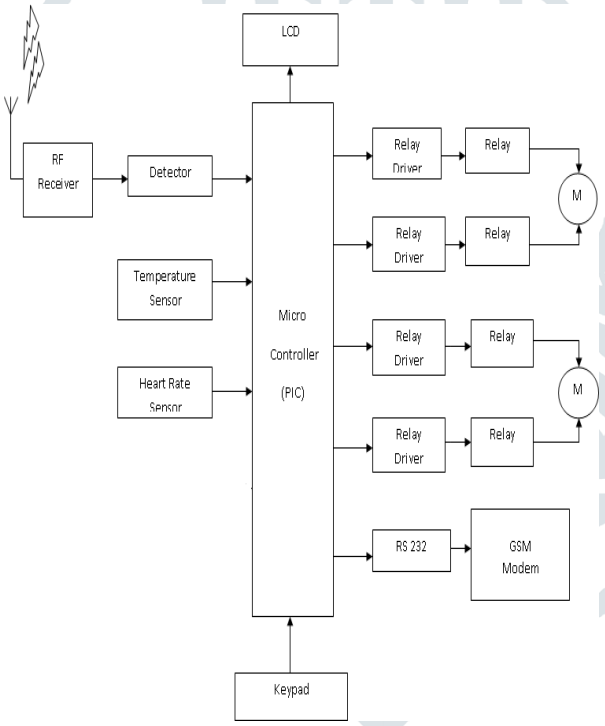

Fig 2 A Receiver

Decoder

The complete RF receiver circuit is as shown in fig 2 decoder circuit employing IC HT12D and RX 433.92 MHz is shown in the below figure. The IC HT12D is Toltec processor, which has eight-address line and four data line. When valuable data is received, one positive pulse is available at VT pin. This decoder IC receives the serially transmitted data, when address of transmitted data is matched with pre-loaded decoder address. When it receives the valuable data, VT pin gives acknowledge signal. The external resistor is connected across oscillator pin to generate base oscillation frequency up to 150 KHz. The actual state of data pins are at low potential (low state). When it receives the valuable data, the corresponding data pin maintains the low potential and other pins go to high state. It is operated at +6V DC, and the power consumption is very low. The valuable data with particular address is transmitted serially using HT12E from far end through TX 433.92 MHz module. In receiver side, by using RX 433.92 module data is received and serially feed to HT12D. If received data is is valuable when the user turns his tongue to the right. Similar operation will happen for all other movements of tongue.

Microcontroller

A microcontroller is one that has microprocessor features together with internal memory, timer/counter, I/O ports etc. The main use of a microcontroller is to control the operation of a machine using a fixed program that is stored in ROM and that does not change over the lifetime of the system. The microcontroller is a special purpose device. For example, the microcontroller chip in calculator performs the function of calculator alone, unless its internal programming is changed. The basic microprocessor had 71% of its total instructions as multi byte instructions. Each byte of a multi byte instruction must be fetched from program memory and each fetch takes time. This results in longer program byte counts and slower execution time versus single byte instructions. But, the basic microcontroller has 62% of its total instructions as multi byte instructions. Hence the program is more compact and runs faster to accomplish similar tasks. Various microcontrollers offer different kinds of memories. EEPROM, EPROM, FLASH etc. are some of the memories of which FLASH is the most recently developed. Technology that is used in pic16F877 is flash technology, so that data is retained even when the power is switched off. Easy Programming and Erasing are other features of PIC 16F877.

Pulse Sensor

The sensor consists of a light source and photo detector; light is shown through the tissues and variation in blood volume alters the amount of light falling on the detector. The source and detector can be mounted side by side to look at changes in reflected light or on either side of a finger or earlobe to detect changes in transmitted light. The particular arrangement here uses a wooden clothes peg to hold an infra- red light emitting diode and a matched phototransistor. The infra-red filter of the phototransistor reduces interference from fluorescent lights, which have a large AC component in their output. The peg is drilled with 3mm holes to take the LED, the phototransistor, the pair of wires linking the two and the two core screened output cable. The holes for the LED and phototransistor are drilled in straight line so that they line up. The ends of each side of the peg are filed on the inside to enlarge the gap and pieces of black closed cell foam are stuck in place to improve grip and make a light tight seal against the skin. At this point, the spring should be adjusted so that the peg will grip an ear lobe while at the same time not being so tight that it excludes blood from a finger.

Thermistor

The LM 358 consist of four independent, high gains, internally frequency compensated operational amplifier which were designed specifically to operate from a single power supply over a wide voltage range. The first stage is a comparator in which the variable voltage due to thermistor is given to inverting input terminal and reference voltage is given to non-inverting input terminal. Initially the reference voltage is set at the voltage corresponding to room temperature level. When the temperature is increased above the room temperature level, the Thermistor resistance is decreased and hence that voltage is given to comparator. Now the comparator delivers the output voltage at the output pin. Then this voltage is given to next stage of preamplifier. Here the change in voltage is amplified then the amplified voltage is given to next stage of gain amplifier. In this amplifier the variable resistor is connected as feedback resistor. The feedback resistor is adjusted to get desired gain. Then the AC components in the output are filtered with the help of capacitors. Then output voltage is given to final stage of DC voltage follower through this the output voltage is given to ADC or other circuit. Thermistor can be classified into two types depending on the sign of *k*. If *k* is positive, the device is called a positive temperature coefficient (**PTC**) Thermistor, **Possessor**. In these devices, the resistance increases with increase in temperature. If *k* is negative, the device is called a negative temperature coefficient (**NTC**) Thermistor. In these devices, the resistance decreases with increase in temperature. Thermistor can be classified into two types depending on the sign of *k*. If *k* is positive, the device is called a positive temperature coefficient (**PTC** Thermistor, **Possessor**. In these devices, the resistance increases with increase in temperature. If *k* is negative, the device is called a negative temperature coefficient (**NTC**) Thermistor. In these devices, the resistance decreases with increase in temperature.

Global System for Mobile Communications (GSM

GSM (Global System for Mobile Communications), is a standard set developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones. It became the de facto global standard for mobile communications with over 80% market share.

1. Base station subsystem

GSM is a cellular network, which means that cell phones connect to it by searching for cells in the immediate vicinity. There are five different cell sizes in a GSM network—macro, micro, pico, femto, and umbrella cells. umbrella cells. The coverage area of each cell varies according to the implementation environment. Macro cells can be regarded as cells where the station antenna is installed on a mast or a building above average rooftop level. . Micro cells are cells whose antenna height is under average rooftop level; they are typically used in urban areas. Picocells are small cells whose coverage diameter is a few dozen metres; they are mainly used indoors. Femto cells are cells designed for use in residential or small business environments and connect to the service provider's network via a broadband internet connection. Umbrella cells are used to cover shadowed regions of smaller cells and fill in gaps in coverage between those cells.Cell horizontal radius varies depending on antenna height, antenna gain, and propagation conditions from a couple of hundred metres to several tens of kilometres. The longest distance the GSM specification supports in practical use is 35 kilometres (22 mi). There are also several implementations of the concept of an extended cell,[10] where the cell radius could be double or even more, depending on the antenna system, the type of terrain, and the timing advance. . Umbrella cells are used to cover shadowed regions of smaller cells and fill in gaps in coverage between those cells.Cell horizontal radius varies depending on antenna height, antenna gain, and propagation conditions from a couple of hundred metres to several tens of kilometers. The longest distance the GSM specification supports in practical use is 35 kilometres (22 mi). There are also several implementations of the concept of an extended cell,[10] where the cell radius could be double or even more, depending on the antenna system, the type of terrain, and the timing advance.

GSM carrier frequencies

GSM networks operate in a number of different carrier frequency ranges (separated into GSM frequency ranges for 2G and UMTS frequency bands for 3G), with most 2G GSM networks operating in the 900 MHz or 1800 MHz bands. Where these bands were already allocated, the 850 MHz and 1900 MHz bands were used instead (for example in Canada and the United States). In rare cases the 400 and 450 MHz frequency bands are assigned in some countries because they were previously used for first- generation systems.

Most 3G networks in Europe operate in the 2100

MHz frequency band. Regardless of the frequency selected by an operator, it is divided into timeslots for individual phones. This allows eight full-rate or sixteen half- rate speech channels per radio frequency. These eight radio timeslots (or burst periods) are grouped into a TDMA frame. Half-rate channels use alternate frames in the same timeslot. The channel data rate for all 8 channels is 270.833 kbit/s, and the frame duration is 4.615 ms.

The transmission power in the handset is limited to a maximum of 2 watts in GSM 850/900 and 1 watt in GSM 1800/1900.

GSM Modem

This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily.The

modem can either be connected to PC serial port directly or to any microcontroller through MAX232. It can be used to send and receive SMS or make/receive voice calls.

DC Motor

A DC motor is a mechanically commutated electric motor powered from direct current (DC). DC motors can operate directly from rechargeable batteries, providing the motive power for the first electric vehicles. Today DC motors are still found in applications as small as toys and disk drives, or in large sizes to operate steel rolling mills and paper machines.ADCmotor in simple words is a device that converts direct current (electrical energy) into mechanical energy. In order to understand the **operating principle of dc motor** we need to first look into its constructional feature.

II.RESULT AND DISCUSSIONS:

The hardware of the project is as shown in Fig 3

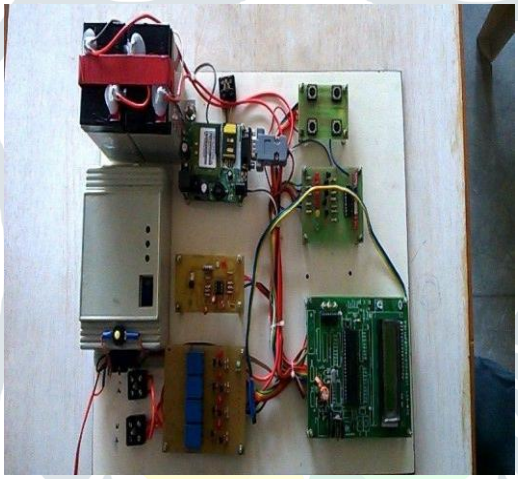

Fig 3:Hardware kit

Fig 4 Real time project

The real time model of the working model is as shown in fig 4.

CONCLUSION

As the magnetic sensor based automated system has been presented which would be very helpful for physically challenged persons. If the controller identify any abnormality health condition of the user then it automatically sends SMS to the pre-defined number stored in it with the help of GSM technology. A hardware set up has also been done to validate this technology.

ACKNOWLEDGMENT

This research project would not have been possible without the support of my guide, teachers and friends. The authors are grateful to the management and the head of the Institution of PSR Engineering College for giving all necessary support and providing facilities for making this research paper a successful one. This knowledgably guidance helped me to complete up to this stage and hope will continue in further research.

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