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Design and Development of Mobile Phones for Old/Disabled People

B.HariKishor Rao
Bachelors of Engineering,
Department of Mechatronics,
Chhatrapati Shivaji Institute of Technology,
Durg, Chhattisgarh, India.

Rupal Jain
Bachelors of Engineering,
Department of Electronics and Telecommunication,
Bhilai Institute of Technology,
Durg, Chhattisgarh, India.

Abstract:

Nowadays as the technology is getting updated day by day which is making educated people to easily operate the mobile phone. But it becomes somewhat critical for old/ disabled people to easily operate the mobile phone to call a specific person. The project "Design and development of mobile phones for old/disabled people" will provide an easy method for the disabled to call a specific person.In this project we are going to design sign language translator for disabled persons. This project will change the sign language of disable person into a form that can be understood easily. This project will also help the old people who can't move from their beds. In the case of emergency the person will move his/her finger to call his/ her family members and thus communication is possible.

Key Words:

Design, development, mobile phones, for old , disabled people.

1. INTRODUCTION:

This project is designed to create a prototype for a system which can be basically used to identify the needs of old as well as disabled people. The project "Design and development of mobile phones for old/disabled people" will provide an easy method for the disabled to call a specific person. In this project we are going to design sign language translator for disabled persons. This project will change the sign language of disable person into a form that can be understood easily. This project will also help the old people who can't move from their beds. In the case of emergency the person will move his/her finger to call his/her family members and thus communication is possible.

The need of communication is an important factor which is not effectively performed by the old or disabled so we are motivated to make this project. To meet this basic needs of the disabled we have designed a phone which will not only perform calling but also performs other functions as well for old/disabled. 2. ADVANTAGES AND DISADVANTAGES

Few disadvantages of the existing system are:
•It becomes problematic if the person does not know the sign language.
•It is having complex circuitary.
•It is not portable.
•It is wired system.
•If network problem is there then calling cannot be done.

The proposed system overcomes the above disadvantages and has the below mentioned merits:
•In case of emergency- It is useful in case of any emergency. For example if there is nobody nearby then the disabled can call or simply give a miss call so that the person's relative get alert just by moving his fingers.
•Accessible to disabled/old who can't move from place to place- It eliminates the problem of going anywhere.
•Calling as well as other functions can also be performed- Apart from calling, the needy can perform more tasks also like the device can indicate his need of water, food, and also indicates the need of switching on/off lights, fan etc. This will be displayed on LCD screen accompanied with a buzzer.
•Can be used in home and hospitals also- It can be effective if the nurse or doctor is not nearby and the patient needs to call.
•More cost-effective.

3. MATERIALS USED:

The list of componeets are summarized in the below table as follows:-

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Sr.no	Equipment	Quantity
1	Flex Sensor	3
2	GSM SIM 900	1
3	Relay ULN 2003	3
4	Voltage regulator	1
5	LCD Display	1
6	Transformer	1
7	Diode	4
8	Resistor	5
9	Capacitor	4
10	LED	7
11	Microcontroller (AT89C51)	1

TABLE 1

4. MATERIALS USED (DESCRIPTION):

4.1 AT89C51 Microcontroller

The IC is a low-power; high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density non-volatile memory technology and is compatible with the industry-standard MCS-51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel IC 8051 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications. The IC 8051 provides the following standard features: 4K bytes of Flash, 128 bytes of RAM, 32 I/O lines, 2 16-bit timer/counters, a five vector two-level interrupt architecture, full duplex serial port, on-chip oscillator and clock circuitry. In addition, the IC 8051 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port and interrupt system to continue functioning.

4.2.FLEX SENSORS:

Flex sensors are sensors that change in resistance depending on the amount of bend on the sensor.They convert the change in bend to electrical resistance- the more the bend the more the resistance valueThey are usually in the form of a thin strip from 1"-5" long tht vary in resistance.They can be made uni-directional or bi-directional.

Sizes:

-1 kilo ohm to 20 kilo ohm
-50 kilo ohm to 50
-50 kilo ohm to 200 kilo ohm
Flex sensor are analog resistors.
They work as variable analog voltage dividers.
Inside the flex sensor are carbon resistive elements within a thin flexible substrate.More carbon means less resistance.When the substrate is bent the sensor produces a resistance output relative to the bend radius.

4.3.LCD:

LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons:

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1.The declining prices of LCDs.
2.The ability to display numbers, characters and graph-ic ‘s. This is in contrast to LEDs, which are limited to numbers and a few characters.
3.Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.
4.These components are “specialized” for being used with the microcontrollers, which means that they can-not be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.

4.4.GSM SIM 900:

•The SIM900 is a complete Quad-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. Featuring an industry-standard interface, the SIM900 delivers GSM OR GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x 24mm x 3 mm, SIM900 can fit almost all the space requirements in your M2M application, especially for slim and compact demand of design. ” SIM900 is designed with a very powerful single-chip processor integrating AMR926EJ-S core ” Quad - band GSM/GPRS module with a size of 24mmx24mmx3mm ” SMT type suit for customer application ” An embedded Powerful TCP/IP protocol stack ” Based upon mature and field-proven platform, backed up by our support service, from definition to design and production.

•GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services. GSM differs from first generation wireless systems in that it uses digital technology and Time Division Multiple Access (TDMA) transmission methods. GSM is a circuit-switched system that divides each 200kHz channel into eight 25kHz time-slots. GSM operates in the 900MHz and 1.8GHz bands in Europe and the 1.9GHz and 850MHz bands in the US. The 850MHz band is also used for GSM and 3GSM in Australia, Canada and many South American countries. GSM supports data transfer speeds of up to 9.6 kbit/s, allowing the transmission of basic data services such as SMS (Short Message Service). Another major benefit is its international roaming capability, allowing users to access the same services when travelling abroad as at home. This gives consumers seamless and same number connectivity in more than 210 countries. GSM satellite roaming has also extended service access to areas where terrestrial coverage is not available.

•Global System for Mobile Communications. The first European digital standard, developed to establish cellular compatibility throughout Europe. It’s success has spread to all parts of the world and over 80 GSM networks are now operational. It operates at 900 MHz.

•GSM-900 uses 890 - 915 MHz to send information from the Mobile Station to the Base Transceiver Station (uplink) and 935 - 960 MHz for the other direction (downlink), providing 124 RF channels (channel numbers 1 to 124) spaced at 200 kHz. Duplex spacing of 45 MHz is used. In some countries the GSM-900 band has been extended to cover a larger frequency range. This ‘extended GSM’, E-GSM, uses frequency range 880 - 915 MHz (uplink) and 925 - 960 MHz (downlink), adding 50 channels (channel numbers 975 to 1023 and 0) to the original GSM-900 band. The GSM specifications also describe ‘railways GSM’, GSM-R, which uses frequency range 876 - 915 MHz (uplink) and 921 - 960 MHz (downlink). Channel numbers 955 to 1023. GSM-R provides additional channels and specialized services for use by railway personnel. All these variants are included in the GSM-900 specification.

1) Mobile Station:

• The mobile station (MS) consists of the mobile equipment (the terminal) and a smart card called the Subscriber Identity Module (SIM). The SIM provides personal mobility, so that the user can have access to subscribed services irrespective of a specific terminal. By inserting the SIM card into another GSM terminal, the user is able to receive calls at that terminal, make calls from that terminal, and receive other subscribed services.

•The mobile equipment is uniquely identified by the International Mobile Equipment Identity (IMEI). The SIM card contains the International Mobile Subscriber Identity (IMSI) used to identify the subscriber to the system, a secret key for authentication, and other information. The IMEI and the IMSI are independent, thereby allowing personal mobility. The SIM card may be protected against unauthorized use by a password or personal identity number.

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2) Mobile Switching Centre:

• The central component of the Network Subsystem is the Mobile services Switching Center (MSC). It acts like a normal switching node of the PSTN or ISDN, and additionally provides all the functionality needed to handle a mobile subscriber, such as registration, authentication, location updating, handovers, and call routing to a roaming subscriber. These services are provided in conjuction with several functional entities, which together form the Network Subsystem. The MSC provides the connection to the fixed networks (such as the PSTN or ISDN). Signalling between functional entities in the Network Subsystem uses Signalling System Number 7 (SS7), used for trunk signalling in ISDN and widely used in current public networks

•.The Home Location Register (HLR) and Visitor Location Register (VLR), together with the MSC, provide the call-routing and roaming capabilities of GSM. The HLR contains all the administrative information of each subscriber.

•registered in the corresponding GSM network, along with the current location of the mobile. The location of the mobile is typically in the form of the signalling address of the VLR associated with the mobile station. The actual routing procedure will be describeed later. There is logically one HLR per GSM network, although it may be implemented as a distributed database.

•The Visitor Location Register (VLR) contains selected administrative information from the HLR, necessary for call control and provision of the subscribed services, for each mobile currently located in the geographical area controlled by the VLR. Although each functional entity can be implemented as an independent unit, all manufacturers of switching equipment to date implement the VLR together with the MSC, so that the geographical area controlled by the MSC corresponds to that controlled by the VLR, thus simplifying the signalling required. Note that the MSC contains no information about particular mobile stations --- this information is stored in the location registers.

•The other two registers are used for authentication and security purposes. The Equipment Identity Register (EIR) is a database that contains a list of all valid mobile equipment on the network, where each mobile station is identified by its International Mobile Equipment Identity (IMEI). An IMEI is marked as invalid if it has been reported stolen or is not type approved. The Authentication Center (AuC) is a protected database that stores a copy of the secret key stored in each subscriber's SIM card, which is used for authentication and encryption over the radio channel.

2) Base Station Subsystem (BSS):

•The Base Station Subsystem is composed of two parts, the Base Transceiver Station (BTS) and the Base Station Controller (BSC). These communicate across the standardized Abis interface, allowing (as in the rest of the system) operation between components made by different suppliers.

•The Base Transceiver Station houses the radio tranceivers that define a cell and handles the radio-link protocols with the Mobile Station. In a large urban area, there will potentially be a large number of BTSsdeployed, thus the requirements for a BTS are ruggedness, reliability, portability, and minimum cost.

•The Base Station Controller manages the radio resources for one or more BTSs. It handles radio-channel setup, frequency hopping, and handovers, as described below. The BSC is the connection between the mobile station andthe Mobile service Switching Center (MSC).

Fig.1. GSM module

4.5.RELAY ULN 2003:

The ULN2001, ULN2002, ULN2003 and ULN2004 are high voltage, high current Darlington Arrays each contain seven open collector Darlington pairs with common emitters. Each Channel rated at 500mA and can withstand peak currents of 600mA. Suppression diodes are Included for inductive load driving and the inputs are pinned opposite the outputs to simplify board.

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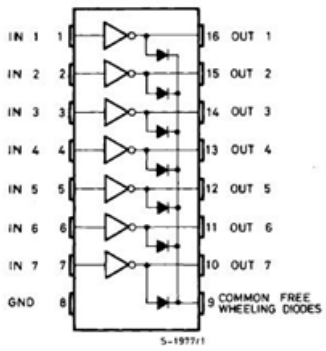

FIG.2 RELAY

5.WORKING:

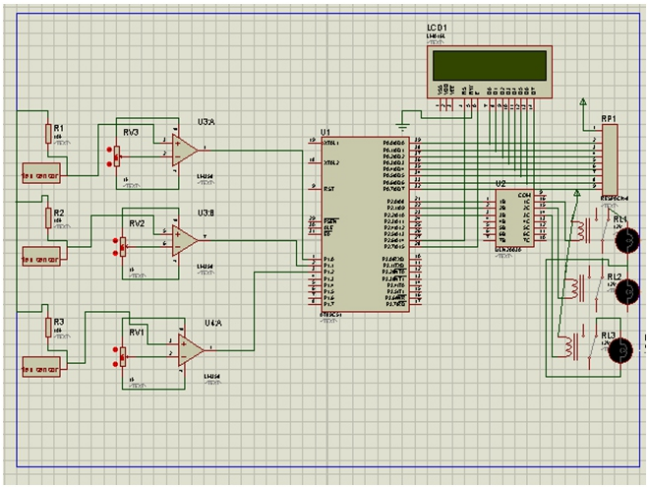

Fig.2.circuit diagram.

To detect the sign flex sensors are connected to the old/ disabled person's finger. flex sensor is actually a variable voltage analog divider which converts the bend into electrical resistance..Each flex sensor is connected to the comparator circuit,whenever it is bend the voltage across the flex sensor will drop.The drop of voltage is connected to the comparator circuit. The comparator circuit will compare the flex voltage with the reference voltage.If the comparator circuit get a non-inverting voltage greater than inverting voltage,the output will become high according to the voltage provided to the positive reference voltage.The output will be either +Vsat or –Vsat. This output voltage of comparator is connected to microcontroller AT89C51.The microcontroller will take this output as an input according to that the microcontroller will perform certain task. Accordingly the task will be displayed on the LCD screen.

The microcontroller will help to detect the sign language taking as an input from the comparator according to the logic, the microcontroller will display certain text to the LCD which indicates the need/situation of the person. Apart from other purpose main motto of this device is to call someone in case of emergency or normal condition. To achieve this operation a GSM module is connected with the microcontroller.Whenever microcontroller will get a call sign language as an input, the controller will send or transmit AT command to GSM module which helps GSM module to call someone.Apart from that we are going to control the appliances according to the input getting to the microcontroller like switching ON/OFF the fan or lights,to indicate person's hunger or thirst.

BLOCK DIAGRAM:

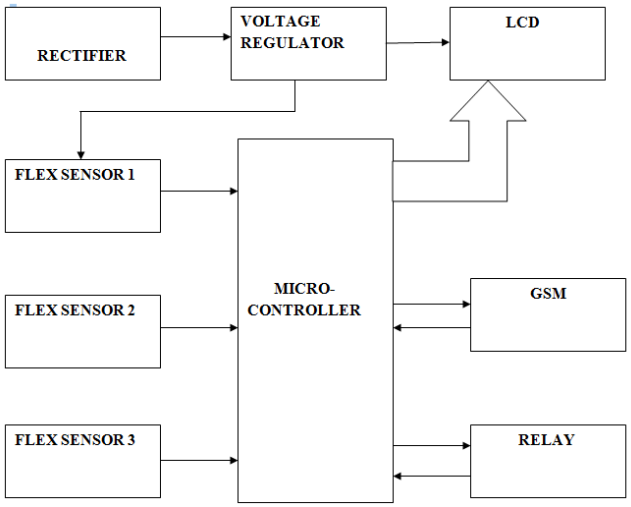

Fig.1. block diagram

6.CONCLUSION:

We have successfully completed this project. The components are effectively used especially the flex sensors which senses the bending movement of fingers and converting it into electrical signals thus producing the required output. The output may be calling a person in case of emergency or indicating other needs of the needy like switching on/ off fans, lights, need of water, food etc. This sign language translator is a solution to get over the big problem of communication. It has also successfully overcome the problem of speech which proves to be beneficial for the disabled and old. It is having few disadvantages which can be removed by exploring further and using advance technology.

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7. FUTURE SCOPE:

•This device can be further extended by making it wireless eliminating the bulk of wires and complexity.
•.By making it wireless it can be made portable and easily accessible to all.
•It can be used for women security purpose by adding a GPS tracker in the circuitary which will track the location of the person in danger by making a particular gesture,and the location will be send to the nearest police station.
•It has a great scope in hospitals for the patients to express their need or calling the nurse.
•Can be used in gaming zone by making electronic gloves using the flex sensors.

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9.BIOGRAPHIES:

B. Harikishor Rao(AUTHOR 1) Completed B.E in "Mechatronic" from CSIT in 2013. Right now he is working as a mentor and teacher in ESIAC, Ideology for Career Enhancement and Seans Infosystem.

Rupal Jain (AUTHOR 2) is a final year student at Bhilai Institute Of Technology Durg Which is the top most college in Chhattisgarh. She has remained consistently good in academics as well as co-curricular activities. She has won prizes for drawing and painting at the National and International level. Some of these include- "Picasso International Golden Artist Award, M.F. Hussain Award, Shipra Shreshtha Kalankan Award, Highly Commended Jury Award and many more.She is a student with self-reliance and good levels of self-confidence.