

Public calling facility based on Global System for Mobile Communication using Subscriber's Identity Module

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Abstract— Subscriber's Identity Module phone services are perfect for the mobile population, especially in the areas where people are not able to afford private phones. This SIM phones are one of the most effective ways of bringing coverage to areas that are not very developed infrastructurally. The primary advantage of using this phone system is that it does not require massive wiring and hence easy to set up .A GSM modem is the main component of the system. It is a service that proves to be of great utility in the locations such as tourist attractions, campuses, and market places etc. It is very easy to install and serve the community in an effective way. As of these reasons it can be regarded as Community Asset.

Keywords— . AT Commands ,GSM,PIC,SIM

I. INTRODUCTION

Mobile phones have become an inevitable part of our day today life. Life without mobile phones is unimaginable for us. But there are times when we are prohibited to use them or the battery is dead which make it out of our reach during long journeys. Here we introduce the new concept of SIM Phone through which we can make a call from our number without using a mobile phone. Coin box phones were widespread across our country till few years ago which have now vanished due to the popularity of cell phones. We make use of the coin box concept in our project where we use a SIM card instead of a coin. One can make a call simply by inserting his SIM card into the SIM Phone .This provides the ease of making a call from our own number by paying money from our own SIM. It is applicable where the mobiles are prohibited or during power failure/dead mobile batteries. Also it is useful for people who are not able to afford cost of cell phones, especially in tribal areas. The main advantage is that it does not require massive wiring and hence it is easy to set up. Since it uses the Coin boxes, reuse of the electronic waste is possible.

II. EXISTING TECHNOLOGY

A. Coin Box

Coin Box Phone services are perfect for the mobile population , especially in the areas that are located on the outskirts of the city or the areas where people are not able to afford private phones. Coin Box Phones are one of the most effective ways of bringing coverage to areas that are not very developed infra structurally.

b. Card System

The card system is used in UAE. A telephone card, calling card or phone card for short, is a small plastic card, size and shape like a credit card, used to pay for telephone services. It is not necessary to have the physical card except with a stored-value system; knowledge of the access telephone number to dial and the PIN is sufficient. Standard cards which can be purchased and used without any sort of account facility give a fixed amount of credit and are discarded when used up; rechargeable cards can be topped up, or collect payment in arrears. The system for payment and the way in which the card is used to place a telephone call vary from card to card. Cards known as remote memory cards have a PIN associated with a specific land-line telephone account; calls using the card are billed to the associated account.

III. BLOCK DIAGRAM

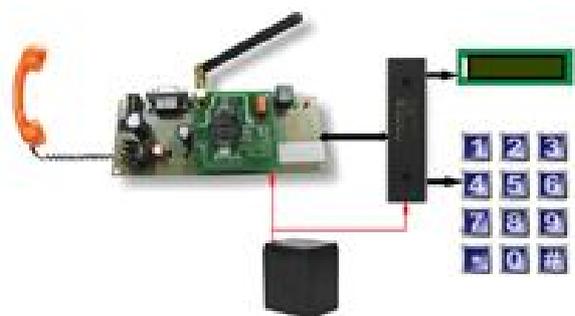


Fig.1

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IV. BLOCK DIAGRAM EXPLANATION

A. GSM Modem

A GSM Modem (Global System for Mobile communication) is a specialized type of modem which accepts a SIM (Subscriber Interface Module) card and operates over a subscription to a mobile operator, just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. GSM modems are frequently used to provide mobile internet connectivity; many of them can also be used for sending and receiving SMS and MMS messages. GSM modem can be dedicated modem device with a serial, USB or Bluetooth connection on it can be a mobile phone that provides GSM modem capabilities. It is used as a generic term to refer any modem that supports one or more of the protocols including GPRS, EDGE and 3G technologies etc. The physical interface to the mobile application is made through a 60 pins board-to-board connector, which provides all hardware interfaces between the module and customers' boards except the RF antenna interface.

B. MAX 232

The MAX232 is a dual driver/receiver that includes a capacitive voltage generator to supply TIA/EIA-232-F voltage levels from a single 5V supply. Each receiver converts TIA/EIA-232-F inputs to 5-v TTL/CMOS levels. These receivers have a typical threshold of 1.3V, a typical hysteresis of 0.5V, and can accept $\pm 30V$ inputs it operate with low Supply Current 8mA Typical. It is designed to be Interchangeable With Maxim MAX232.

C. LCD Display

One of the most common devices attached to an 8051 is an LCD display. Some of the most common LCDs connected to the 8051 are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively. In recent years the LCD is finding widespread use replacing LEDs. This is due to the following reasons

1. Declining prices
2. Ability to display numbers, characters and graphics.
3. Incorporation of a refreshing controller into the LCD.
4. Ease of programming.

D. RS 232

In telecommunications, RS-232 is a standard for serial binary data signals connecting between a DTE (Data

terminal equipment) and a DCE (Data Circuit-terminating Equipment).

It is commonly used in computer serial ports. In RS-232, data is sent as a time-series of bits. Both synchronous and asynchronous transmissions are supported by the standard. In addition to the data circuits, the standard defines a number of control circuits used to manage the connection between the DTE and DCE. Each data or control circuit only operates in one direction that is, signaling from a DTE to the attached DCE or the reverse.

E. PIC Microcontroller

The PIC microcontroller [4] family is manufactured by Microchip Technology Inc. Currently they are one of the most popular microcontrollers, used in many commercial and industrial applications. The PIC microcontroller architecture is based on a modified Harvard RISC (Reduced Instruction Set Computer) instruction set with dual-bus architecture, Providing fast and flexible design with an easy migration path from only 6 pins to 80 pins, and from 384 bytes to 128 kilobytes of program memory. Although there are many models of PIC microcontrollers, the nice thing is that they are upward compatible with each other and a program developed for one model can very easily, in many cases with no modifications, be run on other models of the family. The basic assembler instruction set of PIC microcontrollers consists of only 33 instructions and most of the family members (except the newly developed devices) use the same instruction set. This is why a program developed for one model can run on another model with similar architecture without any changes.

All PIC microcontrollers offer the following features:

1. RISC instruction set with only a handful of instructions to learn
2. Digital I/O ports
3. On-chip timer with 8-bit prescaler
4. Power-on reset
5. Watchdog timer
6. Power-saving SLEEP mode
7. High source and sink current
8. Direct, indirect, and relative addressing modes
9. External clock interface
10. RAM data memory
11. EPROM or Flash program memory

Although there are several hundred models of PIC microcontrollers, the family can be broken down into three main groups, which are:

- a) 12-bit instruction word (e.g., 12C5XX, 16C5X) (also referred as the 12 Series and the 16C5X Series)
- b) 14-bit instruction word (e.g., 16F8X, 16F87X) (also referred to as the 16 Series)
- c) 16-bit instruction word (e.g., 17C7XX, 18C2XX) (also referred to as the 17 Series and the 18 Series).

All three groups share the same RISC architecture and the same instruction set, with a few additional instructions available for the 14-bit models, and many more instructions available for the 16-bit models. Instructions occupy only one word in memory, thus increasing the code efficiency

and reducing the required program memory. Instructions and data are transferred on separate buses, so the overall system performance is increased.

F.14-bit Instruction Word

This is a big family that includes many models of PIC microcontrollers. Most of the devices in this family can operate at up to a 20-MHz clock rate. The instruction set consists of 35 instructions. These devices offer advanced features such as internal and external interrupt sources.

G. PIC16F877

This microcontroller is a 40-pin device and is one of the popular microcontrollers used in complex applications. The device offers flash program memory, 368 bytes of RAM, 256 bytes of nonvolatile EEPROM memory, 33 I/O pins, 8 multiplexed A/D converters with 10 bits of resolution, PWM generator, three timers, an analog capture and comparator circuit, USART, and internal and external interrupt facilities. Data Memory Organization .The data memory is partitioned into multiple bank which contain the General Purpose Registers and the Special Function Registers. Bits RP1 (Status<6>) and RP0 (Status<5>) are the bank select bits .Each bank extends up to 7Fh (128 bytes). The lower locations of each bank are reserved for the Special Function Registers. Above the Special Function Registers are General Purpose Registers, implemented as static RAM. All implemented banks contain Special Function Registers. Some frequently used Special Function Registers from one bank may be mirrored in another bank for code reduction and quicker access.

lower than 2V. MAX232 is a dual driver receiver typically converts the RV, TV, CTS and RTS signal. The driver provides RS232 voltage level outputs approximately $\hat{A}\pm 7.5V$ from a single +5 supply via on-chip charge pump and external capacitor. The receivers reduce RS232 input (which may be high $\hat{A}\pm 25V$) to standard 5V TTL level. The receivers have a typical threshold of 1.3V and a typical hysteresis of 0.5V. When MAX232 IC receives a TTL[5] level to convert it changes a TTL logic 0 between +3 and +15V and change TTL logic 1 to between -3 and -15V and vice versa for converting from RS232 to TTL.

C. POWER SUPPLY

The battery section provides an input voltage V in which is filtered by capacitor c and connected to the pin 1 (in terminal) of the regulator IC 7805. The pin2 (out terminal) of the IC provide a regulated +5v, which is filtered by capacitor c at pin 3 (mostly for any high frequency noise). The third pin (ground terminal) of the IC is connected to the ground, while the input voltage may varied over some acceptable range, o/p voltage remain constant within specified voltage variation limits. The output voltage of +5v acts the supply Vcc to drive the components such as MAX232, PIC16F877A, LCD display etc. present in the system.

D. RS 232

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V.CIRCUIT DIAGRAM

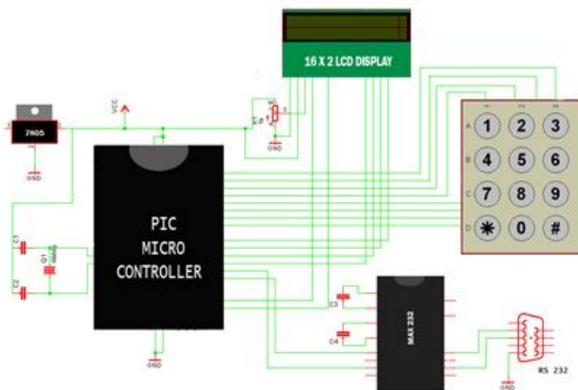


Fig .2

VI.CIRCUIT DIAGRAM DESCRIPTION

A. MAX 232

We used a hands free to take out the signal from the mobile phone to transmit it to the microcontroller. The operating voltage of the mobile phone is 3.3V and provides 3.7V at logic 1 and 0V as logic 0 to take it to the level of microcontroller we use MAX232 IC. It can provide input

E. LCD display

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Fortunately, a very popular standard exists which allows us to communicate with the Vast majority of LCDs

regardless of their manufacturer. The standard is referred to as HD44780U, which refers to the controller chip which receives data from an external source (in this case, the 8051) and communicates directly with the LCD. The 44780 standard requires 3 control lines as well as either 4 or 8 I/O lines for the data bus. The user may select whether the LCD is to operate with a 4-bit data bus or an 8-bit data bus. If a 4-bit data bus is used the LCD will require a total of 7 data lines (3 control lines plus the 4 lines for the data bus). If an 8-bit data bus is used the LCD will require a total of 11 data lines (3 control lines plus the 8 lines for the data bus).

VII.FEATURES OF SIM PHONE

- 1).Tri band 900/1800/1900 MHz operation
- 2).16x2 backlight LCD
- 3).Display of GSM signal strength
- 4).1.8V / 3V SIM Interface
- 5).Low power consumption
- 6).Incoming call restriction

VIII.APPLICATION AREAS

- 1).Call shops / Tele-boutiques.
- 2).Rural Payphone application.
- 3).Mobile applications: Buses, Trains.
- 4).Telecom Operators.
- 5).College campus.
- 6).Community Centers.
- 7).Commercial Places.
- 8).Phone Shops.
- 9).Tourist Places.
- 10).Exhibitions and Events.

IX.ADVANTAGES

- 1) Easy to install and operate.
- 2) Engineered to last a life time for rugged use.
- 3) Compatible to all prepaid and postpaid SIM cards.
- 4) Indoor and Outdoor applications.
- 5) Call cost depends on Network provider.
- 6) It does not require massive wiring and hence easy to set up.
- 7) Leads to the bounce back of the coin box phones.
- 8) The product cannot be misused as the mobile phones.
- 9) Useful to the society in many ways.
- 10) Reduces effects of direct radiation to human body.
- 11) Caller identity is preserved during the call time.
- 12) Reuse of electronic waste.
- 13) No discontinuity during call time due to time restriction.

X. DISADVANTAGES

- 1) Address accessing is impossible.
- 2) Size of the system is large compared to mobile phones.
- 3) Immobile compared to modern mobile technology.

XI. REFERENCE

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