GSM based distributed Transformer Monitoring System and Automatic power meter reading system using GSM network

abstract

The present trend of tariff collection suffers from inefficient system of billing and collection in the way of waiting of valuable manpower. So our aim is to overcome these problems with the introduction of automatic power reading and send to electric board for automatic E billing through the SMS using gsm phone. It will also send if power theft is going on any building the GSM MODEM will send the SMS to the electric board automatically a new approach to tariff collection. (The rate at which electrical energy is supplied to a consumer is known as tariff. This gsm modem is fitted inside the consumer's home, before the energy meter. If it is found OK then his total units consumed is started counting and accordingly his units are determined. At the same time his home gets power supply through Energy Meter, after total power consumption reaches and it count and sent to concerned department for billing. The proposed on-line monitoring system integrates a global service mobile (GSM) Modem, with stand alone single chip microcontroller and sensor packages. It is installed at the distribution transformer site. If there is any abnormality or an emergency situation the system sends SMS (short message service) to designated mobile telephones containing in formation about the abnormality.
This project has following advantages:

1. The man power is decreased considerably, and recording of energy meter reading and preparation of bills for other consumers is simplified.

2. Accurate meter reading and billing and no problems due to faulty and non-reading meters.

3. The consumer is free from maintaining past records.

4. No meter reading problem due to the door locked cases.

5. The main advantage is avoiding the problem of tariff collection i.e.,

6. No detecting of tampering and theft of power.

7. The number of cards released by electricity can predetermine load.

8. The supply authorities can maintain good relation and gain good will from consumer.
9. when the oil level of transformer is less it will send messages automatically to the concerned department
10 when the transformer is got high temperature it will send messages automatically to the concerned department for rectification

**BLOCK DIAGRAM**
SOFTWARES USED:

Embedded C, Keil demo version with simulator, express PCB and Express schematic.

WORKING PRINCIPLE: GSM (GLOBEL STANDARD FOR MOBILE COMMUNICATION).

This GSM technology is used for many applications like process control, security system, remote applications etc. Among this we are making a project on machine process control using this GSM modem. GSM modem is a device, which has all the protocol of GSM standards embedded into a micro controller and this function are controlled by standard AT commands of GSM technology. In this project we use an 89c51 micro controller, which belongs to the Intel 8051 family Architecture. This particular micro controller is wired to GSM modem through the serial RS 232 UART, relays for controlling the Gate, input drivers to connect for the sensors and other accessories as shown in the block diagram.

The GSM with micro controller will be wired to the machine to some sensors like temperature sensor, door sensor, control and an emergency alarm or the main power switch. Whenever any sensors send an output, the GSM device will analyze according to what we have programmed and then it sends to the micro controller. The micro controller will check this command in the database and then sends the required SMS to the owner by connecting to the GSM modem connected to the micro controller. Or even it makes a call to the required person. If the person sends any SMS to the particular mobile the micro controller will receive it and then process according to the command. The main features of this project is that One relay can be made switch off and on a particular date and time. E.g. If we send the SMS “switch off the gate”, The SMS is sent through the network to GSM module. The GSM module will receive this SMS and the GSM modem will intimate the micro controller that it has received a message. The micro controller will send a request command to the modem to send the
The micro controller will receive this data and first verify the phone number with master (owner) phone number. If it matches then it will compare the SMS with the stored SMS in the database. When any of the SMS matches then will see what function has to be carried out, once this SMS is received. If the function is to switch off the machine then it will switch off the machine.

**GSM modem characteristics**

Dual Band or Tri band GSM GPRS modem (EGSM 900/1800MHz) / (EGSM 900/1800 / 1900 MHz)
Designed for GPRS, data, fax, SMS and voice applications
Fully compliant with ETSI GSM Phase 2+ specifications (Normal MS)

**General characteristics**

Input voltage: 8V-40V
Input current: 8mA in idle mode, 150mA in communication GSM 900 @ 12V
Temperature range: Operating -20 to +55 degree Celsius;
Storage -25 to +70 degree Celsius
Overall dimensions: 80mm x 62mm x 31mm / Weight: 200g

**Interfaces**

RS-232 through D-TYPE 9 pin connector
RJ11 voice connector
Power supply through Molex 4 pin connector
SMA antenna connector
Toggle spring SIM holder
Red LED Power on
Green LED status of GSM / GPRS module

**Comfort GSM Module**

The UCM/GSM provides a cellular phone connection to Comfort. This gives Comfort the following abilities;
1. Acts as a backup for alarm dial-out when the land line is faulty or cut.
2. Allows the user to dial to the GSM number instead of the land line to access Comfort menus. There is no voicemail on this line.
3. Allows Comfort to report alarms to the users cellular phones via SMS (Short Message Service).
4. Allows users to send commands to control home appliances and the security system via SMS. Requires a SIM card to be inserted, just like with a cellular phone.

**How?**

The GSM modem is connected to the micro controller. This device will be wired in a house to some sensors like door sensors (PIR sensor movement detector), smoke sensor and an emergency alarm. Whenever any sensors send an output, the device (GSM mobile) will check it with its database and then sends the SMS or it makes a call to the required person.

**EXAMPLE:**

If some one opens the door forcibly, the device will dial the owner number or any number stored inside the controller and will send SMS to the owner.

Think your old parents are inside the house and some robber has entered the house. There will be panic switches wired in the house in all rooms. Who ever is inside the house can press the button, immediately the siren starts on and the device will start sending the SMS and start calling the numbers. Like this we can also have a medical emergency switch the device will call the family doctor and also send an SMS. Where we can incorporate many functions as required.

**COMPONENTS USED:**

- 89S52-Atmel
- Memory Atmel 24C04 4k EEPROM
- LCD-Liquid Crystal Display 2x16
- Power Supply Standard Type 5v DC
- RS232 for Serial Communication
- Buzzer-Iron Make Switch.
- GSM modem
- Relay / Panic switches.
- LPG Gas leakage sensor
1.5 WHY GSM TECHNOLOGY?

A unique feature of GSM, not found in older analog systems, is the Short Message Service (SMS). SMS is a bidirectional service for short alphanumeric (up to 160 bytes) messages. Messages are transported in a store-and-forward fashion. For point-to-point SMS, a message can be sent to another subscriber to the service, and an acknowledgement of receipt is provided to the sender. SMS can also be used in a cell-broadcast mode, for sending messages such as traffic updates or news updates. Messages can also be stored in the SIM card for later retrieval.

1.5.1 ARCHITECTURE OF GSM:

A GSM network is composed of several functional entities, whose functions and interfaces are specified. Figure1.1 shows the layout of a generic GSM network. The GSM network can be divided into three broad parts. The Mobile Station is carried by the subscriber. The Base Station Subsystem controls the radio link with the Mobile Station. The Network Subsystem, the main part of which is the Mobile services Switching Center (MSC), performs the switching of calls between the mobile users, and between mobile and fixed network users. The MSC also handles the mobility management operations. Not shown is the Operations and Maintenance Center, which oversees the proper operation and setup of the network. The Mobile Station and the Base Station Subsystem communicate across the Um interface, also known as the air interface or radio link. The Base Station Subsystem communicates with the Mobile services Switching Center across the A interface.
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.

Base Station Subsystem:

The Base Station Subsystem is composed of two parts, the Base Transceiver Station (BTS) and the Base Station Controller (BSC). 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 BTSs deployed, thus the requirements for a BTS are ruggedness, reliability, portability, and minimum cost. The Base Subsystem.
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 and the Mobile service Switching Center (MSC).

**Network Subsystem:**

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.

The Home Location Register (HLR) and Visitor Location Register (VLR), together with the MSC, provide the call-routing and roaming capabilities of GSM. The location of the mobile is typically in the form of the signaling address of the VLR associated with the mobile station. The actual routing procedure will be described later. There is logically one HLR per GSM network, although it may be implemented as a distributed database.

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).

**1.6 LEARNING ASPECTS:**

This project encompasses various aspects of electronic device usage such as microcontroller, sensing devices (runway and weather sensors), relay mechanisms, serial communication and their respective integrated development environment software including KEIL, embedded C for appropriate execution of codes. As such it has been an invigorating learning experience and also satisfies the unbounded curiosity regarding automatic control of the airport and the aircraft.

**1.7 BENEFITS:**
It is possible to automate all the working procedures in the airport and the aircraft like checking the messages coming from the aircraft and comparing with the stored SMS, if satisfied micro controller also checks the runway and the weather, whether it is suitable for landing purposes, then sends back the reply to the pilot. Soon as the aircraft lands automatic announcement will take place and the conveyor starts rotating automatically along with the luggages.
PARTS OF THE SYSTEM:
• Micro controller (AT89S52)
• Liquid Crystal Display (Hitachi's HD44780)
• Actuators – Relays
• Devices controlled
  Energy meter

2.2.1. MICROCONTROLLER:

In this project we use an 89S52 micro controller, which belongs to the Intel 8051 family
Architecture, it plays an important role and can also be called as ‘heart of our project’ and this
function are controlled by standard AT commands of GSM technology. It contains a ROM
burner to burn program into the microcontroller. ROM burner can erase the flash ROM in addition to burning a program into it.

2.2.3. GSM MODEM AND MAX232:

These two units help in sending and receiving of messages. GSM stands for GLOBAL SYSTEM FOR MOBILE COMMUNICATION. The main feature of MAX232 is it converts RS232 logic to TTL logic while transmission, TTL logic to RS232 logic while reception.

2.2.4. LCD (LIQUID CRYSTAL DISPLAY):

Here we are using 2X16 LCD display to display the message of 2lines and 16 characters. The contrast of the LCD can be varied through the variable resistor.

2.2.9. MEMORY AND POWER SUPPLY:

Here we use memory to store different pilot’s information messages, which are required for announcements etc. Here we use AC 220V power supply from which we can derive +5V and +12V of power supplies respectively. +5V is required for LCD and the microcontroller and +12V is required for other devices.
2.2. FLOW CHART:

START

LCD INITIALIZING

MODE M INITIALIZING?

YES

READING SENSOR STATUS FROM MEMORY

NO

SENS OR O/P?

YES

SEND SMS

NO

3MIN TIMER DELAY

SENS OR O/P?

YES

SEND SMS

NO

SENS OR O/P?

3MIN TIMER DELAY

SMS CHECK?

YES

READ SMS FROM SIM CARD & COMPARE WITH DEFAULT COMMAND

NO

SMSDELETING

YES

VALID COMMAND?

DO OPERATION WITH CORRESPONDING COMMAND

NO
CHAPTER 3:

HARDWARE DESCRIPTION AND COMPONENT SPECIFICATIONS:
3.1. INTERFACING CIRCUIT
FIG 3.1. INTERFACING CIRCUIT
**MICROCONTROLLER:**

We are using 89s52 microcontroller, which belongs to the family of ATMEL 8051/52 series, which is called as mother board from which interfacing of other components is done. Main components like LCD display, MAX232, relays, sensors and power supplies are interfaced with the microcontroller.

**FEATURES:**

- 8K Bytes of In-System Programmable (ISP) Flash Memory
- Endurance: 1000 Write/Erase Cycles
- 4.0V to 5.5V Operating Range
- Fully Static Operation: 0 Hz to 33 MHz
- Three-level Program Memory Lock
- 256 x 8-bit Internal RAM
- 32 Programmable I/O Lines
- Three 16-bit Timer/Counters
- Eight Interrupt Sources
- Full Duplex UART Serial Channel
- Low-power Idle and Power-down Modes
- Interrupt Recovery from Power-down Mode
- Watchdog Timer
- Dual Data Pointer
- Power-off Flag

**Description:**

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel’s high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a
Highly-flexible and cost-effective solution to many embedded control applications. The AT89S52 provides the following standard features: 8K bytes of flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a Six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 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. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

**WHY 89S52?**

1. Meeting the computing needs of the task efficiently and cost effectively
   - Speed, the amount of ROM and RAM, the number of I/O ports and timers, size, packaging, power consumption.
   - Easy to upgrade.

2. Availability of software development tools
   - Assemblers, debuggers, C compilers, emulator, simulator, technical support.

3. Wide availability and reliable sources of the microcontrollers.

**POWER SUPPLY CIRCUIT:**

**WORKING OF THE BRIDGE RECTIFIER CIRCUIT:**

The bridge wave rectifier is used in power supply circuit. AC220V of input signal is given to the bridge wave rectifier circuit. During positive half cycle of the circuit diodes D1 and D3 will conduct, which produces the rectified output at the load. During the negative half cycle diodes D2 and D4 will conduct to produce the rectified output at the load. The load contains bypass capacitors, which bypasses the AC components and produces only DC components to the next circuit. Here we use IC7805, which acts as a voltage regulator to produce +5V of power supply required for LCD and the MICROCONTROLLER and IC7812 which produces +12V of power supply required for other devices.
• RELAY CIRCUIT:

FIG 3.2: RELAY CIRCUIT

Relay is an electromagnetically operated switch. It consists of a coil which is obtained by winding the wire and an electro-magnetic switch.

PRINCIPLE OF WORKING:
When a current is passed through the wire which is wound in form of a coil an electro-magnetic field is developed this acts as a temporary magnet. This phenomenon is used in working of relay.

RELAY PIN DESCRIPTION: 1. NEGATIVE 12 V
2. POSITIVE 12 V
3. COMMON TERMINAL
4. NORMALLY CLOSED
5. NORMALLY OPEN

CONDITIONS: i. WHEN RELAY IS ON:

FIG 3.3

When 12V (from voltage regulator) & -12V (from o/p of 2803) is applied to the coil. Magnetic field is setup around the coil and it acts as temporary magnet. The switch is pulled towards normally open & electric signal is fed to DTMF coder.
ii. WHEN RELAY IS OFF:

When -12 v(from o/p of 2803) is not applied to the coil. Magnetic field is not set up around the coil and it doesn’t act as temporary magnet. The switch is pulled towards normally closed & no electric signal is fed to DTMF coder.

- **MAX232**: RS232 cables are commonly referred as DB25 connector and DB9 connector. When ‘D’ signifies the ‘D’ shape of the connector, the ‘B’ indicates the material being used in the connector and ‘9’ to indicate that it is a 9-pin connector. Generally, most of these DB9 connectors are male type. MAX232 is a Voltage converter from Maxim Corp. The MAX232 converts from RS232 Voltage level to TTL Voltage level and vice versa for connection between a microcontroller and RS232 cable. They are also known as Line Drivers. One advantage is that it uses +5V power source for 8052. The MAX232 has two sets of Line Drivers for transferring and receiving data. The Line Drivers used for TxD are called T1 AND T2 while the Line Drivers for RxD are designated as R1 and R2.

- **LCD**: Alphanumeric LCD displays have become very popular for microcontroller applications because they can add a lot to a project in a variety of ways. A text message giving the user instructions as well as feedback can make the application seem much more “professional” and easy to use. I like to use LCD’s to help debug applications, with break points set to display variable and I/O conditions and they are a lot cheaper using a microcontroller emulator.
To top it off, surplus LCD’s can be found for a dollar or less. The pin assignment is shown in the table 3.1 is the industry standard for character LCD-modules with a maximum of 80 characters.

**PIN ASSIGNMENT FOR <= 80 CHARACTER DISPLAYS**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Symbol</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VSS</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>VDD</td>
<td>Power supply</td>
</tr>
<tr>
<td>3</td>
<td>VLCD</td>
<td>Power Supply for LCD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Select Display</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data(&quot;H&quot;) or Instructions(&quot;L&quot;)</td>
</tr>
<tr>
<td>4</td>
<td>RS</td>
<td>Read or Write Select</td>
</tr>
<tr>
<td>5</td>
<td>R/W</td>
<td>Read or Write Enable Signal</td>
</tr>
<tr>
<td>6</td>
<td>E</td>
<td>Read/Write Enable Signal</td>
</tr>
<tr>
<td>7</td>
<td>DB0</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>DB1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>DB2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>DB3</td>
<td>Display Data Signal</td>
</tr>
<tr>
<td>11</td>
<td>DB4</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>DB5</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>DB6</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>DB7</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>K</td>
<td>Cathode of Backlight</td>
</tr>
<tr>
<td>16</td>
<td>A</td>
<td>Anode of Backlight</td>
</tr>
</tbody>
</table>

TABLE 3.1

and discharging and this is given to oscillator, it amplifies and supply to micro controller.
3.10. VOLTAGE REGULATOR:

Some of the components like microcontroller require 5v power supply and some components like relays need 12v power supply. So voltage regulators are used to regulate the voltage to the levels as required by the component connected.

CHAPTER 4:

SOFTWARE DESCRIPTION:

```
delay( 60000 );
Display("DO");
delay( 60000 );
rx_flag=0;
rx_cnt = 0;
```

4.1. SORCE CODE:

4.1.1. PROGRAM TO RUN THE MICROCONTROLLER

```
#include <AT89X52.H>
#include <string.h>
```
```c
#define RELAY1 P1_5
#define RELAY2 P1_6
#define BUZZER_1 P2_2
#define BUZZER_2 P1_7
#define INPUT1 P1_3
#define INPUT2 P1_4
unsigned char i, msg_no;
unsigned char ADC_DATA;
unsigned char rx_cnt, received;
unsigned char rd_cnt;
unsigned char buf[22];
bit INT_FLAG;
bit INIT_FLAG;
bit MSGRD_FLAG;
bit rx_flag;
bit tx_flag;
bit NEWMSG_FLAG;
bit D1_FLAG;
bit D2_FLAG;
void delay( unsigned int sec )
{
    while( sec-- );
}
void send_data( unsigned char t )
{
    SBUF = t;
    while( tx_flag == 0 );
    TI = 0;
    delay( 1000 );
}
void Send_String( unsigned char *tr )
{
    while( *tr )
    {
```
SBUF = *tr;
while( tx_flag == 0 );
TI = 0;
delay ( 5000 );
tr++;}
}
#include "LCD.c"
#include "GSM.c"
void Timer1_init( void )
{
    TMOD = 0x20; // 8 BIT TIMER1 AUTO RELOAD
    SCON = 0x50; // UART MODE
    TH1 = 0xFD; // 9600 BAUD RATE
    EA = 1; // ENABLE THE
    ES = 1;
    TR1 = 1;
}
void serial_intr( void ) interrupt 4
{
    EA = 0;
    ES = 0;
    ET0 = 0;
    if( TI == 1 )
    {
        tx_flag = 1;
        TI = 0;
    }
    else if ( RI == 1 )
    {
        received = SBUF;
        if( rx_flag == 0 )
        {
            if( INIT_FLAG == 0 )
            {
                // Further processing...
            }
        }
    }
}
if( received == '+' )
{
    INIT_FLAG = 1;
    goto END_ISR;
}

Else
{
    INIT_FLAG = 0;
    if( received == 'O' )
    {
        buf[rx_cnt] = received;
        rx_cnt++;
    }
    else if( received == 'K' )
    {
        buf[rx_cnt] = received;
        rx_cnt++;
        buf[rx_cnt] = '\0';
        rx_flag = 1;
    }
    goto END_ISR;
}

if( MSGRD_FLAG == 1 )
{
    if( rd_cnt == 60)
    {
        if( received != 0x0d)
        {
            buf[rx_cnt] = received;
            rx_cnt++;
        }
        else
        {
            buf[rx_cnt] = received;
            rx_cnt++;
        }
    }
buf[rx_cnt] = "0";
rx_flag = 1;
INIT_FLAG = 0;
MSGRD_FLAG = 0;
rd_cnt = 0;

else
{
  rd_cnt++;
}

} else
{
  if( ( received != 0x0d ) )
  {
    buf[rx_cnt] = received;
    rx_cnt++;
  }
  else
  {
    buf[rx_cnt] = "0";
    rx_flag = 1;
    INIT_FLAG = 0;
  }
}

END_ISR:
  RI = 0;

ET0 = 1;
EA = 1;
ES = 1;
void main()
{
    BUZZER_1 = 1;
    BUZZER_2 = 0;
    RELAY1 = 0;
    RELAY2 = 0;
    Lcd_init();
    delay( 600000 );
    Lcd_command( 0x80 );
    Display( "smart" );
    Lcd_command( 0xC0 );
    Display( "    house    ");
    delay( 60000 );
    Lcd_data( ' ' );
    Lcd_data( ' ' );
    Timer1_init();
    delay( 1000 );
    while( 1 )
    {
        if( rx_flag == 1 )
            Lcd_command( 0x01 );
            Lcd_command( 0xC0 );
            Display( buffer );
            delay( 60000 );
            chk_new_msg();         // for finding a message no
            read_buf();           // reading data from the buffer
            rx_flag = 0;
            rx_cnt=0;
            Display( "smart" );
            Lcd_command( 0xC0 );
            Display( "    house    ");
            delay( 500 );
    }
4.2. Program for the LCD display:

```c
#define RS P2_1
#define EN P2_0
#define LCD_DATA P0
void Lcd_command( unsigned char cmd )
{
    RS = 0;
    LCD_DATA = cmd;
    EN = 1;
    EN = 0;
    delay( 500 );
}
```
void Lcd_data( unsigned char dat )
{
    RS = 1;
    LCD_DATA = dat;
    EN = 1;
    EN = 0;
    delay( 500 );
}
void Lcd_init( void )
{
    Lcd_command( 0x38 );
    Lcd_command( 0x01 );
    Lcd_command( 0x0C );
}
void Display( unsigned char *str )
{
    while( *str )
    {
        Lcd_data( *str );
        str++;
    }
}

4.3. Program for working of GSM:

void PHONE_NO( void )
{
    Send_String( "AT+CMGS="+919362630140">"");
}
void chk_msg( void )
{
    if( strcmp( buf,"d1 on") == 0) 
    {
        RELAY1 = 1;
        D1_FLAG = 1;
    } else
    if( strcmp( buf,"D1 OFF") == 0) 
    {
        RELAY1 = 0;
        D1_FLAG = 0;
    } else
if( strcmp( buf,"d2 on" ) == 0)
{
    RELAY2 = 1;
    D2_FLAG = 1;
} else
if( strcmp( buf,"D2 OFF") == 0)
{
    RELAY2 = 0;
    D2_FLAG = 0;
} else
{
}

void chk_new_msg( void )
{
    {
        NEWMSG_FLAG = 1;
        msg_no = buf[11];
    }
    else
    {
        NEWMSG_FLAG = 0;
    }
}

void READ_SMS( void )
{
    Send_String( "AT+CMGR=");
    send_data( msg_no );
    send_data( 0x0D );
}

void del_sms( void )
{
    Send_String("AT+CMGD=");
    send_data( msg_no );
    send_data( 0x0D);
}

void read_buf( void )
{
    if( NEWMSG_FLAG == 1 )            // THIS IS GOING TO DISPLAY THE MSG NO &
    {                                 // AFTER THE DELETE THE READED MSG
        NEWMSG_FLAG = 0;
        Lcd_command( 0x01 );
        Lcd_command( 0x80 );

        Delay("M NO: ");
        Lcd_data( msg_no );

        Delay( 60000 );
    }
delay(60000);
delay(60000);

Lcd_command(0x01);
Lcd_command(0x80);

Display("READING");
Lcd_data(msg_no);

delay(60000);
delay(60000);
delay(60000);

rx_flag=0;
rx_cnt = 0;

Lcd_command(0x01);
Lcd_command(0x80);

READ_SMS();
MSGRD_FLAG = 1;

while( rx_flag == 0 );
Lcd_command(0x01);
Lcd_command(0x80);

Display(buf);
delay(60000);

chk_msg();
delay(60000);
delay(60000);

del_sms();
delay(60000);

Lcd_command(0x01);
Lcd_command(0x80);
Display("DELETED:");
Lcd_data(msg_no); // MESSAGE NO.
delay(60000);
Lcd_command(0x80);
Display("smart");
Lcd_command(0xC0);
Display("    house    ");

rx_flag=0;
rx_cnt = 0;

} }
CHAPTER 5:

ADVANTAGES AND DISADVANTAGE

5.1 ADVANTAGES:

1. As the working is automated, there is no manual work.
2. The information is authenticated.
3. Speed is high.
4. It provides safe landing.
5. Supports good quality.
6. Accuracy.
7. No delay.
8. No conversation is required.
9. GSM technology makes the working more effective.
10.

5.2 DISADVANTAGE:

The only disadvantage is when the SMS doesn't reach due to some technical disorder, which may lead to problem.
CHAPTER 6:

APPLICATIONS AND FUTURE ENHANCEMENT:

6.1. APPLICATIONS:

- It can be implemented in modern house
- The system can be used in railway and metro stations.
- It may also be used as an automation system in harbours & ship yards.
- May be implemented in space stations.
- Also used in bus stands with some modifications.

CHAPTER 7:

CONCLUSION:

The present situation smart house is all using manual communication. To reduce the manual efforts and human errors, we need to have some kind of automated system monitoring all the parameters and functioning of the connections between the pilot and the airport personnel.

- We are trying to implement a prototype model of an smart house system within the limited available source and economy.
- The system can be subjected to further development using advanced techniques.
- It may become a success if our project can be implemented in the modern air ports.
However a machine is equivalent to 1000 humans input. The same works here.
**BOOKS:**

1) Patterns for Time-Triggered Embedded Systems by Michael J. Pont

2) Embedded Controller Forth for the 8051 Family by William H. Payne

3) C and The 8051: Programming For Multitasking by Thomas W. Schultz

4) Principles and Applications of GSM by Vijay K Garg

**APPENDIX:**

**TEXT FILE FOR USER COMMANDS**

Commands for End User

In this project all the following commands should start with "STX"

--> and Followed that 4 Digit password(STXxxxx)

--> Here "xxxx" are pass word

Ex: STX0000DEVICE10
Command 1: DEVICE\text{xx}

In above command

--> "DEVICE" is mentioning that Devices

--> "xx" Here 1st "x" for Device number(1,2,3,4)

--> and 2nd "x" for Control of Device(1-ON,0-OFF)

Ex:

--> "DEVICE11" This command will switch ON Device 1

--> "DEVICE40" This command will switch OFF Device 4

Command 2: TIMEON\text{ddmmyyhhmm}

TIMEON - It is mentioning that set Switch ON time to Device 4

dd - Date

mm - Month

yy - year

hh - Hours

mm - Minutes

Ex: STX0000TIMEON1502051230

Command 3: TIMEOFF\text{ddmmyyhhmm}

TIMEON - It is mentioning that set Switch OFF time to Device 4

dd - Date

mm - Month

yy - year

hh - Hours

mm - Minutes

Ex: STX0000TIMEON1502051240
Command 4: STATUS

--> Sending through this command we can get back the Status of each device

Ex: STX0000STATUS

Command 5: RSTTMEmmhhwwddmmyy

RSTTME - Command for resetting the RTC time

In that one
mm - Minutes
hh - Hours
ww - WeekDay
dd - Date
mm - Month
yy - Year

Ex: STX0000RSTTME301203150205

Command 6: PASWRDxxxx

PASWRD - It is a command to change the password

xxxx - These are new password characters

there you can enter 4 digit new password

Command 7: MOBILEyyyyyyyyyyyy

MOBILE - It is a command for changing the phone number

using following method we can change the number

yyyyyyyyyyyyyy - Here we can enter the new phone
number with Country code including '+'

Ex: - MOBILE+919448540935

Details for Programmer:

Memory Details:

LOC 00 to 13 : User Phone Number in Mem
LOC 20 to 23 : User Owner Number in Mem
LOC 100 to 106: Start command and Password in Mem
LOC 30 & 40 : For ON & OFF status Storing in RTC
LOC 10 to 14 : To store ON time in Rtc
LOC 20 to 23 : To store OFF time in Rtc

Temperature sensor

Here is a fire indicator circuit built around LM 324 comparator IC. A thermister is used here as a heat sensor.

When temperature in the vicinity of thermister increases, the value of the resistance is decreased in case of fire. The voltage is compared with other input and produce voltage at pin no 1 and the relay gets activate. A Variable resistance is used to set the reference volt as equal with the other input pin. The heat sensed by the thermister reduces its resistance and that in turn cause voltage to drop at pin no. 2 of the comparator. This variation
produces a negative voltage at output pin no.1 which drive the transistor and activate the relay when the relay is activated it send negative voltage to the micro controller. the micro controller send the sms to the concerned people.
AUTOMATIC GATE SENSOR

The IR transmitter and receiver is connected across the door. The IR transmitter is transmitting a 35 khz signal and the IR receiver is receiving the signal and activate the relay. When anybody passes across the door the signal is cut off and the relay is deactivate. The relay is provide negative voltage to the micro controller pin no 3 and the micro controller send the sms to the owner of the house.

IR TRANSMITTER:
Infrared transmitter is used to transmit the IR range light wave form i.e. for communication. IC 555 is working as a stable multi vibrator used to generate a frequency in the range of IR Frequency (40 kHz) and is fed to the transistor BD 140. Pin no 1. The transistor BD140 is amplifies the IR signal and drive the signal through the IR Diode. Registers are used to provide DC biasing to the IC and transistor. Capacitor C1 used for triggering pulse to pin no 2 and capacitor C2 is working as filter and to generate a frequency in the range of IR level (infrared radiation)

**IR RECEIVER:**
The above figure shows the block diagram of the IR receiver. In receiver there are 5 transistors in this circuit. Transistors 1-4 are used as amplifiers and transistor 5 is used as a driver circuit to drive the relay and it provides negative voltage to the relay through emitter to collector.

The receiver IR LED (photo transistor) is placed in the base of transistor Q1. The received IR signals is amplified at transistor Q1 and out put is taken from collector and given to the base of transistor Q2. The transistor Q2 is amplified input signal and fed to the base of transistor Q3 through coupling capacitor Q4 and out put is taken from collector and fed to the base transistor Q4 through resister R8 and R9 and it is working as a coupler, the out put from collector is given transistor Q5 through the diode D1.
The diode D1 is providing positive half cycle to the transistors. The diode D2 used as a polarity diode. The negative voltage is extended from emitter to collector to the relay. When there is no input signals the transistor 1-4 are not conducting so transistor Q5 also will not operate so negative voltage extended to the relay. One end of the relay coil is directly connected to the positive terminal and the other end is connected to the collector of transistor Q5 that is providing negative voltage to the relay for activation. When there is no input signal the transistor Q1 to Q5 are in forward bias and the transistor Q5 will produce negative voltage from emitter to collector the and the relay gets activated.

When the IR sensor receives the input signal from the transmitter, the received signal is amplified by the transistor Q1 to Q4 is amplified then fed to the base of transistor Q5 through a diode which de-operating the transistor Q5 so there is no negative voltage from collector. So the LED gets ON condition.

OVERHEAD WATER TANK
When the over tank water over flow, the water falls on the sensor, the base of transistor T1 is connected to the positive supply line. As a result, transistor T1 and T2 are switched on the relay. When the relay is on negative voltage is applied to the micro controller pin no 4 the micro controller is send the sms to the concerned
The current drawn by the circuit in that condition is about 25 mA.

**PARTS**

1. Resistance 470 k
2. Resistance 100 k
3. Resistance 2.2 k
4. Tr. T1,T2 BC 548
5. Buzzer BZ1 Piezo ceramic resonator