

# DESIGN OF GSM BASED STUDENT'S ACADEMIC INFORMATION SYSTEM

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## ABSTRACT

This paper explains how parents will get their ward's academic information through GSM message. It also explains how to establish effective and reliable communication between mobile phone and microcontroller using GSM modem. It is useful in school, colleges etc. In today's fast and busy life cycle it is difficult for parents to regularly monitor their ward's academic record. It is necessary to monitor academic record of their ward. This system helps to do this. It provides academic progress records and attendance information to their parents through GSM SMS. Such system also provides student academic profile. The system uses GSM module for sending message and MMC card for the storage of information. It is faster interactive system. Short Message Service (SMS) is a text messaging service component of phone, web or mobile communication system, using standardized communication protocols that allow the exchange of short text message between fixed line or mobile phone devices. GSM network can interconnect and roam all over the country. This can be used in school, college, banking etc.

**Keyword:** - GSM Modem, Reliable Communication, MMC card, Short Message Service, Standardized Communication Protocol.

## 1. INTRODUCTION

It is a real time monitoring system which allows parents to check attendance and academics records of their ward. It also helps to college administrative people to maintain student related information. It is time consuming task to check each and every student attendance to the parent. This project gives the information to the parent about bunking of the student and other academic record through GSM SMS will give an easy, low cost and automatic solution. This project based on GSM modem, microcontroller PIC18F4620. The establishment of system is based on GSM short message mode that can monitor and control the remote communication between the central monitoring station and remote monitoring station. This system is proposed to utilize the GSM short message service and microcontroller (PIC18F4620) to achieve remote real time data monitoring. The system provides advantage of getting academic information to the parents without personal interaction with their ward teacher guardian. System uses MMC card to store student related data based.

## 2. LITERATURE REVIEW

The idea of this project comes from the attendance system project based on RFID and GSM SMS. The paper presented by Mr. C.S. Karthikeyan and S. Murugeswari on RFID based student attendance system published in International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering in Dec 2013. In this particular project parent get the SMS after their son/daughter will use RFID card for the entry in college. The main drawback behind this project is that anyone can use others card to make entry so that parents will get SMS even after their son/daughter not personally attending college. Our project will overcome this drawback from our developed system parents will get total attendance and other college related academic records.

### 3. BLOCK DIAGRAM

Functional Blocks :- a) Power supply section b) Microcontroller c) GSM modem.

Power supply section consists of 12V transformer, full wave bridge rectifier, IC7805 voltage regulator. It receives 230V AC input supply this input voltage is step down to 12V AC. This 12V supply is passed through bridge rectifier to convert it into 12V DC. This output of bridge rectifier is passed through IC7805 voltage regulator to obtain constant 5V DC supply. Microcontroller operates on 5V DC supply. Microcontroller interfaces with GSM modem by using serial communication protocol. MMC card module interfaces with microcontroller using SPI protocol. GSM modem communicates with microcontroller.

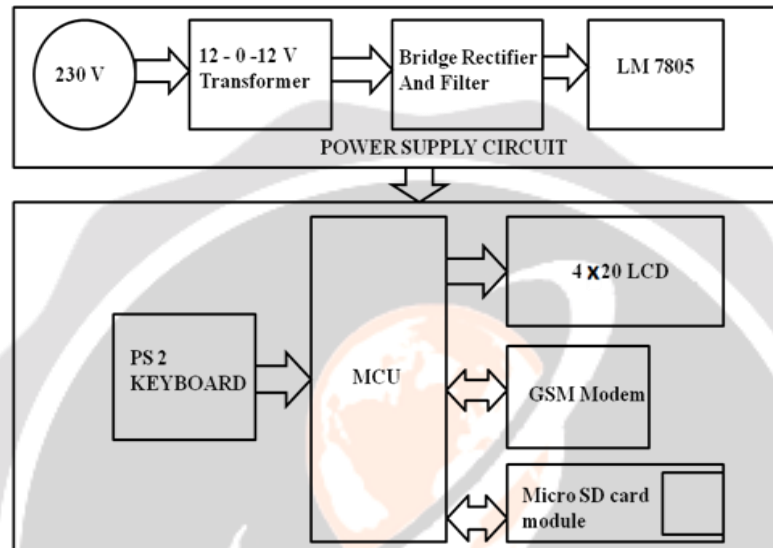


Fig -1: Block Diagram

The data is entered with the help of keyboard through microcontroller and saves it to the MMC card which is used as a storage media for entering data. When call is made to the system at that time microcontroller takes the charge from GSM modem and disconnect the call. Microcontroller then scans the calling number and fetches the data associated with this number from MMC card and sends to the requested number with the help of GSM modem.

### 4. HARDWARE

In this paper hardware used is Step Down Transformer, Voltage Regulator IC7805, Peripheral Interface Controller (PIC), Rectifier, LCD display, SIM300 Module, MMC Card.

#### 4.1 Step Down Transformer

A transformer is an electrical device that transfers electrical energy between two or more circuit through electromagnetic induction. Electromagnetic induction produces an electromotive force within a conductor which is exposed to time varying magnetic fields. Transformers are used to increase or decrease the alternating voltages in power applications. Commonly, transformers are used to increase or decrease the voltage of alternating current in electrical power application. A varying current in the transformers primary winding creates a varying magnetic flux in the transformers core and a varying magnetic field impinging on the transformers secondary winding as in fig.4.1. This varying magnetic field at the secondary winding induces a varying electromotive force or voltage in the secondary winding due to electromagnetic induction making use of Faraday's law in conjunction with high magnetic permeability. Core properties of transformers can be designed to change efficiently AC voltages from one voltage level to another within power networks.

#### 4.2 Voltage Regulator IC7805

ICs regulator mainly used in the circuit to maintain the exact voltage which is followed by the power supply. A regulator is mainly employed with the capacitor connected in parallel to the input terminal and the output terminal of the IC regulator. For the checking of gigantic in the input as well as in the output filter, capacitors are used. While

the bypass capacitors are used to check the small period spikes on the input and the output level. Bypass capacitors are mainly of small values that are used to bypass the small period pulses straightly into the earth. IC7805 is a voltage regulator integrated circuit it is a member of 78xx series of fixed linear voltage regulator ICs. The voltage source in a circuit may have fluctuation will not give the fixed voltage output. The voltage regulator IC maintain the output voltage at a constant value .The xx in 78xx indicate the fixed output voltage It is design to provide. IC7805 provides +5v regulated power supply. It is a DC regulated IC of 5V. This IC is very flexible and widely employed in all types of circuit like a voltage regulator. It is a three terminal device and mainly called input, output and ground. Pin diagram of the IC7805 is shown in fig.4.2.



Fig -4.1: Step Down Transformer

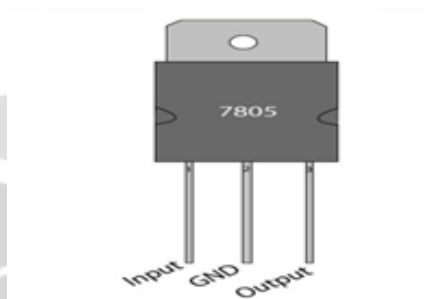


Fig -4.2: Voltage Regulator IC 7805

#### 4.3 Peripheral Interface Controller (PIC)

PIC is a family of modified Harvard architecture microcontrollers made by microchip technology. The name PIC initially referred to peripheral interface controller. The first parts of the family were available in 1976. Early models of PIC had read only memory(ROM) or field programmable EPROM for program storage, some with provision for erasing memory. All current model use flash memory for program storage and newer models allow the PIC to reprogram itself shown fig.4.3. Program memory and data memory are separated. Data memory is 8bit and 16 bit and in latest models, 32 bit wide. Program instructions are vary in bit-count by family of PIC, and may be 12, 14, 16, or 24 bits long. The instructions set also varies by model, with more powerful chips adding instructions for digital signal processing functions. The hardware capabilities of PIC devices range from 8-pin DIP chips up to 100-pin SMD chips, with decrease I/O pins, ADC and DAC modules, and communications port such as UART, I2C, CAN, and even USB. Low-power and high-speed variations exist for many types. The PIC devices are popular with both industrial developers and hobbyists due to their low cost, wide availability, large user base, extensive collection of applications notes, availability of low cost or free development tools, serial programming and reprogramming flash memory capability.

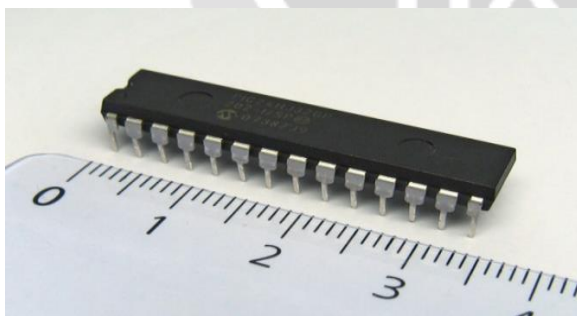


Fig -4.3: Peripheral Interface Controller (PIC)

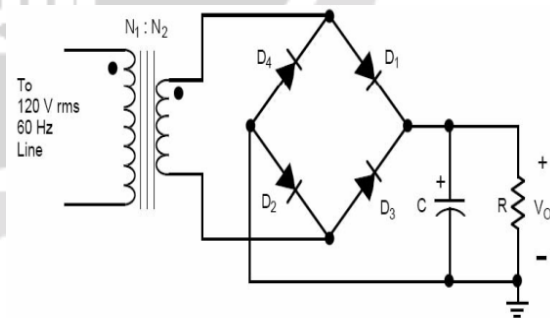


Fig -4.4: Rectifier

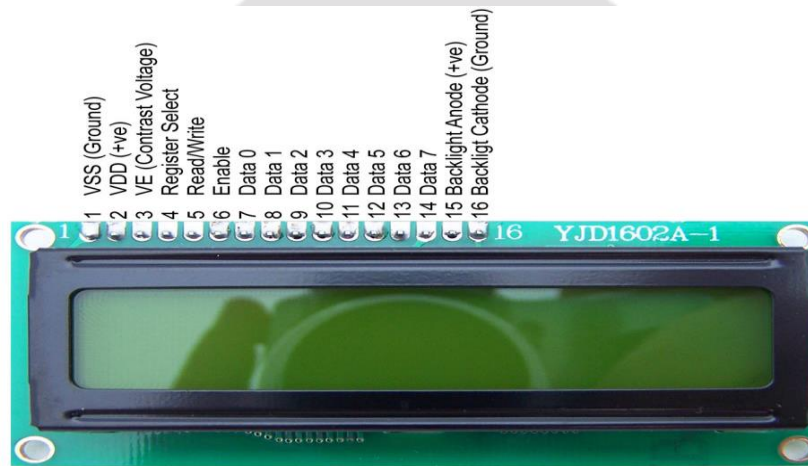
#### 4.4 Rectifier

A rectifier is an electrical device that converts alternating current, which periodically reverses direction, to direct current, which flows in only one direction shown fig.4.4. The process is known as rectification. Physically rectifiers take a number of forms, including vacuum tube diodes, mercury-arc valves, copper and selenium oxide rectifiers, semiconductor diodes, silicon-controlled rectifiers and other silicon-based semiconductor switches. Rectifiers have many uses, but are often found serving as components of DC power supplies and high-voltage direct current power

transmissions systems. Rectification may serve in roles other than to generate direct current for use as a source of power. There are many applications of the rectifiers, such as power supplies for radio, television, and computer equipment, require a steady constant DC current. In these applications the output of the rectifier is smoothed by an electronic filter to produce a steady current. A diode bridge is an arrangement of four diode in a bridge circuit configuration that provides the same polarity of output for either polarity of input. When used in its most common application, for conversion of an alternating current (AC) input into a direct current (DC) output, it is known as a bridge rectifier. A bridge rectifier provides full-wave rectification from a two-wire AC input, resulting in lower cost and wait as compare to a rectifier with a 3-wire input from a transformer with a centre-tapped secondary winding.

#### 4.5 LCD Display

A Liquid Crystal Display (LCD) is a flat panel display shown fig.4.5, electronic visual display, all video display that uses the light modulating properties of liquid crystal. Liquid crystal does not emit light directly. LCDs are used in a wide range of applications including computer monitors, instruments panels, watches, calculators, etc.



**Fig -4.5:** LCD Display

As you would probably guess from this description, the interface is a parallel bus, allowing simple and fast reading/writing of data to and from the LCD. This waveform will write an ASCII byte out to the LCD's screen. The ASCII code to be displayed is eight bits long and is sent to the LCD either four or eight bits at a time. If four bit mode is used, two "nibbles" of data (Sent high four bits and then low four bits with an "E" clock pulse with each nibble) are sent to make up a full eight bit transfer. The "E" clock is used to initiate the data transfer within the LCD. Sending parallel data as either four or eight bits are the two primary modes of operation. While there are secondary considerations and modes, deciding how to send the data to the LCD is most critical decision to be made for an LCD interface application. Eight bit mode is best used when speed is required in an application and at least ten I/O pins are available. Four bit mode requires a minimum of six bits. To wire a microcontroller to an LCD in four bit mode, just the top four bits (DB4-7) are written to. The "R/S" bit is used to select whether data or an instruction is being transferred between the microcontroller and the LCD. If the bit is set, then the byte at the current LCD "Cursor" position can be read or written. As you would probably guess from this description, the interface is a parallel bus, allowing simple and fast reading/writing of data to and from the LCD. This waveform will write an ASCII byte out to the LCD's screen. The ASCII code to be displayed is eight bits long and is sent to the LCD either four or eight bits at a time. If four bit mode is used, two "nibbles" of data (Sent high four bits and then low four bits with an "E" clock pulse with each nibble) are sent to make up a full eight bit transfer. The "E" clock is used to initiate the data transfer within the LCD. Sending parallel data as either four or eight bits are the two primary modes of operation. While there are secondary considerations and modes, deciding how to send the data to the LCD is most critical decision to be made for an LCD interface application. Eight bit mode is best used when speed is required in an application and at least ten I/O pins are available. Four bit mode requires a minimum of six bits. To wire a microcontroller to an LCD in four bit mode, just the top four bits (DB4-7) are written to. The "R/S" bit is used to select whether data or an instruction is being transferred between the microcontroller and the LCD. If the bit is set, then the byte at the current LCD "Cursor" Position can be read or written.

#### 4.6 SIM300 Module

A GSM Modem is a specialized type of modem which accepts a SIM Card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connect to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. This is a plug and play GSM Modem with a simple to interface serial interface. Use it to send SMS, make and receive calls, and do other GSM operations by controlling it through simple AT commands from micro controllers and computers. It uses the highly popular SIM300 module for all its operations as shown in fig.4.6. It comes with a standard RS232 interface which can be used to easily interface the modem to micro controllers and computers.



Fig -4.6: SIM300 Module

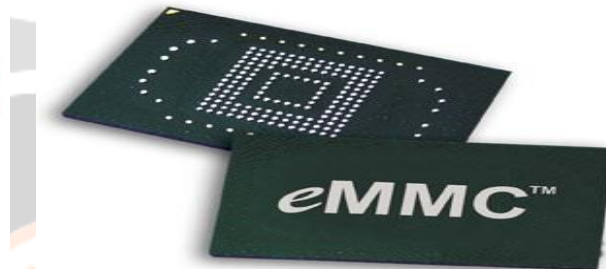


Fig -4.7: Multimedia Card

#### 4.7 Multimedia Card

Multimedia card (MMC) is a memory card standard used for solid-state storage shown in fig.4.7. Unveiled in 1997 by SanDisk and Siemens AG, it is based on Toshiba's NAND based flash memory and is therefore much smaller than earlier system based on Intel NOR based memory such as compact Flash. MMC can be used in most devices that can use secure digital cards. Typically, an MMC is used as a storage medium for a portable device, in a form that can easily be removed for access by a PC. For example, a digital camera would use an MMC for storing image files. With an MMC reader, a user could copy the pictures taken with the digital camera off to his or her computer. Modern computers, both laptops and desktops, often have SD slots, which can additionally read MMCs if the operating system drives can. MMCs are available in sizes up to and including 512 GB. They are used in almost every context in which memory cards are used, like cellular phones, digital audio players, digital cameras and PDAs. Since the introduction of SD cards, few companies build MMC slots into their devices, but the slightly thinner, pin compatible MMCs can be used in almost any device that can use SD cards if the software/firmware on the device is capable.

### 5. RESULT AND DISCUSSION

The project is ready to execute the proposed output. As per the requirement of the project through GSM communication the message is send to the parents. fig. 5.1 is the hardware implementation of the project. Where all the components shown by the arrows. To feed the information of new student into the MMC card the keyboard is given and the same display can be seen on LCD screen. Where we can enter the information like student name, marks and attendance along with their parents mobile number. The entire database can be saved into the MMC card. If the parent of the students wants details of their ward then they have to call to the system. As soon as the call came it will gets disconnected and the message of the details of their ward will be send to their parents. The display on the parents mobile is shown in fig. 5.2. As proposed project is GSM based the parents can gets their ward's information from long distant. Here all the information of database is stored into the MMC card hence the storage of the data can be done anywhere in the college computer.

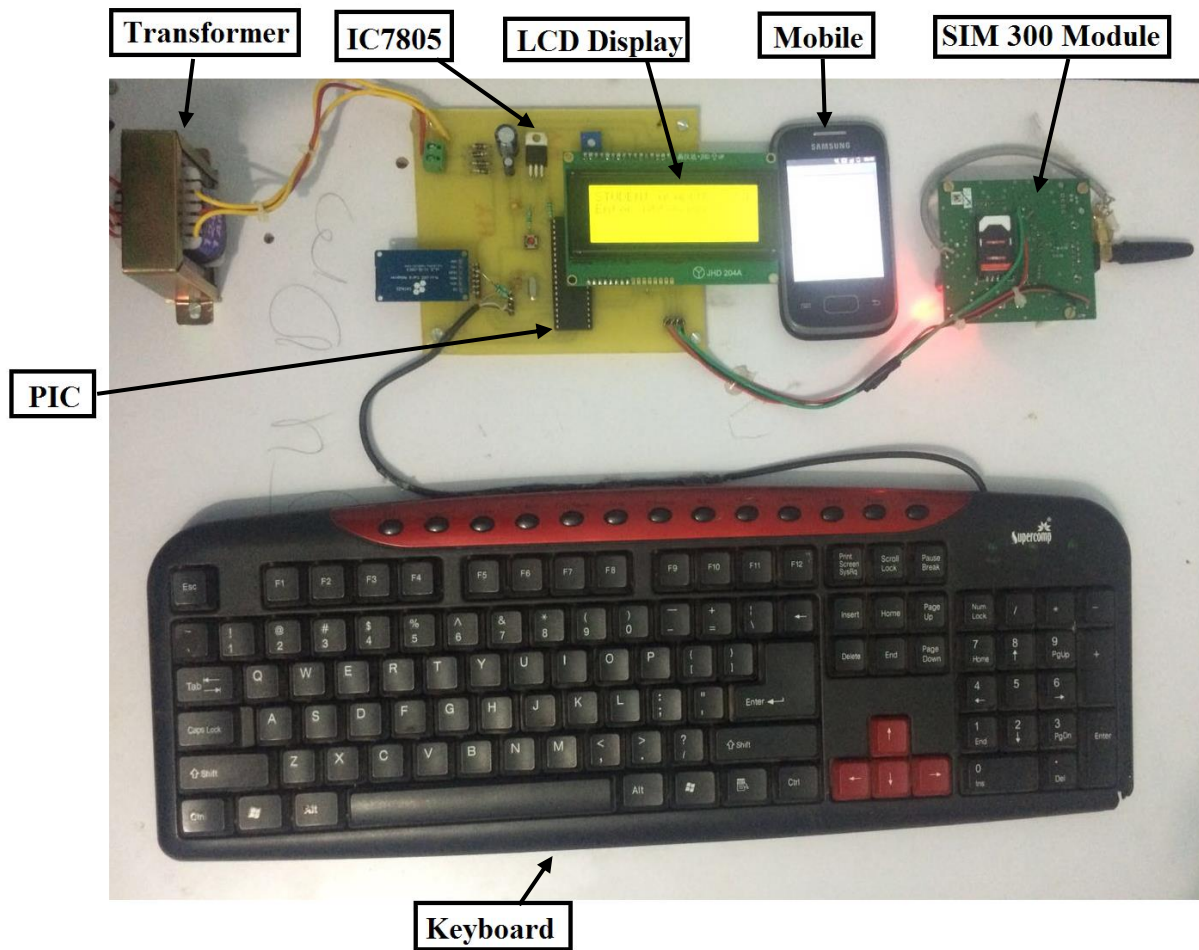


Fig -5.1: Project Hardware



Fig -5.2: Mobile Showing Message

## 6. CONCLUSION

Proposed project is successfully implemented and is ready to use for any institution as a application based. As the project is working on GSM based all around the world the data of the students can be received by their parents. Without any kind of disturbances except network coverage the pure information filled by the college authority will be received by the parents. This is the advantage of the project that they can get the status of their ward's by sitting to their home on single call through mobile and It is possible to get information at any time, any place and anywhere.

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