RESEARCH ARTICLE OPEN ACCESS

REAL-TIME APPLICATION FOR INDUSTRIAL BATTERY THEFT ALERTUSING A GLOBAL SYSTEM FOR MOBILE COMMUNICATION SYSTEM

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ABSTRACT:

GSM Based Monitoring System of Industrial batteries for high power backup applications deals with the concept that nowadays in most Industries or Companies or factories or any in our domestic use or any other area where there is use of an electronic system that runs of battery-based supply deals with a common problem at the time of power failure.

GSM Based Monitoring System of ups battery for high-power backup applications deals with the concept that nowadays in most of Industries or Companies or factories or any in our domestic use or any other area where there is use of electronic system that runs of battery based supply deals with a common problem at the time of power failure , to avoid there power failures in Industries as well as domestic there are many devices which provide us backup known as Uninterruptible Power Supply(UPS).The purpose of the project is it provides detailed UPS Running and Battery Voltage Information from Long Distance and Wide Area.

INTRODUCTION

Battery theft has become a source of concern in almost all parts of the world. This is, very often, the case of countries facing a social crisis such as extreme poverty and unemployment. These problems give rise to further predicaments and robbery is one of them. According to World Bank statistics, 71% of the world's population live with an income of $10 dollar a day or less [1]. In Pakistan, around 21,000 batteries are stolen every year, whose overall cost is estimated at 5 Billion (PKR) [2]. In India, about 44,000 vehicles have been stolen over the last three years. In 2013, an estimated number of 699,595 batteries were stolen in USA [3]. Because of this escalating phenomenon, industries have expressed deep concern on how to protect their cars against this serious offense. Current popular anti-

theft systems include vehicle tracking and alarming systems. These security systems generally involve usage of immobilizers, alarm systems, GPS and some basic steering wheel locks to prevent vehicles from being stolen. However, there are certain limitations and major security gaps that these technologies are not able to deal with and thus, theft and robbery of cars still occurs. The major reason behind this is the lack of up-gradation and adaptability of the security systems to the latest technologies that makes it easier for professional thieves to overcome. These robbers not only steal the car but also go a step ahead by re-

selling the vehicles' parts [4]. Moreover, greater costs are incurred in the purchase and maintenance of these systems. For example, GPS system often comes with a yearly monitoring fee. Yet despite

spending huge money on these systems, car theft rate does not seem to be declining. Therefore, some circuit is required to protect the starting mechanism of the cars to make them safe. The authors propose an improved vehicle security solution to overcome all the problems stated above. It converts the wired ignition system to wireless with antitheft features. The remaining of the paper is organised in five sections. Section II, presents an overview of the proposed security ignition system. Section III presents the design and implementation techniques of the system. Section IV describes the optional features available to the users. Finally, the results and conclusions are presented in Section V and VI respectively.

SYSTEM OVERVIEW

This system is designed to overcome most battery theft techniques and prevents power damage. It has been observed that the industry security system currently in the market is not efficient enough to prevent 100% theft. Extensive research has been carried out to determine the reason behind the escalating number of batteries stolen [4]. The conclusion was that the major problem of theft is The purpose of the project is it provides detailed Battery Voltage Information from Long distances and Wide Areas.

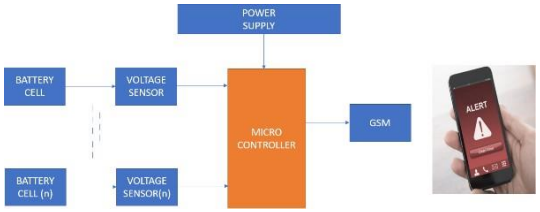
SYSTEM AND WORKING OF THE PROJECT.

While developing this project, all these system bugs and loopholes including economic benefits for the consumers have been considered in order to develop a better and much cheaper security system (Figure 1). This system will be incorporated in the car audio system or the LCD unit and will also act as another brain or primary side of the security system, without any interaction with the car OBD Port. And both sides have microcontrollers within them (Figure 2).

PROPOSED SYSTEM

By using Wireless technology, GSM can send a message to the service person even if he is not available in the station so communication works well. To Design an Electronic System involving GSM Technology to monitor UPS batteries through sending SMS to mobile phone in case failure or when battery charge falls to an unexpected level.

BLOCK DIAGRAM



COMPONENTS AND DETAILS

HARDWARE COMPONENTS

EXPLANATIONARDUINO:

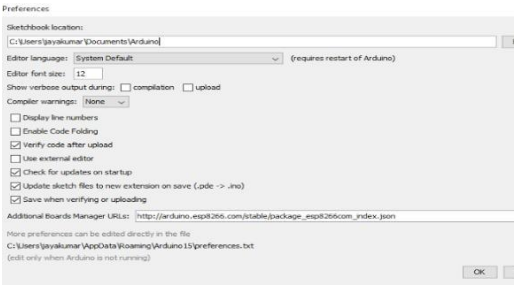
Overview :

Arduino Uno Any automatic system requires an intelligent chip such as a microcontroller that controls the system components. Microcontroller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. The microcontroller unit used in this project is Arduino uno which is a platform for prototyping interactive objects using electronics. It consists of both hardware and software. Arduino is based on the Atmel AVR CPUs and is being deployed in a wide variety of projects, ranging from sensor networks to robotic submarines. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a

computer with a USB cable or power it with a AC-to-DC adapter or battery to get start.

Go to files and -click -on the preference in the Arduino IDE

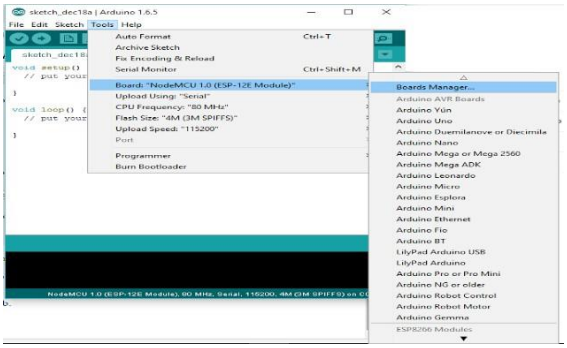
Preference window – additional board manjors



copy the below code in the Additional Boards Manager

http://arduino.esp8266.com/stable/package_esp8266com_index.json

click OK to close the preference Tab



After completing the above steps , go to Tools and board, and then select.

Board Manager

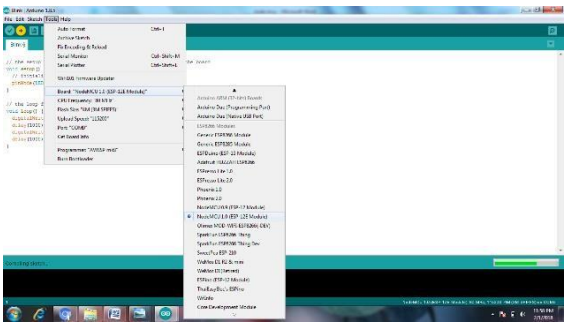
Navigate to esp8266 by esp8266 community and install the software for Arduino After installing the software check the board manager esp8266 availability in board options. Once all the above processes have been completed we are ready to program our esp8266 with Arduino IDE.

For this example, I have used NodeMCU esp8266 and if you are using any other vendor wifi chips or generic wifi module please check with the esp8266 Pin mapping which is very essential to make things work.

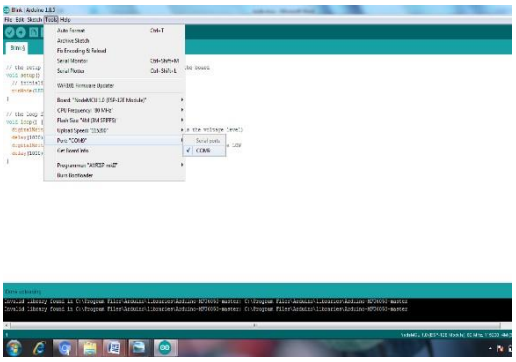
The reason why we used the D7 pin for this example is, I uploaded the basic blink program that comes with the examples program in the Arduino IDE which is connected to 13 pin of Arduino.

The 13th pin is mapped into D7 pin of NodeMCU.

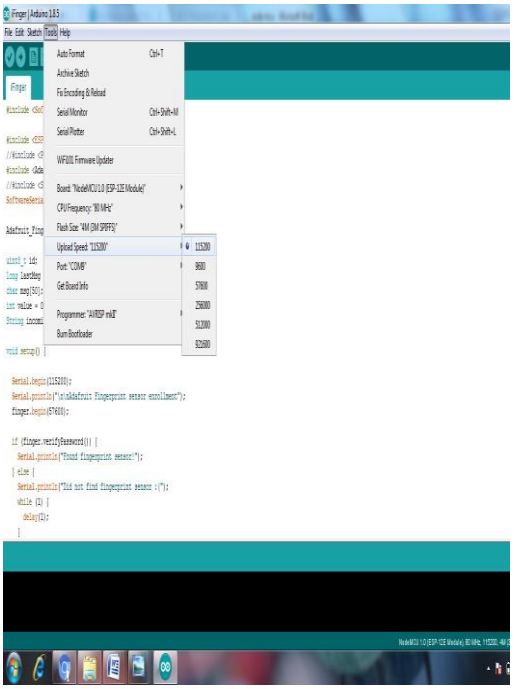
Go to board and select the type of esp8266 you are using.



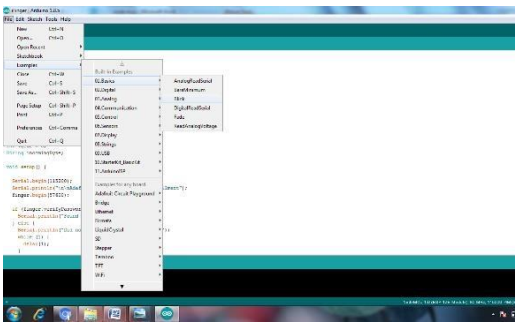
- Select the correct COM port to run the program on your esp8266 device.



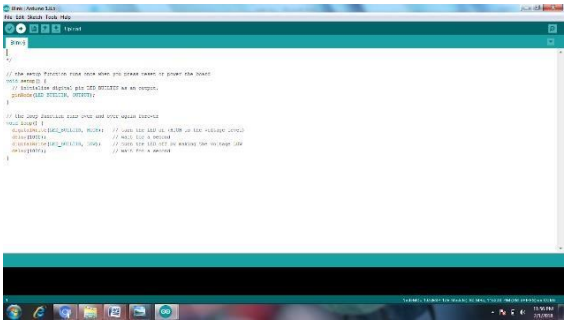
- Select upload speed 115200



- Example code select led blink code.



- Open the code upload the program to **ESP8266 NODE MCU**



PROTEUS

Introduction

Computer Control Technology is a comprehensive and important technical course for university students in the School of electrical engineering and Automation. The course requires students to master control theory, computer control system analysis and design methods, and basic design skills to design a simple computer control system.

In the process of teaching the course, we find that students usually feel difficulty in computer control system hardware design, which is abstract and difficult to imagine. Usually, in teaching practice, teachers first explain the theory and use the theory to explain the relevant practical part, which makes the theory and practice teaching disjointed. A computer control system test box is used in the experimental process of Computer Control Technology, whose internal structure is fixed.

So, students only do some simple connections during the experimental process and then check and analyze the results system operation. Such experiments are unable to practice the abilities of students to design a computer control system. Obviously, current laboratory hardware is unable to meet existing experimental modern teaching needs. Fortunately, with the development of computer technology, simulation technology has become an

important means to aid circuit analysis and system design.

Particularly, Proteus simulation software from UK Lab Center Electronics Company, combines circuit simulation, PCB design, and simulation of a virtual model together effectively to solve the problem of the design and co-simulation of microcontroller and peripheral circuits.

Many teachers have employed Proteus in relevant teaching. In this paper, we analyze in detail the application of Proteus in teaching through a teaching example. We believe that software simulation of teaching examples will improve the overall design capabilities of a computer control system for students.

Application of Proteus in Computer Control Technology:

Proteus is an EDA tool that can simulate microcontrollers and peripheral devices. Proteus can truly turn a complete design from concept into a product. Proteus can program based on the virtual prototype directly. Together with display and output devices, input and output can be seen after running of programs. Proteus establishes a comprehensive electronic design and development environment.

The teaching content of the Computer Control Technology course includes theoretical teaching and experimental teaching, which are mainly related to hardware design techniques such as bus technology, analogy and digital input and output, digital control technology, practices and complex control technology, and computer control system design and implementation.

A transformation, stepper motor control about the parallel interface chip 8255A, timer counter chip 8253, 8259, and interrupt controller chip. These chips work more complicated due to too many pins and complicated links. Consequently, it is difficult for students to understand and grasp a lot of related knowledge. Now, after the introduction of Proteus software, we can directly show the real-time running effects of these circuit chips, meanwhile dynamically changing the parameters related to devices just in the classroom, which shows the advantages combination of virtual simulation and the theory.

Therefore, using Proteus in the classroom can demonstrate corresponding examples to explain the theory of knowledge, which can greatly improve the learning initiative of students. On the other hand, Proteus updates soon, so the latest relevant teaching device can be found in the new version of Proteus.

Proteus simulation

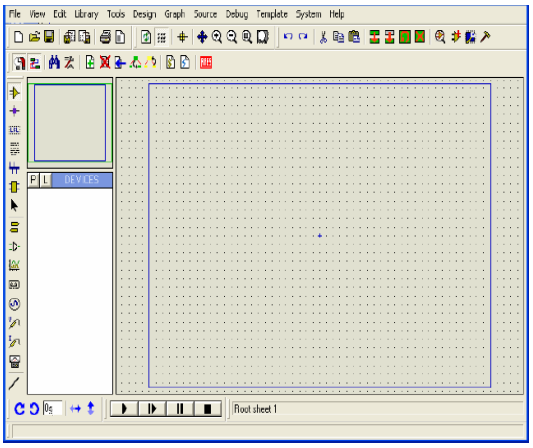


Fig.5.3.1.Simulation Worksheet

Proteus simulation example

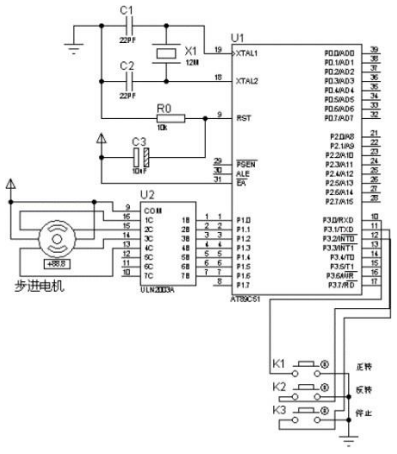
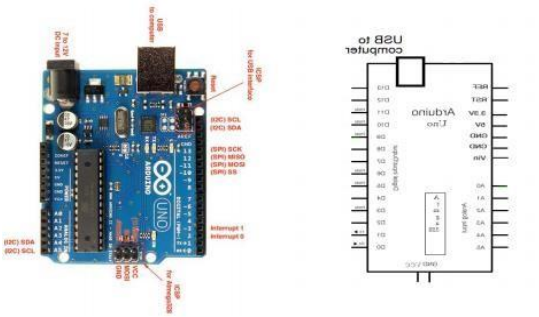


Fig.5.3.2.Simulation Diagram

In this paper, we describe the process of using Proteus for virtual simulation in the teaching of computer control technology based on AT89C51 stepper motor control.

This example mainly contains four steps a key input, interrupts, timers, and a stepper motor. After the system is running, we can use buttons to start, stop, forward and reverse the stepper motor. From this example, students can be very intuitive and see the process of hardware design, software programming and debugging, and the running states of the stepper motor. Through this example, students can take a deep understanding of the working mechanism of the stepper motor and some ways to operate the hardware.

Further, during the process of simulation using Proteus, students can always modify the parameters related to the device, or replace certain parts, which can greatly improve the student's enthusiasm for learning. Meanwhile, the most important thing is that it is very easy.



The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to the ground, making it easier to put into DFU mode. Revision 3 of the board has the following new features:

- pinout: added SDA and SCL pins that are near the AREF pin and two other new pins placed near the RESET pin, the IOREF that allow the shields to adapt to the voltage provided by the board. In the future, shields will be compatible both with the board that uses the AVR, which operate with 5V, and with the Arduino Due which operates with 3.3V. The second one is a not connected pin, that is reserved for future purposes.
- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

Summary

- Microcontroller ATmega328
- Operating Voltage 5V
- Input Voltage (recommended) 7-12V
- Input Voltage (limits) 6-20V
- Digital I/O Pins 14 (of which 6 provide PWM output)
- Analog Input Pins 6
- DC Current per I/O Pin 40 mA

- DC Current for 3.3V Pin 50 mA
- Flash Memory 32 KB (ATmega328) of which 0.5 KB is used by bootloader SRAM 2 KB (ATmega328)
- EEPROM 1 KB (ATmega328)
- Clock Speed 16 MHz.

Schematic & Reference Design

EAGLE files: arduino-uno-Rev3-reference-design.zip (NOTE: works with Eagle 6.0 and newer) Schematic: arduino-uno-Rev3-schematic.pdf Note: The Arduino reference design can use an Atmega8, 168, or 328, Current models use an ATmega328, but an Atmega8 is shown in the schematic for reference. The pin configuration is identical on all three processors.

Power

The Arduino Uno can be powered via a USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts. The power pins are as follows:

- VIN. The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- 5V.This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.
- 3V3. A 3.3-volt supply is generated by the onboard regulator. The maximum current draw is 50 mA.
- GND. Ground pins.

Memory

The ATmega328 has 32 KB (with 0.5 KB used for the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

Input and Output:

Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions:

- Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip. External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details.

- PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analogWrite() function.
- SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.
- LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

The Uno has 6 analog inputs, labeled A0 through A5, each of which provides 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function? Additionally, some pins have specialized functionality:

- TWI: A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library.

There are a couple of other pins on the board:

- AREF. Reference voltage for the analog inputs. Used with analogReference().
- Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields that block the one on the board.

See also the mapping between Arduino pins and ATmega328 ports. The mapping for the Atmega8, 168, and 328 is identical.

Communication:

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A SoftwareSerial library allows for serial communication on any of Uno's digital pins. The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify the use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library

Programming:

The Arduino Uno can be programmed with the Arduino software (download). Select "Arduino Uno from the Tools > Board menu (according to the microcontroller on your board). For details, see the reference and tutorials. The ATmega328 on the Arduino Uno comes pre burned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files). You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these instructions for details. The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available. The ATmega16U2/8U2 is loaded with a DFU bootloader, which can be activated by:

- On Rev1 boards: connecting the solder jumper on the back of the board (near the map of Italy) and then resetting the 8U2.

- On Rev2 or later boards: there is a resistor that pulls the 8U2/16U2 HWB line to the ground, making it easier to put into DFU mode.

You can then use Atmel's FLIP software (Windows) or the DFU programmer (Mac OS X and Linux) to load new firmware. Or you can use the ISP header with an external programmer (overwriting the DFU bootloader). See this user-contributed tutorial for more information.

Automatic (Software) Reset:

Rather than requiring a physical press of the reset button before an upload, the Arduino Uno is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the ATmega328 via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the bootloader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload. This setup has other implications. When the Uno is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half a second or so, the bootloader is running on the Uno. While it is programmed to ignore malformed data (i.e., anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits for a second after opening the connection and before sending this data. The Uno contains a trace that can be cut to disable the auto-reset. The pads on either side of the trace can be soldered together to re-enable it. It's labeled "RESET-EN". You may also be able to disable the auto-reset by connecting a 110-ohm resistor from 5V to the reset line; see this forum thread for details.

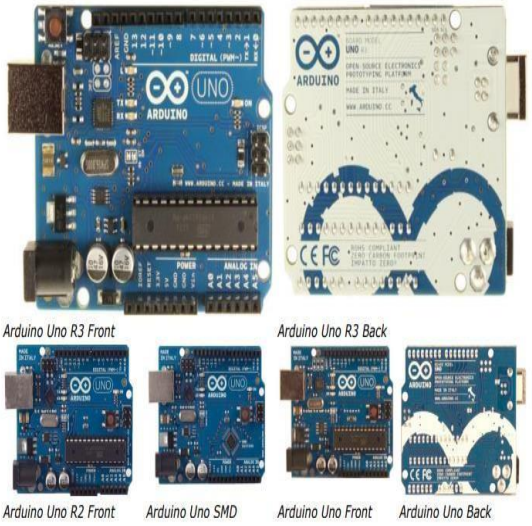
USB Overcurrent Protection:

The Arduino Uno has a resettable polyfuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

Physical Characteristics:

The maximum length and width of the Uno PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Four screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil (0.16"), not an even multiple of the 100 mil spacing of the other pins.

ARDUINO

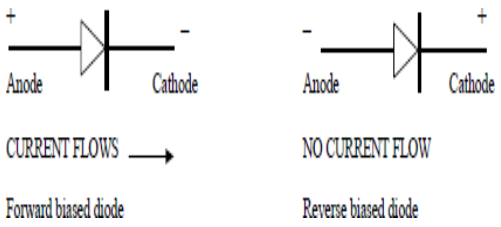


PULSE WIDTH MODULATION:

PWM is an effective method for adjusting the amount of power delivered to the load. The PWM technique allows a very smooth operation and is reliable in nature. The microcontroller can generate a PWM signal to adjust the duty cycle of the pulse simultaneously the motor terminal voltage can vary with the duty cycle and also speed will vary. The ratio of on-time to off-time is called the duty cycle. The desired speed can be obtained by changing the duty cycle. The Pulse-Width-Modulation (PWM) in the microcontroller is used to control the duty cycle of the DC motor drive.PWM is an entirely different approach to controlling the speed of a DC motor. Power is supplied to the motor in a square wave of constant voltage but varying pulse width or duty cycle. Duty cycle refers to the percentage of one cycle during which duty cycle of a continuous train of pulses. Since the frequency is held constant while the on-off time is varied, the duty cycle of PWM is determined by the pulse width. The figure is shown below the change of duty cycle of the PWM microcontroller. The microcontroller having a 25% duty cycle then it provides a ¼ of power to the motor when the microcontroller having a 50% duty cycle then microcontroller provides a ½ of power to the motor when the microcontroller having a 75% duty cycle then the microcontroller provides a ¾ of power to the motor and finally the microcontroller provides a 100% duty cycle then microcontroller provides a full power to the motor.

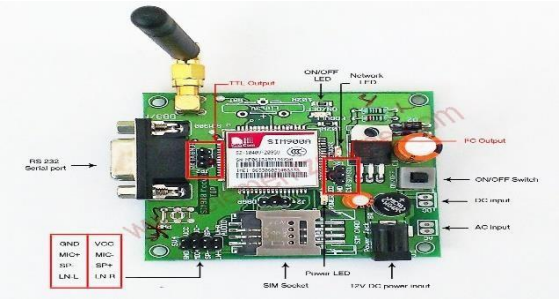
DIODES:

Semiconductor diodes are active devices that are extremely important for various electrical and electronic circuits. Diodes are active non-linear circuit elements with non-linear voltage-current characteristics. Diodes are used in a wide variety of applications in communication systems (limiters, gates, clippers, mixers), computers (clamps, clippers, logic gates), radar circuits (phase detectors, gain-control circuits, power detectors, parameter amplifiers), radios (mixers, automatic gain control circuits, message detectors), and television (clamps, limiters, phase detectors, etc). The ability of diodes to allow the flow of current in only one direction is commonly exploited in these applications. Another common application of diodes is in rectifiers for power supplies. In this chapter, we will study some simple diodes and their application in rectifier circuits for power supplies. Three basic types of rectifier circuits will be studied. Rectifiers are mainly used in power supplies where an AC signal is to be converted to DC. The DC voltage is obtained by passing the rectifier's output through a filter to remove the ripple (AC components). Although various types of filters (covered in the chapter on Frequency Response) can be used, in this chapter we will limit our analysis to the simplest type of filter using a capacitor. Diodes allow electricity to flow in only one direction.



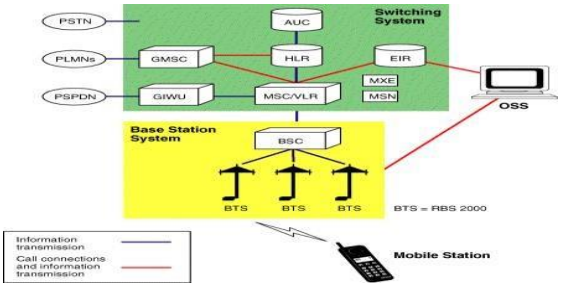
GSM Modem:

Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz.



THE GSM NETWORK

GSM provides recommendations, not requirements. The GSM specifications define the functions and interface requirements in detail but do not address the hardware. The reason for this is to limit the designers as little as possible but still to make it possible for the operators to buy equipment from different suppliers. The GSM network is divided into three major systems: the switching system (SS), the base station system (BSS), and the operation and support system (OSS). The basic GSM network elements are shown in below *figure*



GSM Network Elements

GSM MODEM:

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves.

A GSM modem can be an external device or a PC Card / PCMCIA Card. Typically, an external GSM modem is connected to a computer through a serial cable or a USB cable. A GSM modem in the form of a PC Card / PCMCIA Card is designed for use with a laptop computer. It should be inserted into one of the PC Card / PCMCIA Card slots of a laptop computer. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate.

As mentioned in earlier sections of this SMS tutorial, computers use AT commands to control modems. Both GSM modems and dial-up modems support a common set of standard AT commands. You can use a GSM modem just like a dial-up modem.

In addition to the standard AT commands, GSM modems support an extended set of AT commands. These extended AT commands are defined in the GSM standards. With the extended AT commands, you can do things like:

- Reading, writing, and deleting SMS messages.
- Sending SMS messages.
- Monitoring the signal strength.
- Monitoring the charging status and charge level of the battery.
- Reading, writing, and searching phone book entries.

The number of SMS messages that can be processed by a GSM modem per minute is very low -- only about six to ten SMS messages per minute.

GSM MODEM APPLICATIONS

FACTS AND APPLICATIONS OF GSM/GPRS MODEM

The GSM/GPRS Modem comes with a serial interface through which the modem can be controlled using AT command interface. An antenna and a power adapter are provided. The basic segregation of working of the modem is as under

• Voice calls

• SMS

• GSM Data calls

•GPRS

Voice calls:

Voice calls are not an application area to be targeted. In the future if interfaces like a microphone and speaker are provided for some applications then this can be considered.

SMS:

SMS is an area where the modem can be used to provide features like:

• Pre-stored SMS transmission

• These SMS can be transmitted on certain trigger events in an automation system

• SMS can also be used in areas where small text information has to be sent. The transmitter can be an automation system or machines like vending machines, collection machines, or applications like positioning systems where

The navigator keeps on sending SMS at particular time intervals. SMS can be a solution where GSM data calls or GPRS services are not available

APPLICATIONS

Access control devices:

Now access control devices can communicate with servers and security staff through SMS messaging. A complete log of transactions is available at the head-office Server instantly without any wiring involved and the device can instantly alert security personnel on their mobile phone in case of any problem. RaviRaj Technologies is introducing this technology in all Fingerprint Access control and time attendance products.

Transaction terminals:

EDC machines and POS terminals can use SMS messaging to confirm transactions from central servers. The main benefit is that the central server can be anywhere in the world. Today you need local servers in every city with multiple telephone lines. You save huge infrastructure costs as well as per transaction cost.

Supply Chain Management:

Today SCM require huge IT infrastructure with leased lines, networking devices, data centre, workstations and still you have large downtimes and high costs. You can do all this at a fraction of the cost with GSM M2M technology. A central server in your head office with GSM capability is the answer; you can receive instant transaction data from all your branch

officers, warehouses and business associates with nil downtime, Low cost.

APPLICATIONS SUITABLE FOR GSM COMMUNICATION

If your application needs one or more of the following features, GSM will be more cost-effective then other communication systems.

Short Data Size:

You data size per transaction should be small like 1-3 lines. e.g. banking transaction data, sales/purchase data, consignment tracking data, updates. These small but important transaction data can be sent through SMS messaging which cost even less then a local telephone call or sometimes free of cost worldwide. Hence with negligible cost you are able to send critical information to your head office located anywhere in the world from multiple points.

You can also transfer faxes, large data through GSM but this will be as or more costly compared to landline networks.

Multiple remote data collection points:

If you have multiple data collections points situated all over your city, state, country or worldwide you will benefit the most. The data can be sent from multiple points like your branch offices, business associates, warehouses, and agents with devices like GSM modems connected to PCs, GSM electronic terminals and Mobile phones. Many a times some places like warehouses may be situated at remote location may not have a landline or internet but you will have a GSM network still available easily.

High uptime:

If your business requires high uptime and availability GSM is best suitable for you as GSM mobile networks have high uptime compared to landlines, internet, and other communication mediums. Also, in situations where you expect that someone may sabotage your communication systems by cutting wires or taping landlines, you can depend on GSM wireless communication.

Large transaction volume

GSM SMS messaging can handle large numbers of transactions in a very short time. You can receive large number of SMS messages on your server like e-mails without internet connectivity. E-mails normally get delayed a lot but SMS messages are almost instantaneous for instant transactions. Consider a situation like shop owners doing credit card transactions with GSM technology instead of conventional landlines. The time you find local transaction servers busy as these servers use multiple telephone lines to take care of multiple transactions, whereas one GSM connection is enough to handle hundreds of transactions.

Mobility, Quick installation:

GSM technology allows mobility, GSM terminals, modems can be just picked up and installed at other locations, unlike telephone lines. Also, you can be mobile with GSM terminals and can also communicate with servers using your mobile phone. You can just purchase the GSM hardware like modems, terminals, and mobile handsets, insert SIM cards, and configure software that is ready for GSM communication.

VOLTAGE SENSOR:

Description:

A voltage Sensor is a precise low-cost sensor for measuring voltage. It is based on the principle of resistive voltage divider design. It can make the red terminal connector input voltage 5 times smaller. Arduino analog input voltages up to 5V, the voltage detection module input voltage not greater than 5Vx5=25V (if using 3.3V systems, input voltage not greater than 3.3Vx5=16.5V). Arduino AVR chips have 10-bit AD, so this module simulates a resolution of 0.00489V (5V/1023), so the minimum voltage of the input voltage detection module is 0.00489Vx5=0.02445V.

Features:

- Voltage input range: DC 0-25V
- Voltage detection range: DC 0.02445V-25V
- Voltage Analog Resolution: 0.00489V
- DC input connector: Terminal cathode connected to VCC, GND negative pole.
- Output interface: "+" connect 5/3.3V, "-" connect GND, "s" connects the Arduino AD pins

CONCLUSION

Although the environments in which our platform should work are highly corrosive and very noisy from an electrical point of view, they function according to the parameters set at the beginning of the development.

The main advantages of these platforms are:

• High autonomy (over 10 years) compared to other industrial products (5-10 years)

• Robust system

• No interference

• Large coverage (over 3 km in an urban environment)

• Modularity and rapid access to data

• Cost reduction due to: o Lack of expensive cables o Large area covered by a single gateway o Easy assembly and moving of the entire system

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