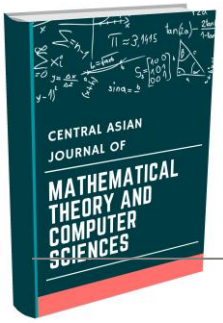

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ACCIDENT REPORTING AND NOTIFICATION SYSTEM FOR INCIDENTS INVOLVING MOTOR VEHICLES

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Abstract

An innovative GPS vehicle tracking system with a GSM module for remote vehicle locking. Its purpose is to protect car owners from intruders and theft. When an intruder tries to get into your car, the system analyses the data from the sensors and sends a notification to you via GSM. It uses Global Positioning System technology to transmit the vehicle's coordinates. An Arduino controller is used for vehicle control. The motor's speed is reduced over time, and it eventually stops. A large variety of control features can be created using the same set of control principles described in the paper. To detect an accident, a vibration sensor is utilised as a detecting device. The CPU is always keeping an eye on the vibration sensor's output; if the sensor detects a voltage increase beyond a certain threshold, the processing is halted and the processor learns that an accident has occurred.

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Introduction:

Rapid progress in the automotive industry has resulted in an increase in traffic accidents and other dangers. There is a serious threat to human life [1]. The lack of adequate emergency services in our country allows this predicament to persist. Many people die every year in accidents in the United States [2-3]. As a result of casualties or a failure to properly brief the rescue squad. In order to address this problem and minimise any human suffering caused by it, we have proposed an effective remedy [4]. According to our idea, the system's layout allows us to spot incidents in an extremely short amount of time and send vital information, including precise locations, the time of the incident, and the direction the vehicle was travelling, to the nearest emergency facility in a matter of seconds. Rapid notification is made to the emergency response team (ambulance) and the cell phone number on file [5-11]. Invaluable human lives are being preserved thanks to this real-time programme. The GPS module will relay the incident's precise coordinates to the GSM module,

which will then transmit the data [12]. The basic concept is to use a vehicle's real-time GPS position to pinpoint its exact location, which will then be relayed to a GSM network via a web page service [13-17].

The GPS system monitors the whereabouts of a car using satellite technology [18]. The global positioning system (GPS) module is a standard component of most tracking systems [19-25]. A GSM module, a GPS module, a microprocessor, a relay circuit, and a liquid crystal display make up the framework of the vehicle tracking system's basic design [26]. The motor's speed is slowed down over time [27-34]. The latitude and longitude of the user's current position are also transmitted to the user's mobile device [35]. To see the vehicle's location on Google Maps, just enter these coordinates [36]. This system is tailored to the needs of those in the transportation and land development industries, giving users instant access to useful data including their trucks' current location, speed, and estimated time of arrival [37-44].

There are a number of published articles on the topic of the improvement of GPS and GSM modem-based vehicle tracking systems [45]. This article presents a differential GPS technique that can provide near real-time PPP service. GPS measurement error sources are estimated [46-51]. The notion of focus of expansion (FOE) is introduced, and its role in the evolution of real-time visual tracking systems for use in automotive safety applications is explained [52-66]. An inexpensive real-time tracking system is described, one that can pinpoint the exact location of the tracked vehicle [67-75]. To facilitate vehicle tracking, we also implement licence plate recognition. As a result of the great interest in reliable vehicle tracking systems, scientists have proposed a variety of new techniques for making such systems more precise. Developments in both the hardware and software of the Global Positioning System and the Global System for Mobile Communications are discussed. In order to implement the proposed GPS/GSM based System, a mobile unit and a controlling station are required [76-81]. All system components, including the mobile unit, the control stations, and the interfaces and connections between them, are operational. These findings are consistent with global positioning system tools [82-91].

A car tracking system is an electronic device that can be installed in a vehicle and used to follow its whereabouts, either by the vehicle's owner or a third party. In this study, we present a GPS and GSM-based system for tracking vehicles [92-99]. This embedded system can pinpoint the location of any vehicle using Global Positioning System and the Global System for Mobile Communication (GSM) [100]. This setup can monitor a moving Vehicle and provide status changes on demand. In Face Detection System utilised to recognise the face of the driver, and compare with the predefined face [101-111]. While the owner was sound asleep at night, his car was stolen. Then, the Face Detection System captures images using a single, unobtrusive webcam installed inconspicuously someplace in the vehicle [112-115]. To do this, the Face Detection System compared the new data with the existing database of faces. If the photos don't match, then the information sent to the owner through MMS [116-127]. The owners can identify the burglar by viewing photographs stored on their phones and tracking his or her location using GPS. The place of the automobile and its speed displayed to the owner through SMS [128]. The owner can recognise the thief photographs as well as the site of the car and may quickly find out the hijackers image. In our regular lives, this system worked [129].

By adapting the preexisting modules, this system guaranteed the safety and security of the car's interior, which relied on the embedded system [130]. Toxic gases like carbon monoxide (CO), liquefied petroleum gas (LPG), and alcohol can be detected and their levels within the vehicle can be monitored using this technology, with the resulting data serving as an alarm in potentially hazardous conditions [131-141]. All it takes is a GSM phone and a few keystrokes to send a text message to the right recipient. If an IR sensor detects a stationary barrier in the vehicle's path, the engine is shut off and the vehicle comes to a halt. Collisions between moving cars and immobile objects can be avoided in this way. The proposed monitoring system utilises the resources of the cloud [142-151]. The fuel level, the driver's health, and the vehicle speed are all things that may be tracked with the use of these sensors. Information is sent from the GSM-enabled smartphone to a remote server in the cloud [152-161]. Each car has a GPS antenna so they can find their way there. Alcohol sensors are fitted to keep track of whether or not drivers are impaired. Highway accidents can be greatly reduced with the help of the proposed technology [162].

Remote monitoring using short message service (SMS) and general system mobile communication (GSM) was introduced in [163]. Hardware and software are created in accordance with the system's overall design. In this work, the GSM network is used to carry the remote control signal. Two components make up this: the centralised control room and the outpost monitoring equipment [164-171]. Computers and a GSM connection module make up the monitoring centres. The centralised software monitoring facility, and the off-site monitoring station, were both developed in Visual Basic [172-181]. This proof-of-concept demonstrates that the system can monitor and manage data transmissions between the control room and the outpost [182-195].

For the purpose of improving road safety, Kai-Tai Song and Chih-Chieh Yang have developed a real-time visual tracking system [196]. This research developed a novel feature-based vehicle-tracking algorithm that can automatically recognise and track a number of vehicles or motorcycles in front of the tracking vehicle [197-201]. Based on the focus of expansion (FOE) and view analysis, the developed system can distinguish between the foreground and background motion of an image and provide a real-time collision warning. Based on a CMOS image sensor and NMOS embedded CPU architecture, the suggested technique is very low power. The designed stand-alone visual tracking system validated in real road tests [202-210]. The findings revealed details on collision warning in a city artery travelling at night and during the day at speeds of around 60 km/h. The GPS and GSM networks' hardware and software were created in. In order to implement the proposed GPS/GSM based System, a mobile unit and a controlling station are required. All system components, including the mobile unit, the control stations, and the interfaces and connections between them, are operational. These findings are consistent with global positioning system tools [211-215].

A car tracking system is an electronic device that can be installed in a vehicle and used to monitor its whereabouts, either by the vehicle's owner or by a third party. A GPS and GSM-based vehicle tracking system was proposed in this paper [216-220]. Through the use of GPS and the Global System for Mobile Communication, this embedded-based system can locate and track down any car (GSM). This design will keep an eye on a moving Vehicle and give you updates whenever you want [221-225]. By adapting the preexisting modules, this system guaranteed the safety and security of the car's interior, which relied on the embedded system. Toxic gases like carbon monoxide (CO), liquefied petroleum gas (LPG), and alcohol can be detected and their levels within the vehicle can be monitored using this technology, with the resulting data serving as an alarm in potentially hazardous conditions [226].

Existing System

While the ultrasonic system's distance data is used in the current setup, the speed of the vehicles is not required [227-228]. Accidents on the roads are becoming common as a result of technological advancements, leading to substantial loss of life and property due to a lack of adequate emergency services. In order to get around this shortcoming, the author suggests using the proposed system.

Proposed System

Our project relies on accident detection and tracking to function. Activation and system initialization have been completed. Nothing alerts the rescue squad if the car is operating normally. When an accident occurs, the car suddenly reverses course and begins vibrating at extremely high speeds. When something is wrong with a car, the vibration detector will pick it up. The accident warning information, including the location of the accident and the status of any injured parties, is transmitted to the appropriate authorities and family members via text message and phone call after the controller receives data from the sensors. Using Internet of Things (IoT) technology, it can help people get in touch with the closest hospital and get the care they need.

Architecture Design

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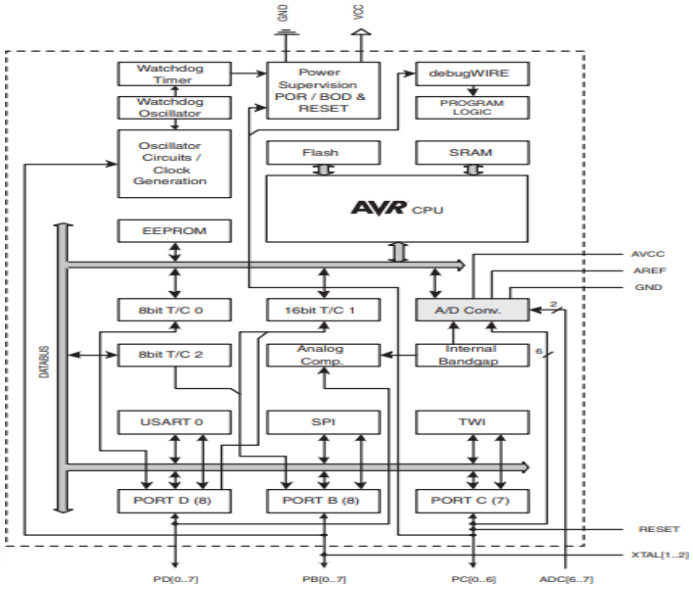

Figure 1: Architecture Design of AVR MCU - AT328P

The ATmega328P chip can be used as a drop-in replacement for the arduino board in both the Arduino Uno and the Arduino nano. For starters, you'll need to flash the chip with the Arduino bootloader (or purchase a chip already loaded with the bootloader, such as the ATMega328P-PU). This programmable IC includes a bootloader that allows it to communicate with the Arduino Uno board. Once the IC has had the Arduino programme burned into it, it may be used in place of the Arduino board in a given project; all that's needed in addition to the IC is a Crystal oscillator and any other components specified by the given project. The table below details the pinout of the ATmega328P chip, which is compatible with the Arduino Uno. The AVR employs a harvard architecture, which features dedicated programme and data memory and buses for increased performance and parallelism. With a single level of pipelining, the instructions stored in the programme memory are processed. The next instruction is pre-fetched from the programme memory while the current one is being executed. When applied to computing, this idea allows for instructions to be carried out during each tick of the clock.

Reprogrammable flash memory is used for the system's programme storage. Unit for Monitoring and Interrupting Operations General-Purpose Registers, 32 bits by 8 bits Communications Link for ALU This 8-bit Data SRAM Unit of SPI Instruction Registration Procedure Decoder Timer with a Dogwatch Function Comparator, Analog EEPROM Communication Ports Module d'interfaces d'entrées et sorties Directives for Taking Charge There are two types of addresses: direct and indirect. IO Module 2 IO Module 1 Counter Software ROM (Read Only Memory) Flash. One clock cycle is all it takes to access the 32 to 8-bit general purpose working registers in the fast-access register file. This paves the way for arithmetic logic unit (ALU) operations that take place in a single cycle. During a single clock cycle, an ALU transfers data from the register file to the operational circuit, performs the operation, and returns the result to the register file. Address computations can be performed quickly and accurately thanks to the fact that six of the 32 registers can be used as pointers to three 16-bit indirect address registers for the data space. One of these address pointers can be utilised as the address pointer for look up tables in the flash programme memory. The X-, Y-, and Z- registers, each with 16 bits of storage, are the newly introduced functional registers. Calculations and logical operations between registers or between a constant and a register are supported by the ALU. The ALU is not limited to performing multi-register operations, though. The outcome of an arithmetic operation is recorded in the status register upon the completion of the operation (figure 2).

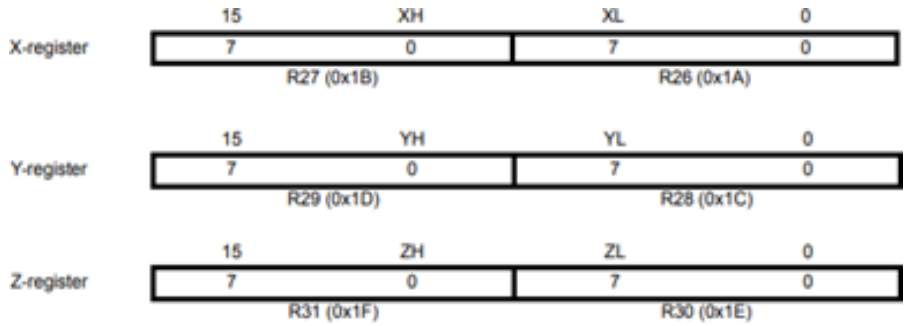

Figure 2: Arithmetic operation

Conditional and unconditional jump and call instructions, which can directly target the entire address space, are responsible for the execution of the programme. Single 16-bit word format is used for the vast majority of AVR instructions. Each address in the program's memory map corresponds to a 16- or 32-bit command. There are two distinct parts to the storage space for software in the flash memory: the boot programme and the application programme. Separate lock bits prevent unauthorised changes to either segment. There must be a boot programme section in which the SPM instruction that writes to the application flash memory area resides. The stack is used to temporarily save the programme counter (PC) and the return address during interruptions and calls to subroutines. Since the stack is implemented in the general data SRAM, its maximum size is constrained only by the available and used SRAM space. The reset routine of every user programme must initialise the SP (before subroutines or interrupts are executed). From the input/output (I/O) domain, you can read and write to the stack pointer (SP). AVR's five addressing modes make it simple to reach the data SRAM. All memory maps in the AVR design are linear and standardised. Temporary data, local variables, and return addresses from interrupted or called subroutines are all stored on the stack. When implemented, a stack would naturally expand from more recent to older memory locations. The top of the stack is always indicated by the stack pointer register. To access the stack section in data SRAM, where both the subroutine and interrupt stacks are kept, use the stack pointer.

The status register of a versatile interrupt module contains an extra global interrupt enabling bit in addition to the control registers in the I/O address space. Every single interrupt has its own unique entry in the interrupt vector database. Interrupts are prioritised based on their interrupt vector position. It is more important to have a lower interrupt vector address. There are 64 addresses in the I/O memory space that are dedicated to CPU peripherals such control registers, SPI, and other I/O operations. Direct access to the I/O memory is possible, alternatively it can be viewed as the data space positions immediately following the register file, from 0x20 to 0x5F. The ATmega328P features a larger I/O range in SRAM, from 0x60 to 0xFF, accessible exclusively through the use of the ST/STS/STD and LD/LDS/LDD instructions. Both a USB cable and an external power supply are acceptable for powering the Arduino Uno. The system intelligently chooses the power supply. Both an AC-to-DC adapter (wall-wart) and batteries can supply external (non-USB) power. Adapter connection is achieved by inserting a 2.1mm center-positive connector into the power jack on the circuit board. Connecting a battery's leads to the POWER connector's Gnd and Vin pin headers. The board can use an external power supply between 6 and 20 volts. However, the board may become unstable if the 5V pin is provided with less than 7V. Above 12V, the voltage regulator runs the risk of overheating and frying the board. Seven to twelve volts is the sweet spot. The power pins are as follows:

- Arduino's VIN value indicates the voltage at which the board is powered by an external supply (as opposed to 5 volts from the USB connection or other regulated power source). This pin can be used to either supply power or, if using a power jack, to draw power.
- It uses a 5V regulated power supply to run the microcontroller and other components. This can be supplied by VIN, via an on-board regulator, or by USB or another regulated 5V source.
- The on-board regulator creates a 3.3-volt power supply. The maximum allowed current is 50 mA.
- Pins that connect to the ground are labelled GND.

- Sleep modes allow the programme to power down the MCU's unused subsystems when not in use.
- The AVR's several sleep modes let developers adjust power usage as needed. The Brown-out Detector (BOD) keeps an eye on the voltage from the power source even when the device is sleeping.

Memory

There is 32 KB of flash memory on the Atmega328 for storing code (0.5 KB of which is utilised for the boot loader), 2 KB of static random-access memory (SRAM), and 1 KB of erasable programmable read-only memory (EEPROM) (which can be read and written with the EEPROM library). It is structured as a distinct data space, with access restricted to single bytes. The EEPROM can withstand at least a hundred thousand cycles of writing and erasing without failing. The peripherals and input/output (I/O) ports for the ATmega48P/88P/168P/328P are located in the I/O area. The LD/LDS/LDD and ST/STS/STD instructions allow access to all I/O locations, allowing for the transfer of data between the 32 general purpose working registers and the I/O space. The SBI and CBI instructions allow direct bit access to the I/O Registers from 0x00 to 0x1F. Values of individual bits in these registers can be examined with the use of the SBIS and SBIC instructions. Please read the manual for further information. The IN and OUT I/O commands require the use of the I/O addresses between 0x00 and 0x3F (figure 3).

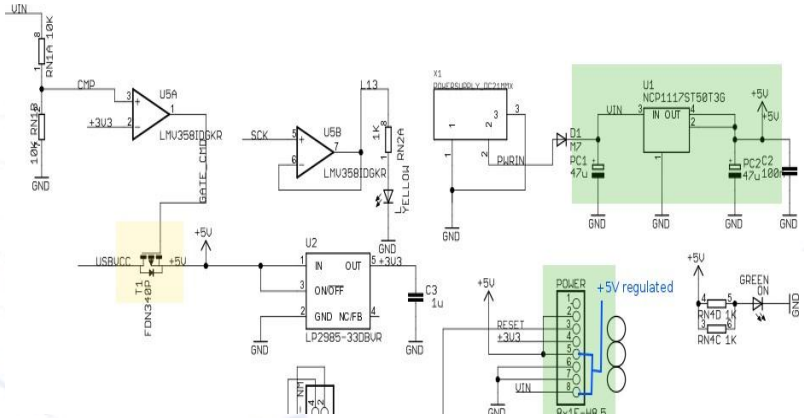

Figure 3: Circuit Diagram of Power Supply Design – Arduino UNO

General Purpose Input and Output

The Uno's 14 digital pins can be configured in a variety of ways, including as inputs or outputs, with the use of the pin Mode (), digital Write (), and digital Read () commands. They require 5 volts to function properly. There is a 20-50 KOhm pull-up resistor built into each pin that is normally unplugged to allow for a maximum of 40 mA of input or output current. Additionaly, several pins serve specific purposes:

- Serial 0 (TX) and 1 (RX) (TX). Functions as a TTL serial data receiver and transmitter. The ATmega8U2 USB-to-TTL Serial chip's relevant pins are wired here.
- Both External Interruptions 2 and 3 occurred outside the system. An interrupt can be set off by a low value, a rising or falling edge, or a change in value for each of these pins. For more information, see to the attach Interrupt () method.
- Specifically, PWM 3, 5, 6, 9, 10, and 11. Create 8-bit pulse-width-modulated (PWM) output using the analogue Write() method.
- The tenth, eleventh, twelfth, and thirteenth syllables in the standard format for SPIs are: (SCK). Although the underlying hardware facilitates SPI communication, support for it is not yet built into the Arduino programming language.
- LED 13. Connected to digital pin 13, an LED is part of the device's standard configuration. The LED will be illuminated when the pin's value is HIGH, and it will be turned off when the value drops to LOW.

- There are 6 analogue inputs on the Uno, each with 10 bits of resolution (i.e. 1024 different values). The default measuring range is from ground to 5 volts, however the AREF pin and the analogue Reference() function allow for the upper limit to be adjusted. Some of the pins also have particular purposes.
- The proteins I2C4 (SDA) and 5 (SCL). The Wire library was added to provide I2C (TWI) communication.
- Analog inputs have their own reference voltage. Referencing with an analogue (). The microcontroller can be reset by making this line LOW. In most cases, shields that cover the on-board reset button will benefit from having one of their own. For more information on how Atmega328 ports relate to Arduino pins, check out this handy table.

Power Supply

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Block Diagram

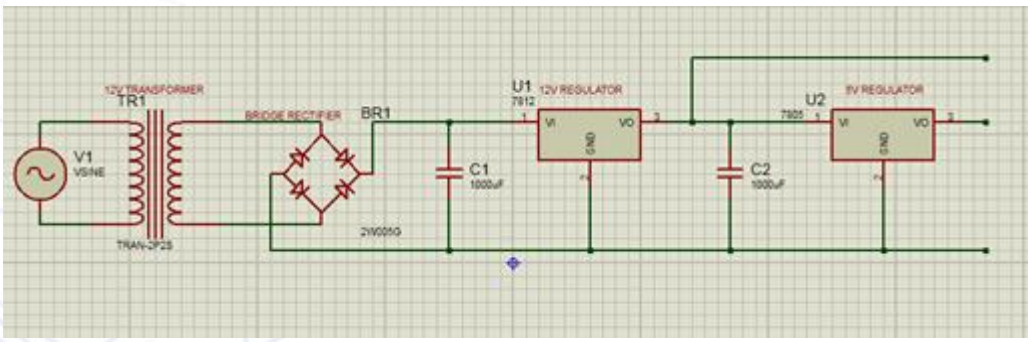

Figure 4: Circuit Diagram

At first, a small step down transformer is utilised to convert the 230V AC power supply to the safer 12V AC. A rectifier takes the sinusoidal AC voltage produced by the transformer and transforms it into DC voltage with periodic pulses. A filter circuit receives this output and smooths out the ac noise while letting the dc current through. 12V DC research voltage is regulated using a 7812. The 7805 regulator is used to change the DC voltage into a stable 5V (figure 4).

Vibration Sensor

The amount of vibration is used in conjunction with the module's potentiometer, vibration sensor, and LM393 comparator chip to generate a tunable digital output. The sensitivity can be fine-tuned by turning the potentiometer in either direction. When activated, the module sends out a high logic level (VCC), and when not, it sends out a low logic level (GND). An on-board LED light also activates in response to a signal being sent to the module.

Working

The company's latest motion sensor module, the sw-420, is a normally closed type vibration sensor with a clean signal, nice waveform, and robust driving ability that operates at 3.3V to 5V with a current draw of more than 15MA.

Form of output: digital switch output (0 and 1) The bolt hole is permanent, making assembly a breeze. Product on vibration switch is closed on state, the output terminal output low level, the green light is lit

product vibration, the vibration switch instantaneously disconnect, output the output high level, the green light is not bright output can be directly connected to microcontroller, through single chip microcontroller to detect the high and low level, thus to detect whether there is a vibration. Similar to the generally open type vibration sensor module, this one can operate a relay module if a vibration is detected for an extended length of time.

LCD Display

Hobbyists employ a wide variety of display devices. Among the many types of displays they use, LCD screens are among the most cutting-edge. You'll find it to be the simplest and most trustworthy output device after you've mastered the UI. Furthermore, not every time any debugger can be utilised for micro controller based project. LCD screens can be used to verify the outputs in this way. When an accident happens, the GPS module in the car sends the precise coordinates (in latitude and longitude) of where the car is to the satellite. Therefore, the data is sent to an Arduino Uno. When processing is complete, data is sent to the LCD and GSM modem (figure 5).

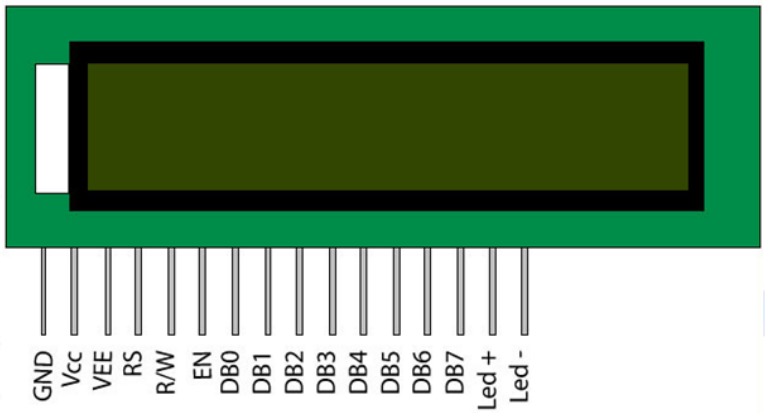

Figure 5: LCD Display

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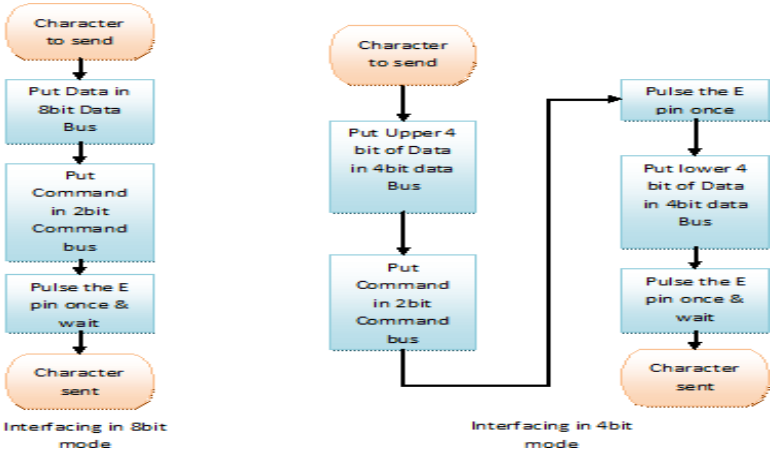

Figure 6: Flow chart of interfacing LCD display

Both dynamic random access memory (DDRAM) and static random access memory (CGRAM) are used in LCD displays. Data Display Random Access Memory (DDRAM) stores information on which ASCII

character will be shown at a given location. On an LCD screen, each distinct coordinate is represented by one byte of dynamic random-access memory (DDRAM). The data is read from the DDRAM and displayed on the LCD screen via the LCD controller. Users of CGRAM can create their own unique glyphs. That's why the first 16 ASCII characters of an address are always set aside for user access. Once CGRAM is configured to show characters, users can easily show their own characters on the LCD screen.

GPS Module

The NEO-6MV2 serves as a navigational GPS (Global Positioning System) module. The module's sole purpose is to verify its geographic location and relay that information in the form of longitude and latitude coordinates. It's a member of the same family of standalone GPS receivers that also includes the u-blox 6 positioning engine, which is known for its superior accuracy and speed. Small (16 mm x 12.2 mm x 2.4 mm), lightweight, and inexpensive, these receivers provide multiple connection choices. NEO-6 modules are perfect for low-cost, space-constrained, battery-operated mobile devices thanks to their compact design, plentiful power, and versatile memory. Its cutting-edge engineering ensures that NEO-6MV2 can successfully navigate in any environment. To avoid receiving an error message, the baud rate between the controller and the module must be set once the circuitry is complete. After establishing the baud rate, serial data can be retrieved from the module without any more intervention. Users can manipulate these values, which are simply longitudes and latitudes, as they see fit. The module's raw values can be difficult to read without some sort of decimal calculation, which can be easily implemented in code.

GSM Module

TTL Output (for Arduino, 8051, and other microcontrollers) and RS232 Output (to interface directly with a PC) are just two examples of the types of output available on a GSM Module, which is essentially a GSM Modem (like SIM 900) connected to a PCB (personal computer). There will be pins or provisions on the board for connecting a microphone and a speaker, as well as for extracting +5V or other values of power and ground connections. Modules may have different types of provisions. A wide selection of GSM modems and GSM modules are available on the market. The best GSM module to use with Arduino is one that has TTL Output provisions, as this will allow us to connect the GSM modem or module to Arduino and send and receive SMS messages. We use SIM900 GSM Module. In other words, the 900MHz band is supported for communication by the module. Those of us who hail from India will know that the 900Mhz band is the most popular among local mobile network providers. You need to make sure your mobile phone is compatible with the local network if you're visiting from another country. The 850Mhz band is widely used by American mobile networks (the band is either 850Mhz or 1900Mhz). The 1900 Mhz band is the most common in Canada. For more information on GSM frequency bands around the world, see this article on Wikipedia.

GSM modules are manufactured by a variety of companies, so it's important to verify the power requirements of each individual module. A variety of specifications for the input power supply are used. Remember to double-check the power needs of your GSM modules. An input of 12 volts is needed for our GSM module in this guide. We use a 12V,1A DC power supply to power it. Input voltage for some GSM modules is 15 volts, while I've seen others that only need 5 volts. Their quality varies depending on the manufacturer. In the event you have a 5V module, you can connect it directly to the 5V out on your Arduino. To make a GSM module, a specific GSM modem is soldered onto a PCB, and from there, features like RS232 outputs, TTL outputs, mic and speaker interfacing provisions, etc. are added. The SIM 900 GSM modem, made by SIM Com, is currently the most widely used modem. They produce GSM modems in the 850 MHz, 300 MHz, and other frequency bands. Verify the presence of TTL output pins in the module; only if these are present will you be able to send data from the GSM module directly to the Arduino. Instead, you must use a MAX232 IC to convert the RS-232 data to TTL before feeding it to an Arduino. The vast majority of GSM modules on the market today feature TTL output pins. Just make sure you're getting the correct one (figure 7).

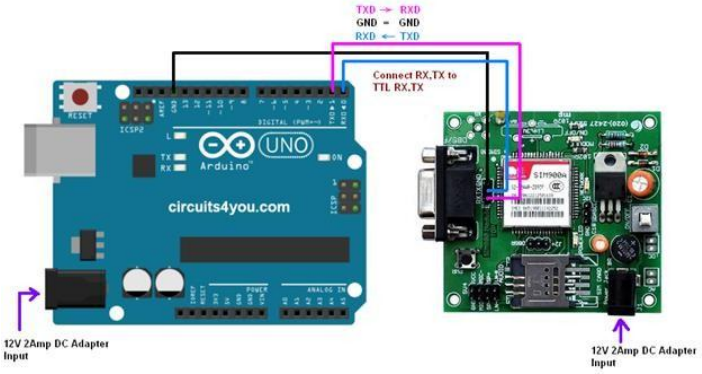

Figure 7: Connection Diagram

Using the UART or RS232 Interface, you can talk to this module like you see above. With the help of the UART interface, information can be transmitted to and received from the module. The module requires a regular +4.0V power source, which is what it usually gets. It requires +4.5V regulated electricity to function, and anything greater than that could potentially destroy the module. Also, the maximum current that may be supplied by the power supply must be 2A. The connection between the two devices using the UART protocol is made in the manner depicted in the picture. You need just connect the module's RXD to the Arduino's TXD, and the Arduino's TXD to the module's RXD. There must be a connection between the controller's ground and the module's ground for the voltage to be properly referenced. Here, the microphone is plugged into the AUDIO IN jack, and sound is emitted through the speaker jack. Last but not least, a functional GSM SIM card must be inserted into the module. When the module is powered on, the NETLIGHT LED will blink at regular intervals to indicate a stable connection.

Once all of the wires have been connected, the microcontroller will require a programme written so that it can communicate with the module. The controller-to-module data exchange sequence is extremely complex, thus we will be making use of libraries designed specifically for modules. Websites provide access to controller and module libraries for download. The use of these libraries facilitates simple interaction. The libraries can be downloaded and then called from within the programmes. After the header file is included, the controller can be instructed to send or receive data with just a few lines of code. Data is transmitted from the controller to the module via the UART Interface, with the protocol being defined in the controller's corresponding library. Through the cellular network, the module transmits the information to another GSM user. Data received from the cellular network (or another GSM user) will be sent to the controller via UART serial communication if the module is functioning properly.

Result

The sensor on the board is connected to the hardware via an interface. The microprocessor, LCD, GSM/GPS module, and sensors are all part of the hardware. An embedded SIM card facilitates two-way communication with the medical centre and loved ones at home. Below is the output indicating the information will be sent via GSM and GPS module. It's what chooses the tone and who to call (figure 8).

Figure 8: Alert System for Vehicle Accident

Conclusion

The suggested system makes use of the Internet of Things to detect and alert authorities to car accidents, as well as to monitor vehicles via GPS modem. In this project we have created IOT based car accident detection and tracking system using GPS modem. Consequently, IoT has the potential to dramatically alter the way systems interact and respond in a wide range of contexts, including traffic management. This strategy is the best and most practical option to improve the emergency care given to people injured in car crashes. An instant response can be made in the event of an accident with the aid of this technology by sending a message to the appropriate parties. In the event of an accident, the occupants of the car will be protected from harm by the airbag system, which can communicate with this device to prevent them from colliding with the dashboard, the steering wheel, or the window. Connecting a camera to the controller module and taking a picture of the scene of the accident would also be a useful improvement, since it would facilitate tracking.

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