

PROJECT FILE

MINOR PROJECT

UC-BTC-631-18

“SAATHI”

-Web based accident
detection system

Submitted by –

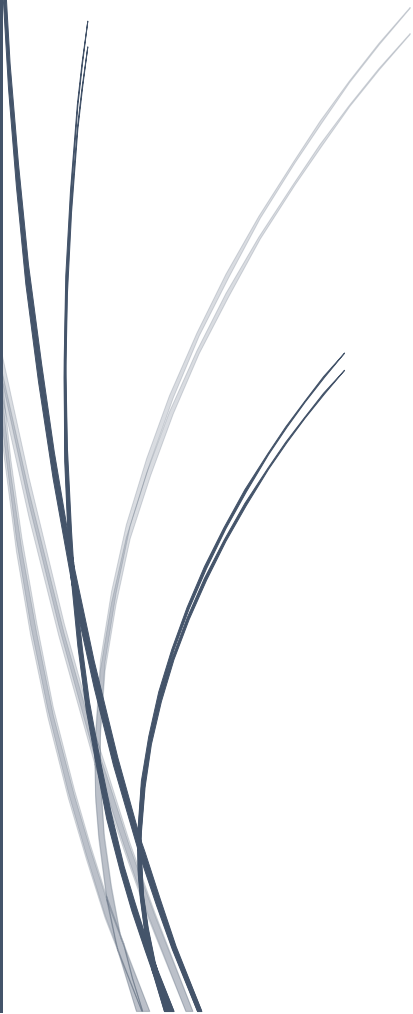
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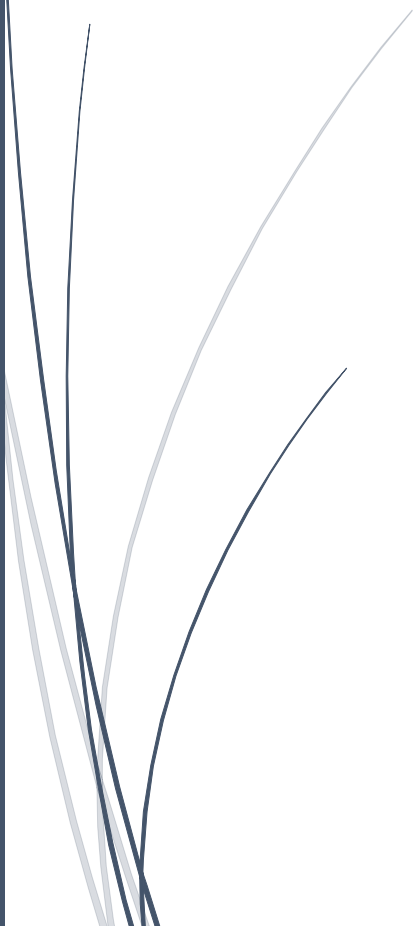
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CERTIFICATE

We hereby declare that the work being presented in this Minor Project Report in partial fulfillment of requirements for the award of degree of Bachelor of Technology submitted in the Department of Electronics & Communication Engineering at Main Campus, IKG Punjab Technical University, Kapurthala is an authentic record of our work under the supervision of Dr Rakesh Goyal . The matter presented in this report has not been submitted by us in any other University / Institute for the award of Degree / Diploma.





ACKNOWLEDGEMENT

In the present world of competition there is a race of existence in which those are having will to come forward succeed. Project is like a bridge between theoretical and practical working. With this willing I joined this particular project. First of all, I would like to thank the supreme power the Almighty God who is obviously the one has always guided me to work on the one has always guided me to work on the right path of life. Without his grace this project could not become a reality. Next to him are my parents, whom I am greatly indebted for me brought up with love and encouragement to this stage. I am feeling oblige in taking the opportunity to sincerely thanks to Dr.Rakesh Goyal, we are highly obliged in taking the opportunity to sincerely thanks to all the staff members of department for their generous attitude and friendly behaviour. At last but not the least I am thankful to all my teachers and friends who have been always helping and encouraging me through out the year. I have no valuable words to express my thanks, but my heart is still full of the favours received from every person.

ABSTRACT

As per the World Health Organization (WHO), more than a million individuals on the planet pass on every year on account of vehicle mishaps. Regardless of mindfulness cause, this issue is as yet expanding because of rider's poor practices, for example, drunk driving, speed driving, riding without adequate rest, riding with no cap insurance, and so forth. This accident alarm system is based on Arduino and GPS. To detect the accident there is accelerometer sensor present in this rescue system. Vehicles state and user information as well as alarm locations will be transmitted to the website. The website will display this information on map, the GSM module included sends messages about the location to the respective guardian and rescue team. With the help of accelerometer sensor signal, a severe accident due to an obstacle can be recognized. Microcontroller sends the alert message through the GSM module including the location to guardian or a rescue team. So, the emergency help team can immediately trace the location through the GPS module, after receiving the accident location information, action can be taken immediately. This accelerometer-based accident detection system is powered by ATMEGA 328 Microcontroller it consists of display, Accelerometer Sensor, GSM module and alarm. This automatic ambulance rescue system project is useful in detecting the accident.

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INTRODUCTION

This Web-Based Vehicle Accident Detection and Tracking Module help to find the location of your loved ones and trace them for you. This project-based on IoT helps to reduce the life threat. This accident alarm system is based on Arduino and GPS. To detect the accident there is accelerometer sensor present in this rescue system. Vehicles state and user information as well as alarm locations will be transmitted to the website. The website will display this information on map, the GSM module included sends messages about the location to the respective guardian and rescue team. With the help of accelerometer sensor signal, a severe accident due to an obstacle can be recognized. Microcontroller sends the alert message through the GSM module including the location to guardian or a rescue team. So, the emergency help team can immediately trace the location through the GPS module, after receiving the accident location information, action can be taken immediately. This accelerometer-based accident detection system is powered by ATMEGA 328 Microcontroller it consists of display, Accelerometer Sensor, GSM module and alarm. This automatic ambulance rescue system project is useful in detecting the accident. So, basically this project is divided into both hardware and software part.

HARDWARE PART

In the hardware part of our project we use different components such as:

- Power Supply
- Rectifier
- Regulator
- LCD
- GPRS module
- Atmega Microcontroller
- GPS Module
- DC MOTOR
- BUZZER
- MEMS , ADXL335
- Capacitors
- Diodes

1. **Power supply** : A **power supply** is an electrical device that supplies electric power to an electrical load. The primary function of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load. As a result, power supplies are sometimes referred to as electric power converters. Some power supplies are separate standalone pieces of equipment, while others are built into the load appliances that they power. Examples of the latter include power supplies found in desktop computers and consumer electronics devices. Other

functions that power supplies may perform include limiting the current drawn by the load to safe levels, shutting off the current in the event of an electrical fault, power conditioning to prevent electronic noise or voltage surges on the input from reaching the load, power-factor correction, and storing energy so it can continue to power the load in the event of a temporary interruption in the source power (uninterruptible power supply). All power supplies have a *power input* connection, which receives energy in the form of electric current from a source, and one or more *power output* connections that deliver current to the load. The source power may come from the electric power grid, such as an electrical outlet, energy storage devices such as batteries or fuel cells, generators or alternators, solar power converters, or another power supply. The input and output are usually hardwired circuit connections, though some power supplies employ wireless energy transfer to power their loads without wired connections. Some power supplies have other types of inputs and outputs as well, for functions such as external monitoring and control.



2. **Rectifier** : A rectifier is a device that converts an oscillating two-directional alternating current (AC) into a single-directional direct current (DC). **Rectifiers** can take a wide variety of physical forms, from vacuum tube diodes and crystal radio receivers to modern silicon-based designs. The simplest rectifiers, called half-wave rectifiers, work by eliminating one side of the AC, thereby only allowing one direction of current to pass through. Since half of the AC power input goes unused, half-wave rectifiers produce a very inefficient conversion. A more efficient conversion alternative is a full-wave rectifier, which uses both sides of the AC waveform. For information on how half-wave and full-wave rectifiers operate



3. **Regulator** : A **voltage regulator** is a system designed to automatically maintain a constant voltage. A voltage

regulator may use a simple feed-forward design or may include negative feedback. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages. Electronic voltage regulators are found in devices such as computer power supplies where they stabilize the DC voltages used by the processor and other elements. In automobile alternators and central power station generator plants, voltage regulators control the output of the plant. In an electric power distribution system, voltage regulators may be installed at a substation or along distribution lines so that all customers receive steady voltage independent of how much power is drawn from the line.



4. **LCD:** We use a 16x2 LCD display screen with I2C interface. It is able to display 16x2 characters on 2 lines, white characters on blue background. Usually, Arduino LCD display projects will run out of pin resources easily,

especially with Arduino Uno. And it is also very complicated with the wire soldering and connection. This I2C 16x2 Arduino LCD Screen is using an I2C communication interface. It means it only needs 4 pins for the LCD display: VCC, GND, SDA, SCL. It will save at least 4 digital/analog pins on Arduino. All connectors are standard XH2.54 (Breadboard type). You can connect with the jumper wire directly. To avoid the confliction of I2C address with other I2C devices, such ultrasonic sensor, IMU, accelerometers, and gyroscope, the I2C address of the module is configurable from 0x20-0x27. And its contrast can be adjusted manually. Another alternative option is I2C 20x4 Arduino LCD Display Module if more characters are required.



5. **GPRS Module** : GSM GPRS Modules are one of the commonly used communication modules in embedded systems. A GSM GPRS Module is used to enable

communication between a microcontroller (or a microprocessor) and the GSM / GPRS Network. Here, GSM stands for Global System for Mobile Communication and GPRS stands for General Packet Radio Service. A GSM GPRS MODEM comprises of a GSM GPRS Module along with some other components like communication interface (like Serial Communication – RS-232), power supply and some indicators. With the help of this communication interface, we can connect the GSM GPRS Module on the GSM GPRS MODEM with an external computer (or a microcontroller). GSM / GPRS Modules allow microcontrollers to have a wireless communication with other devices and instruments. Such wireless connectivity of microcontroller opens up to wide range of applications like Home Automation, Home Security Systems, Disaster Management, Medical Assistance, Vehicle Tracking, Online Banking, E – Commerce etc. to name some.



6. **ATmega Microcontroller** : The **ATmega328** is a single-chip microcontroller created by Atmel in the megaAVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8-bit RISC processor core. The Atmel 8-bit AVR RISC-based microcontroller combines 32 KB ISP flash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz. Arduino ATMEGA-328 microcontroller has been programmed for various applications. By using the power jack cable, arduino microcontroller has been programmed so that the execution of the program may takes place. Various kinds of arduino board are present in the market. In this paper, Arduino UNO ATMEGA-328 microcontroller is described in a detailed manner. Arduino software is installed in the computer and so that we can edit and upload the program according to the applications. Mainly these arduino software supports c and c++ programming languages. Various inputs and

outputs are present in the arduino board and therefore simultaneously 8 input and output ports can be used for various applications. Some of the applications used by using arduino boards are rotating general motor, stepper motor, control valve open, etc.,



7. **GPS Module:** One of the global positioning system (GPS) devices utilizes data from satellites to locate a specific point on the Earth in a process named trilateration. Meanwhile, a GPS receiver measures the distances to satellites using radio signals to trilaterate. And trilateration is similar to triangulation, which measures angles, depicted in this illustration (Tim Gunther, 2020). GPS modules contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies. From there, it'll receive timestamp from each visible satellites, along with other pieces of data. If the module's antenna can spot 4 or more satellites, it's able to accurately calculate its position and time. The four well-known Global Navigation Satellite System include

GPS, BDS(Beidou), GLONASS and GALILEO four satellite navigation systems. The earliest appeared in the United States is GPS (Global Positioning System), which is the most complete technology at this stage. BDS, GLONASS and GALILEO have become the other largest satellite navigation systems in the world and are currently in the process of modernization.



8. **DC Motor:** A **DC motor** is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor. DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in

its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.



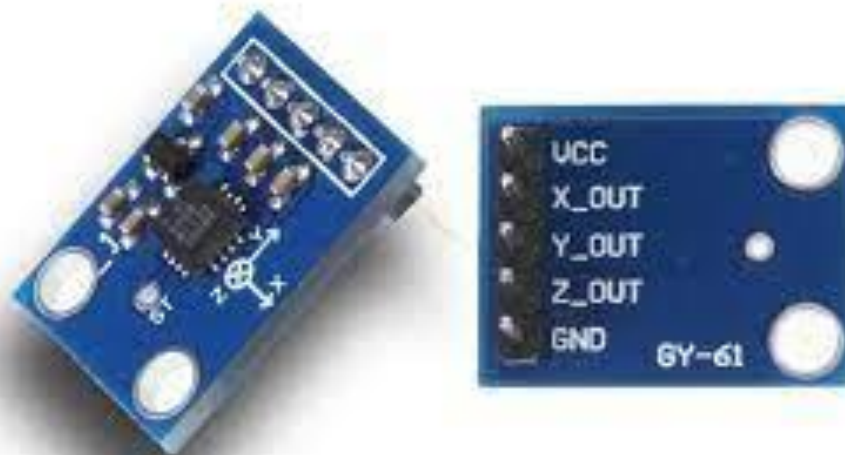
9. **Buzzer:** A **buzzer** is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on [breadboard](#), Perf Board and even on PCBs which makes this a widely used component in most electronic applications. There are two types are buzzers that are commonly available. The one shown here is a simple buzzer which when powered will make a Continuous Beeeeeeppp.... sound, the other type is called a readymade buzzer which will look bulkier than this and will produce a Beep. Beep. Beep. Sound due to the

internal oscillating circuit present inside it. But, the one shown here is most widely used because it can be customised with help of other circuits to fit easily in our application. This buzzer can be used by simply powering it using a DC power supply ranging from 4V to 9V. A simple 9V battery can also be used, but it is recommended to use a regulated +5V or +6V DC supply. The buzzer is normally associated with a switching circuit to turn ON or turn OFF the buzzer at required time and require interval.



10. **MEMS ADXL335:** MEMS stands for micro electro mechanical system and applies to any sensor manufactured using microelectronic fabrication techniques. These techniques create mechanical sensing structures of microscopic size, typically on silicon. When coupled with microelectronic circuits, MEMS sensors can be used to measure physical parameters such as acceleration. Unlike ICP[®] sensors, MEMS sensors measure frequencies down to 0 Hz (static or DC acceleration). PCB[®] manufactures two types of MEMS accelerometers: variable capacitive and piezoresistive.

Variable capacitive (VC) MEMS accelerometers are lower range, high sensitivity devices used for structural monitoring and constant acceleration measurements. Piezoresistive (PR) MEMS accelerometers are higher range, low sensitivity devices used in shock and blast applications.



ElectronicWings.com

11. **Capacitor:** A **capacitor** is a device that stores electrical energy in an electric field. It is a passive electronic component with two terminals. The effect of a capacitor is known as capacitance. While some capacitance exists between any two electrical conductors in proximity in a circuit, a capacitor is a component designed to add capacitance to a circuit. The capacitor was originally known as a **condenser** or **condensator**.^[1] This name and its cognates are still widely used in many languages, but rarely in English, one notable exception being condenser microphones, also called capacitor microphones. The

physical form and construction of practical capacitors vary widely and many types of capacitor are in common use. Most capacitors contain at least two electrical conductors often in the form of metallic plates or surfaces separated by a dielectric medium. A conductor may be a foil, thin film, sintered bead of metal, or an electrolyte. The nonconducting dielectric acts to increase the capacitor's charge capacity. Materials commonly used as dielectrics include glass, ceramic, plastic film, paper, mica, air, and oxide layers. Capacitors are widely used as parts of electrical circuits in many common electrical devices. Unlike a resistor, an ideal capacitor does not dissipate energy, although real-life capacitors do dissipate a small amount (see Non-ideal behavior). When an electric potential (a voltage) is applied across the terminals of a capacitor, for example when a capacitor is connected across a battery, an electric field develops across the dielectric, causing a net positive charge to collect on one plate and net negative charge to collect on the other plate. No current actually flows through the dielectric. However, there is a flow of charge through the source circuit. If the condition is maintained sufficiently long, the current through the source circuit ceases. If a time-varying voltage is applied across the leads of the capacitor, the source experiences an ongoing current due to the charging and discharging cycles of the capacitor.



12. **Diode:** A **diode** is a semiconductor device that essentially acts as a one-way switch for current. It allows current to flow easily in one direction, but severely restricts current from flowing in the opposite direction. Diodes are also known as **rectifiers** because they change alternating current (ac) into pulsating direct current (dc). Diodes are rated according to their type, voltage, and current capacity. Diodes have polarity, determined by an **anode** (positive lead) and **cathode** (negative lead). Most diodes allow current to flow only when positive voltage is applied to the anode. Diodes are available in various configurations. From left: metal case, stud mount, plastic case with band, plastic case with chamfer, glass case. When a diode allows current flow, it is **forward-biased**. When a diode is **reverse-biased**, it acts as an insulator and does not permit current to flow.



SOFTWARE PART


In software part of this project we use various technologies such as:

- Arduino compiler
- Programming Language: C
- GOOGLE MAP
- Orcad Software
- Embedded C
- Web Technology
- Serial Communication

1. **Aurduino compiler:** The **Arduino Integrated Development Environment (IDE)** is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards. The source code for the IDE is released under the GNU General Public License, version 2.
2. The **Arduino IDE** supports the languages C and C++ using special rules of code structuring. The **Arduino IDE** supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub *main()* into an executable cyclic executive program with the GNU toolchain, also included

with the IDE distribution. The Arduino IDE employs the program *avrdude* to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware. By default, *avrdude* is used as the uploading tool to flash the user code onto official Arduino boards. Arduino IDE is a derivative of the Processing IDE, however as of version 2.0, the Processing IDE will be replaced with the Visual Studio Code-based Eclipse Theia IDE framework. With the rising popularity of Arduino as a software platform, other vendors started to implement custom open source compilers and tools (cores) that can build and upload sketches to other microcontrollers that are not supported by Arduino's official line of microcontrollers.

```
1  ' Calculate and display the first 16 Fibonacci numbers
2  '
3  ' calculate the next
4  FUNCTION NEXT_FIB(F0, F1)
5  '   RETURN F0+F1
6  END FUNCTION
7  '
8  MAIN:
9  FIB0 = 0
10 FIB1 = 1
11
12 PRINT FIB0
13 PRINT FIB1
14 '
15 FOR I=3 TO 16
16     FIBNEW = NEXT_FIB( FIB0, FIB1 )
17     FIB0 = FIB1
18     FIB1 = FIBNEW
19     PRINT FIBNEW
20 NEXT I
21 END
```

The Arduino logo is displayed on the right side of the code editor. It features a teal infinity symbol with a minus sign in the left loop and a plus sign in the right loop. Below the symbol, the word "ARDUINO" is written in a bold, teal, sans-serif font.

2. Programming Language: C : C is a general-purpose, procedural computer programming language supporting structured programming, lexical variable scope, and recursion, with a static type system. By design, C provides constructs that map efficiently to typical machine instructions. It has found lasting use in applications previously coded in assembly language. Such applications include operating systems and various application software for computer architectures that range from supercomputers to PLCs and embedded systems. A successor to the programming language *B*, C was originally developed at Bell Labs by Dennis Ritchie between 1972 and 1973 to construct utilities running on Unix. It was applied to re-implementing the kernel of the Unix operating system. During the 1980s, C gradually gained popularity. It has become one of the most widely used programming languages, with C compilers from various vendors available for the majority of existing computer architectures and operating systems. C has been standardized by the ANSI since 1989 (ANSI C) and by the International Organization for Standardization (ISO). C is an imperative procedural language. It was designed to be compiled to provide low-level access to memory and language constructs that map efficiently to machine instructions, all with minimal runtime support. Despite its low-level capabilities, the language was designed to encourage cross-platform programming. A standards-compliant C program written with portability in mind can

be compiled for a wide variety of computer platforms and operating systems with few changes to its source code. As of January 2021, C was ranked first in the TIOBE index, a measure of the popularity of programming languages, moving up from the no. 2 spot the previous year.



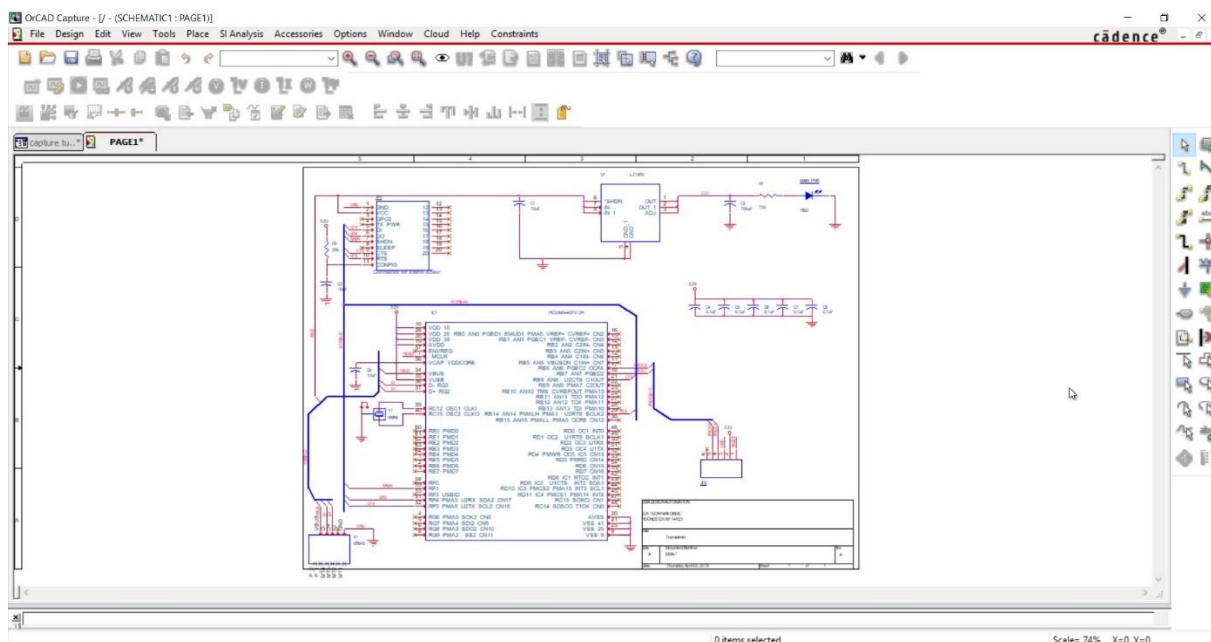
3. **Google Map** : **Google Maps** is a web mapping platform and consumer application offered by Google. It offers satellite imagery, aerial photography, street maps, 360° interactive panoramic views of streets (Street View), real-time traffic conditions, and route planning for traveling by foot, car, air (in beta) and public transportation. In 2020, Google Maps was being used by over 1 billion people every month around the world. Google Maps began as a C++ desktop program developed by brothers Lars and Jens Rasmussen at Where 2 Technologies. In October 2004, the company was acquired by Google, which converted it into a web application. After additional acquisitions of a geospatial data visualization company and a real time traffic analyzer, Google Maps was launched in February 2005.^[2] The service's front end utilizes JavaScript, XML,

and Ajax. Google Maps offers an API that allows maps to be embedded on third-party websites,^[3] and offers a locator for businesses and other organizations in numerous countries around the world. Google Map Maker allowed users to collaboratively expand and update the service's mapping worldwide but was discontinued from March 2017. However, crowdsourced contributions to Google Maps were not discontinued as the company announced those features would be transferred to the Google Local Guides program. Google Maps' satellite view is a "top-down" or bird's-eye view; most of the high-resolution imagery of cities is aerial photography taken from aircraft flying at 800 to 1,500 feet (240 to 460 m), while most other imagery is from satellites. Much of the available satellite imagery is no more than three years old and is updated on a regular basis. Google Maps previously used a variant of the Mercator projection, and therefore could not accurately show areas around the poles. In August 2018, the desktop version of Google Maps was updated to show a 3D globe. It is still possible to switch back to the 2D map in the settings. Google Maps for Android and iOS devices was released in September 2008 and features GPS turn-by-turn navigation along with dedicated parking assistance features. In August 2013, it was determined to be the world's most popular smartphone app, with over 54% of global smartphone owners using it. In May 2017, the app has reported to have 2 billion users on Android, along with

several other Google services including YouTube, Chrome, Gmail, Search, and Google Play.



4. **Orcad Software: OrCAD Systems Corporation** was a software company that made **OrCAD**, a proprietary software tool suite used primarily for electronic design automation (EDA). The software is used mainly by electronic design engineers and electronic technicians to create electronic schematics, perform mixed-signal simulation and electronic prints for manufacturing printed circuit boards. OrCAD was taken over by Cadence Design Systems in 1999 and was integrated with Cadence Allegro since 2005. The name OrCAD is a portmanteau, reflecting the company and its software's origins: *Oregon* + *CAD*



5. Embedded C : **Embedded C** is a set of language extensions for the C programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embedded systems. Embedded C programming typically requires nonstandard extensions to the C language in order to support enhanced microprocessor features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. In 2008, the C Standards Committee extended the C language to address such capabilities by providing a common standard for all implementations to adhere to. It includes a number of features not available in normal C, such as fixed-point arithmetic, named address spaces and basic I/O hardware addressing. Embedded C uses most of the syntax and semantics of standard C, e.g., `main()` function, variable definition, datatype declaration, conditional

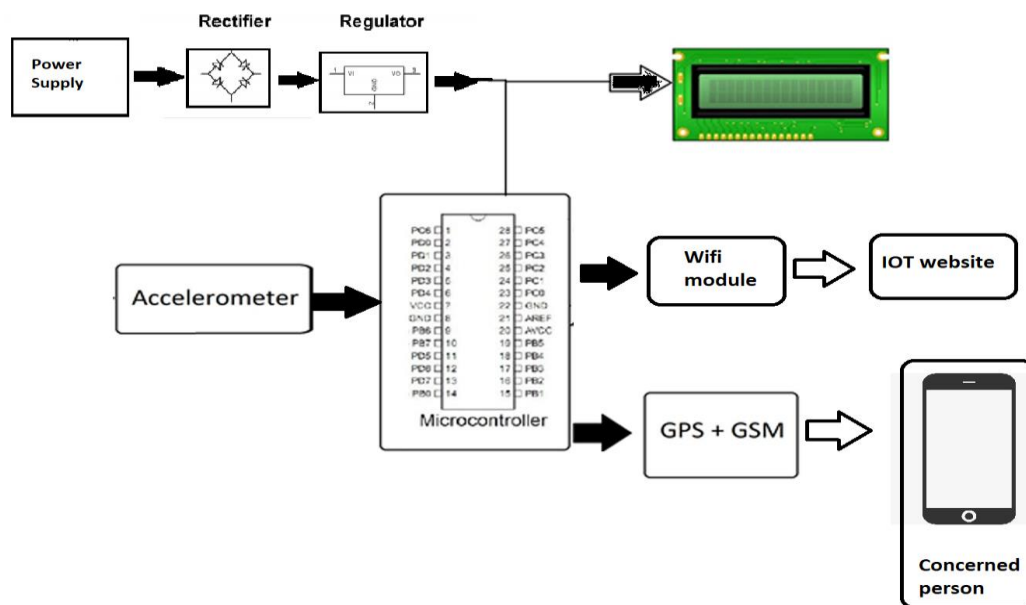
statements (if, switch case), loops (while, for), functions, arrays and strings, structures and union, bit operations, macros, etc. A Technical Report was published in 2004 and a second revision in 2006.

6. **Web Technology** : The methods by which computers communicate with each other through the use of markup languages and multimedia packages is known as **web technology**. In the past few decades, web technology has undergone a dramatic transition, from a few marked up web pages to the ability to do very specific work on a network without interruption. It is the **web** server's job to give the **web** browser the relevant HTML, CSS and JavaScript code that it needs in order to display an interactive **web** page. ... It is the **web** browsers job to interpret these languages in order to display a **web** page properly. The web, in this case, refers to the World Wide Web, more commonly known as WWW. It first came into being in 1989 when famous scientist and engineer, Tim Berners-Lee, came up with an efficient mechanism to share resources between scientists all over the world.



7. Serial Communication : In telecommunication and data transmission, serial communication is the process of sending data one bit at a time, sequentially, over a communication channel or computer bus. This is in contrast to parallel communication, where several bits are sent as a whole, on a link with several parallel channels. Serial communication is used for all long-haul communication and most computer networks, where the cost of cable and synchronization difficulties make parallel communication impractical. Serial computer buses are becoming more common even at shorter distances, as improved signal integrity and transmission speeds in newer serial technologies have begun to outweigh the parallel bus's advantage of simplicity (no need for serializer and deserializer, or SerDes) and to outstrip its disadvantages (clock skew, interconnect density). The migration from PCI to PCI Express is an example.

BLOCK DIAGRAM



Application of the project

- Used as tracking system .
- Used for traffic control.
- Used for Ambulance to reach at remote areas.

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