ACCIDENT IDENTIFICATION WITH AUTOMATIC AMBULANCE RESCUE SYSTEM

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ABSTRACT

Nowadays, road accidents are very high. On time medical aid can help in saving lives. Integrated engineering is a latest trend to solve problems. To be able to design a product using an integrated technology will be beneficial to any engineering problems and a huge contribution to the community. An important indicator of survival rates after an accident is the time between the accident and when emergency

medical personnel are dispatched to the accident location.

By eliminating the time between when an accident occurs and when the first responders are dispatched to the scene decreases mortality rate and can save lives. One approach to eliminating the delay between accident occurrence and first responder dispatch is to use in vehicle automatic accident detection and notification systems. Also tracking a vehicle in case of any theft has become a tough job. This system aims to alert the near and dear ones of the person in the vehicle about the accident to provide immediate medical aid.

In this System when a vehicle meets with an accident immediately Impact sensor, Piezoelectric Sensor Transducer, Micro electro mechanical system (mems) will detect the signal and sends it to Arduino (Atmega328P). Immediately microcontroller sends the signal to GPS module to give the exact value of the geographical coordinates which contains the value of longitude, latitude and altitude. After that the microcontroller sends the alert message through the GSM module to the near and dear ones.

Also, in case of any theft our project facilitates the owner to get his vehicle's position in terms of Latitude and Longitude and a link directing to the google maps when the owner sends a SMS to the SIM used in the system. the rapid growth of population vehicles has become an absolute necessity of our daily life. Increasing vehicles causes lots of accidents and loss of life due to late information reaching to the rescue team and arrival of an ambulance.

Vibration sensor, Global System for Mobile (GSM) and Global Positioning System (GPS) are used in this system. After taking places of an accident, the system delivers a short message to a nearby rescue team and police station via GSM module. The message includes the longitude and latitude values of the location. A rescue team can instantly trace the location of the vehicle tapping geographical coordinates in Google earth or any other GPS viewer application to help wounded people.

The time between the occurrence of accident and the emergency medical facility provided to the accident location is the important factor in the survival rates after the accident. By reducing the time between the accident and medical facility provided to the scene decreases mortality rates so that more lives can be saved. This gives alert if the accident occurred and immediately notify to the emergency responders. To identify the Accident, happen to Vehicle we use MEMS sensor and vibration Sensors. Also due to the delay in reaching of the ambulance to the accident location and the traffic congestion in between accident location and hospital increases the chances of the death of victim.

There is a need of introducing a system to reduce the loss of life due to accidents and the time taken by the ambulance to reach the hospital. To overcome the drawback of existing system we will implement the new system in which there is an automatic detection of accident through sensors provided in the vehicle. A patient monitoring system in the ambulance will send the vital parameters of the patient to the concerned hospital. This system is fully automated, thus it finds the accident spot and helping to reach the hospital in time.

1. INTRODUCTION

1.1 Embedded System

Embedded means something that is attached to another thing. An embedded system can be thought of as a computer hardware system having software embedded in it. An embedded system can be an independent system, or it can be a part of a large system. An embedded system is a microcontroller or microprocessor-based system which is designed to perform a specific task. For example, a fire alarm is an embedded system; it will sense only smoke.

An embedded system has three components.

- It has hardware.

- It has application software.
- It has Real Time Operating system (RTOS) that supervises the application software and provide mechanism to let the processor run a process as per scheduling by following a plan to control the latencies. RTOS defines the way the system works. It sets the rules during the execution of application program. A small-scale embedded system may not have RTOS.

Characteristics of an Embedded System

- **Single-functioned** − An embedded system usually performs a specialized operation and does the same repeatedly. For example: A pager always functions as a pager.
- **Tightly constrained** − All computing systems have constraints on design metrics, but those on an embedded system can be especially tight. Design metrics is a measure of an implementation's features such as its cost, size, power, and performance. It must be of a size to fit on a single chip, must perform fast enough to process data in real time and consume minimum power to extend battery life.
- **Reactive and Real time** − Many embedded systems must continually react to changes in the system's environment and must compute certain results in real time without any delay. Consider an example of a car cruise controller; it continually monitors and reacts to speed and brake sensors. It must compute acceleration or de-accelerations repeatedly within a limited time; a delayed computation can result in failure to control of the car.
- **Microprocessors based** − It must be microprocessor or microcontroller based.
- **Memory** − It must have a memory, as its software usually embeds in ROM. It does not need any secondary memories in the computer.
- **Connected** − It must have connected peripherals to connect input and output devices.
- **HW-SW systems** − Software is used for more features and flexibility. Hardware is used for performance and security.

Applications of Embedded Systems:

Embedded systems have a vast variety of application domains that varies from low cost to high, consumer electronics to industrial equipment's, entertainment devices to academic equipment's and medical instruments to weapons and aerospace control systems. The applications of embedded systems include home appliances, office automation, security, telecommunication, instrumentation, entertainment, aerospace, banking and finance, automobiles personal and in different embedded systems projects.

1. Embedded System for Detecting Rash Driving on Highways:
The main intention of this project is to design a highway speed-checker device that identifies rash driving on highways and alarms the traffic authorities if the speed checker finds any vehicle violating the set speed limits on highways.

2. Application of Embedded System for Street Light Control:
The main intention of this project is to detect the movement of vehicles on highways and to switch on streetlights ahead of it, and then to switch off the streetlights as the vehicle go past the street lights to conserve energy. Embedded System for Street Light Control by Edge Kits

3. Embedded System for Traffic Signal Control System:
The main goal of this project is to design a density-based traffic signal system. At every junction, the signal timing changes automatically according to the traffic density at every junction. Traffic jam is a major problem in many cities across the world and gives regular nightmares to the commuters and travelers.

4. Application of Embedded System for Vehicle Tracking:
The main purpose of this project is to find the exact location of a vehicle by using a GPS modem and in order to reduce vehicle thefts. The GSM modem sends an SMS to a predefined mobile which stores the data in it. An LCD display is used to display the location

information in terms of latitude and longitude values. The 5. Embedded System for Auto Intensity Control

5. Application of Embedded System for Home Automation System:

The main purpose of this project is to design a home automation system with the Android application based remote control. Remote operation is performed by Android OS based smartphone or Tablet etc., upon a Graphical User Interface based touch screen operation. In order to achieve this, Android application act as a transmitter, that sends on/off commands to the receiver wherein loads are connected.

- Embedded System for Home Automation System by Edge Kits

6. Embedded System for Industrial Temperature Control:

The main intention of this industrial temperature controller project is to control the temperature of any device in any industrial application according to its necessity. An LCD display is used to display the temperature in the range of – 55°C to +125°C. The heart of the circuit is the microcontroller which is from 8051 families and controls all its functions.

7. Application of Embedded System for War Field Spying Robot:

The main goal of this project is to design a robotic vehicle using RF technology for remote operation and attached with wireless camera for monitoring purpose. The robot with camera can wirelessly transmit real-time video with night vision capabilities. This type of robot can be helpful for spying purposes in war fields. An 8051 series of microcontroller is used for the desired operation.

1.2 Introduction To Our System

Vehicle accidents are one of the most leading causes of fatality. The time between an accident occurrence and the emergency medical personnel are dispatched to the accident location is the important factor in the survival rates after an accident. By eliminating that time between an accident occurrence and the first responders

are dispatched to the scene decreases mortality rates so that we can save lives. One approach to eliminate that delay between accident occurrence and first responder dispatch is to use An Accident Alert and Vehicle Tracking System, which sense when a traffic accident is likely to occur and immediately notify emergency occurred. In this project, that system is described the main application of which is accident detection.

In this system initially the GPS continuously takes input data from the satellite and stores the latitude and longitude values. If we have to track the vehicle, we need to send a message to GSM device, by which it gets the activated. It also gets activated by detecting accident on the accelerometer connected to Arduino Uno. Once GSM gets activated it takes the last received latitude and longitude positions values from the buffer and sends a message to a phone number. This system uses the things i.e. Arduino, Accelerometer, GPS and GSM modules to detect traffic accidents. There is a SOS button(switch) present to trigger the buzzer if anyone needs help immediately or if the person is feeling sick. A Reset button(switch) is also provided in order to terminate the sending of a message in rare case where there is no casualty, this can save the precious time of the ambulance. The high demand of vehicles has also increased the traffic hazards and the road accidents.

An automatic alert system for vehicle accidents is introduced in this project. The proposed system which can detect accidents in significantly less time and sends the basic message information to first aid Centre within a few seconds covering the geographical coordinates, and also a link which directly opens in google maps. This alert message is sent to the central emergency dispatch server in a short time so that the emergency dispatch server will inform to the ambulances which are to that location, which will help in saving the valuable lives. This application provides the optimum

solution to poor emergency facilities provided to the road accidents in the most feasible way.

Traffic accidents are a major public issue worldwide nowadays. A huge number of injuries and death as a result of road traffic accident uncovers the story of the global crisis of road safety. According to a statistical projection of traffic fatalities, the most obvious reason of a person's death during accidents is the unavailability of the first aid provision, due to the delay in the information of the accident being reached to the ambulance or to the hospital. The following is the list of patents analyzed before designing the Accident Alert System. It helped us to understand the interfacing of various components used in the project, such as GSM and GPS modems, and also the practical implementation of such projects in real life. The analysis of these Research Papers helped to understand the current technologies prevalent in the field of accident notification system and to find better yet simpler alternatives to modernize notification systems. The following is the list of patents analyzed before designing the Accident Alert System. It helped us to understand the interfacing of various components used in the project, such as GSM and GPS modems, and also the practical implementation of such projects in real life.

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1.3 Study About Rescue System

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1.4 PROBLEM STATEMENT

A number of technological and sociological improvements have helped reduce traffic fatalities during the past decade, e.g., each 1% increase in seatbelt usage is estimated to save 136 lives.The road accidents lead to loss of human life and/or incapacitation. It was noted, with deep concern that most of these deaths occur as a result of late response by emergency services especially for accident occurring in remote areas or at night where there is no witness or a means of alerting the responsible authorities such as police, emergency services responders and or relatives. Moreover, each minute that an injured crash victim does not receive emergency medical care can make a large difference in their survival rate Analysis shows that reducing accident response time by one correlate to a six% difference in the number

of lives saved. This project seeks to reduce the time taken between accident time and notifying the emergency responders of the accident occurrence.

1.5 OBJECTIVES

This vehicle tracking system takes input from GPS and send it through the GSM module to desired mobile/laptop using mobile communication. Vehicle Tracking System is one of the biggest technological advancements to track the activities of the vehicle. The security system uses Global Positioning System GPS, to find the location of the monitored or tracked vehicle and then uses satellite or radio systems to send to send the coordinates and the location data to the monitoring Centre. At monitoring Centre various software's are used to plot the Vehicle on a map. In this way the Vehicle owners are able to track their vehicle on a Realtime basis. Due to real-time tracking facility, vehicle tracking systems are becoming increasingly popular among owners of expensive vehicles to detect the vehicle accident and transmit the location of the accident to the rescue team and police Centre, so will get the exact location by the geographical coordinates transmitted via message with the help of map.

2. LITERATURE SURVEY

During this project we have gone through different articles, journals and the papers related to flood monitoring and detection system. Different online resources (websites) can also be used to gain knowledge on related topic.

Carsten Maple, Fizzah Bhatti, Munam Ali Shah and Saif Ul Islam (2019) writes in their paper "A Novel Internet of Things-Enabled Accident Detection and Reporting System for Smart City Environments" that a customized android application designed and develop a low-cost solution for accident detection and instant rescue message to emergency services through mobile GSM network system and take longitude and latitude from GPS system of mobile.

Dr.C.Nalini and N.Swapna Raaga(2020) write in their paper "IOT based Vehicle Accident Detection & Rescue Information System" that an IoT based vehicle accident detection and rescue information system is developed in order to detect vehicle accident and send the location information of the accident place to vehicle owner, nearest hospital and police station via a web service. The communication between the web server and hardware device is established via GSM/GPRS shield, and the location is traced by using the GPS shield.

Abdul Kadar Muhammad Masum, Frahim Wadud Taj, S M Taslim Reza, Md. Kalim Amzad Chy, Iftekhar Mahbub (2018) write in their paper "Automatic Accident Detection and Human Rescue System Assistance through Communication Technologies" that A rescue team can instantly trace the location of the vehicle tapping geographical coordinates in Google earth or any other GPS viewer application to help wounded people. Most of the previous system comprised of multiple sensors for detecting accident which increased the cost of the project. But the proposed model includes only one vibration sensor; thus, it reduces the cost of multiple sensors and the complexity of interfacing.

Karanam Niranjan Kumar, C. H. Rama Narasimha Dattu, S. Vishnu and S. R. Jino Ramson (2020) write in their paper "Automatic Accident Rescue System Using IoT" that reaching of ambulance to the accident location is mostly delayed due to the congested traffic that increases the chance of victim death.

Bhandari Prachi, Dalvi Kasturi, Chopade Priyanka (2019) write in their Journal "Intelligent Accident-Detection and Ambulance- Rescue System" that a GPS and GSM module in the concerned vehicle willsend the location of the accident to the main server which will rush an ambulance from a nearest

hospital to the accident spot. Along with this there would be control of traffic light signals in the path of the ambulance using RF communication. This will minimize the time of ambulance to reach the hospital. A patient monitoring system in the ambulance will send the vital parameters of the patient to the concerned hospital.

Smith William, Anthony Sebastien (2018) write in their journal "International Journal of Research in Engineering Technology -– Volume 1 Issue 1" that concerned with the vehicle tracking system using the GPS module and which ensures that the position and location of the vehicle can be determined through the database in which this system is installed. Which helps in the increase in accuracy, systems scale and global reach will benefit everyone.

K. Ramamohan Reddy, M. Lavanya Latha, B. Mallikarjuna Reddy write in their journal "International Journal of Advance Research, Ideas and Innovations in Technology" volume 5, issue 2) (2019) This project is to overcome the drawback mentioned if any vehicle met with an accident immediately a vibration sensor in the pre-installed device kept in the vehicle gets activated and sends signals to Arduino microcontroller. The message signal will also be forwarded for the emergency rescue which overcome the immediate panic.

Pranmya Ratnaparkhi (2021) write in the journal "International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 08 Issue: 01". The use of ESP32 for the project which detects and analyses the obstacles and generates the alarming signals according to the distance of the object. The proposed system makes use of mobile GPS in order to get the location of a vehicle by uploading the parameters like coordinates to the cloud which can be easily accessed. The

proposed system is very light, compact and affordable

Wireless technologies are becoming more popular around the world and the consumers appreciate this wireless lifestyle which gives them relive of the well-known "cable chaos" .

3. EXISTING SYSTEM

Presently a lot of methodologies are available in vehicles that allow vehicle protection and tracking. Airbags are one of the most mandatory elements in vehicles. Front airbags have been standard on all new cars since 1998 and light trucks since 1999 Seat belts are also available in four wheelers. tire-pressure monitoring system (TPMS) is an electronicsystem designed to monitor the air pressure inside the pneumatic tires on various types of vehicles.

TPMS report real time tire-pressure information to the driver of the vehicle, either via a gauge, a pictogram display, or a simple low pressure warning light. An anti-lock braking system or anti-skid braking system (ABS) is an automobile safety system that allows the wheels on a motor vehicle to maintain tractive contact with the road surface according to driver inputs while braking, preventing the wheels from locking up (ceasing rotation) and avoiding uncontrolled skidding. Traction control and electronic stability control go hand in hand and is designed to designed to prevent loss of traction of driven road wheels The latest implemented techniques move along the lines of providing help to the driver even if he is trapped in a remote location unable to respond. An emergency is a deviation from planned or expected behavior or a course of event that endangers or adversely affects people, property, or the environment.

This project reports a complete research work in accident (automobile) emergency alert situation. The authors were able to programme a GPS / GSM module incorporating a crash detector to report automatically via the GSM

communication platform (using SMS messaging) to the nearest agencies such as police posts, hospitals, fire services etc. Giving the exact position of the point where the crash had occurred. This will allow early response and rescue of accident victims; saving lives and properties. A paper reports its experimental results, gives appropriate conclusions and recommendations. When an auto crash occurs suddenly, the reaction of the emergency services now becomes a race between life and death. Today, wireless innovation has tilted the odds in favor of success like never before. Before, the people in the emergency services had little more to rely upon than raw courage.

Now the world of wireless has inspired an entirely new way of managing and minimizing the death rate due to auto crash. The scene of a fatal accident is always at heater where man and technology face the ultimate test. Whether the emergency is fire, earthquake or flood, relief or needed medical attention in this case, the stakes are always high. Indeed, wireless communications has become extremely important in emergency response.

Accident Alert System (AAS) is quite a novel research area, on the15th of January 2017, the European Commission (EC) proposed an auto crash alert system called the ecall. The ecall system is intended to automatically initiate an emergency call to112 from the vehicle and transmits satellite positioning data to the operator in case of a road accident. It has been estimated by a new research report from the analyst firm; There are variants of location-based systems with various advantages and disadvantages. E-OTD uusesmobile signal from base-station to call special chip and then to fixed location known to operators.

This is triangulated among three points, it has an accuracy of 5 to 50 m but it involves high network investment cost for the operator and also requires new handset. GPS method uses satellite sent positioning signal to handsets equipped with GPS chip, which calculates it's own location to approximately 1-10m. It has a

high accuracy but could be used only outdoor. It uses the GPS coupled with geo-referenced GIS (Geographical Information System) maps to communicate real- time information to the control station. A handset provided allows the driver to speak to the control station anytime and send an alert in case of emergency through the hotline buttons provided on it.

Use of modern networking technology to provide a cost-effective solution was emphasized by he argued technological advancements would help with better identification of the vehicle location at all times, data transfer facilitation, and application of automated monitoring.

4. PROPOSED SYSTEM

4.1 Block diagram
The general block diagram of the overall system is shown below. The system consists of a power supply, LCD Display, Vibration Sensor, GSM Module, The Arduino controller acts as I/F between Vibration Sensor and GSM module if alert happen then sends a message to the nearest location and LCD display Blinks and intimate to the user.
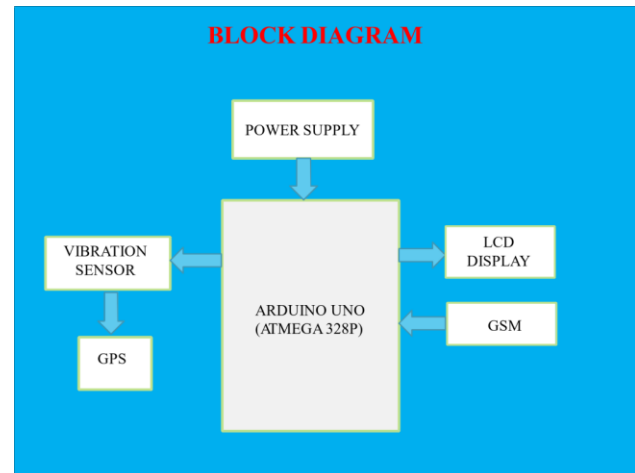

Fig 4.1 System Block diagram

4.2. METHODOLOGY
The proposed design achieved a turnaround response, which is faster than conventional rescue system without these features. Hence, saving more lives as possible through

technology. Vehicle accidents are one of the most leading causes of fatality. The time between an accident occurrence and the emergency medical personnel are dispatched to the accident location is the important factor in the survival rates after an accident. By eliminating that time between an accident occurrence and the first responders are dispatched to the scene decreases mortality rates so that we can save lives. One approach to eliminate that delay between accident occurrence and first responder dispatch is to use An Accident Alert and Vehicle Tracking System, which sense when a traffic accident is likely to occur and immediately notify emergency occurred In this project, that system is described the main application of which is accident detection. In this system initially the GPS continuously takes input data from the satellite and stores the latitude and longitude values. If we have to track the vehicle, we need to send a message to GSM device, by which it gets the activated. It also gets activated by detecting accident on the accelerometer connected to Arduino Uno.

system, for establishing communication between vehicle and response units.

When the accident occurs SMS containing location will be send immediately to the emergency contacts using GSM and GPS modules.
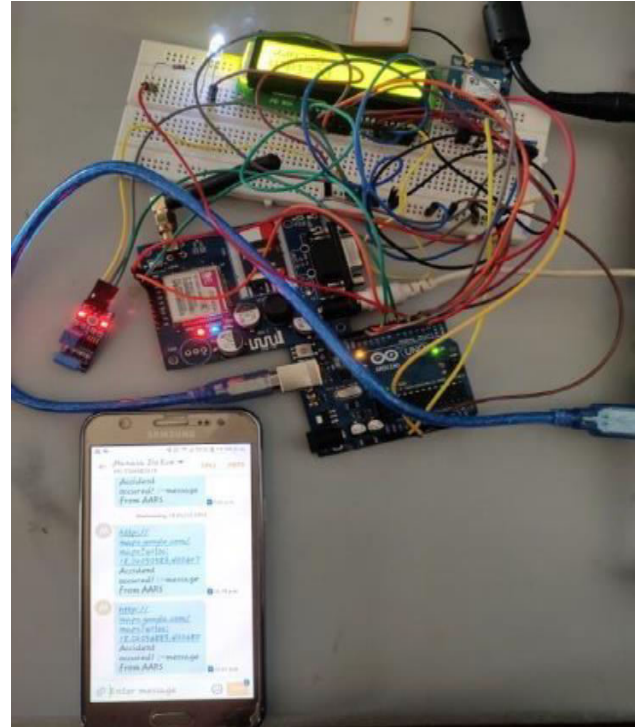

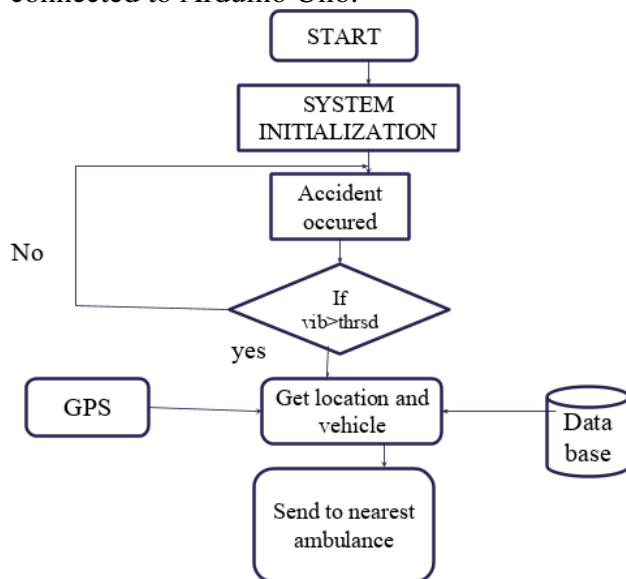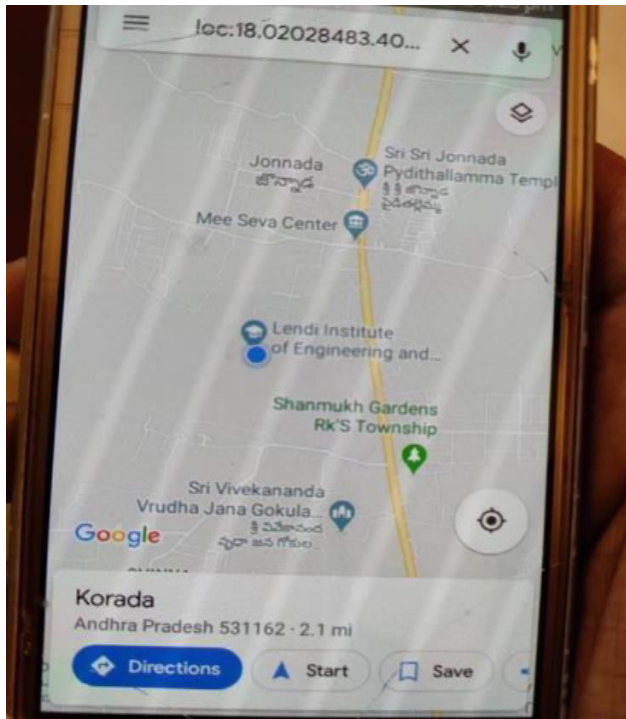**Fig 5.1: Accident alert message**

Fig 4.2: Flowchart

5. RESULTS

Thus, we have fostered the vehicle unit and successfully coordinated with the central

Fig 5.2 Accident location through GPS

6. CONCLUSION

This project designed and implemented a for sending immediate information to the response units after the occurrence of the accident. This can be implemented in countries with large population can produce better results. Accident can be detected with the help of vibrator sensors connected to the central system. This may help the save the life of the victim.

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