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An Approach to Make Way for Intelligent Ambulance Using IoT

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Abstract: **The use of embedded technology has been implemented in traffic light control, as per the traffic light control whenever ambulance reached to traffic road, it has to wait for the clearance of traffic, for clearing traffic it takes a several minutes. If the case patient will not get treatment in proper time to reduce this hazard, By making use of IoT scenario, It is possible to clear the traffic by sending message to the signal board hence ambulance can reach hospital without delay in time and without wasting time for the clearance of traffic load, By making use of Embedded and IoT we can develop a model to clear the traffic while ambulance coming in the path**

Keywords: **Internet of Things (IoT), Intelligent Ambulance, Traffic control management, Global positioning system (GPS).**

1. INTRODUCTION

Traffic management on the road has become a biggest severe problem of today's society. There are so many examples that ambulance got strucked in the traffic load, Ambulance has to wait for some minutes to hours to clear the traffic load. Patient may die because of lack of treatment at proper time. To overcome this hazard and to save many lives, [1] A new model proposed in this paper which provides the functionality of one path clearance i.e. the ambulance going path will be cleared. This scenario is done by upgrading technology called Internet of Things, IoT means that the components are connected to the internet and those components can be controlled via internet from being in other place. This IoT has significance since the object that represents itself digitally makes itself something greater than the object by itself.

The things can be connected to other devices either through RFID(Radio Frequency Identification) or Bluetooth or sensor networks. There is an expectation that around 50 to 100 billion things will be connected to internet in next ten years and we are now experiencing paradigm shift where in which the objects we use everyday have become interconnected and smart. On a broader scale the IoT is applied to things for reducing waste and increase the efficiency of the things by reducing the energy usage. This scenario is operated by intelligent ambulance.

As shown in figure 1,The process is old one and presently in use. In traffic load everyone has to wait until they get green signal especially when ambulance has arrived it must wait to clear the vehicles on road ,this principal is based on vehicle detection, image processing vehicle detector method, So new technology i.e. combined technology of embedded system and IoT which can get the maximum benefits and saves many lives. The main aim is to resetting the timer[signal board] to green signal whenever ambulance has in path which got the traffic load and making the opposite signal board to red signal This process is controlled by the ambulance and IoT.That is ambulance driver will send the request to signal point by using GPS location and by using cloud user connecting to the cloud server by GSM technology when the request was sent to the signal board it automatically sends the received acknowledgement,[2,3] Hardware implantation requires ARM processor, Display board, GPS, GSM platform hubs and software includes algorithm for IoT cloud servers and accessing points.

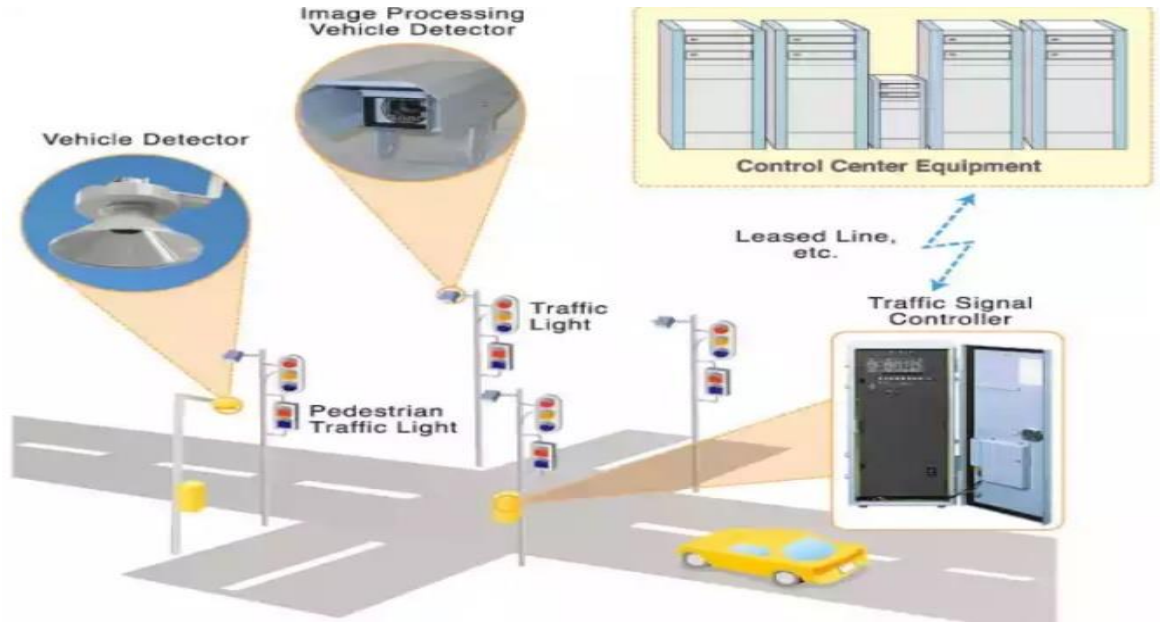

Figure 1: Pesently implemented traffic control scenario

2. PREVIOUS WORK

Traffic control system based LAN networking is applied in many countries for well-known purpose such as congestion prevention augmenting efficiency by improving the traffic security, [3,4] minimizing travelling times, and driving comfort, and reducing environmental hazards and damages.

A traffic lights control system using LAN technology which has the capability of mimicking human intelligence for controlling traffic lights. Its analysis, design, develop and deploy monitoring and information system jointly with the help of state of the art traffic equipment, to enable the safe and efficient and effective movement of traffic for all road users. Other technology is in use was implemented the first based on RFID networking. Its main goals are minimizing travel time, improving safety and public transport service. Such improvements are beneficial to health and the environment, Traffic control system by using RFID technique. Compose of different RFID tags and other hardware peripheral components. Tags control the condition of real time. It can change the set times automatically. Sensors are used in the driver circuit to know the traffic jams. The output can be demonstrated by LEDs. These are old techniques and also some of the technique are presently in use in different countries and goal is to counteract the traffic control management system.

3. BLOCK DIAGRAM

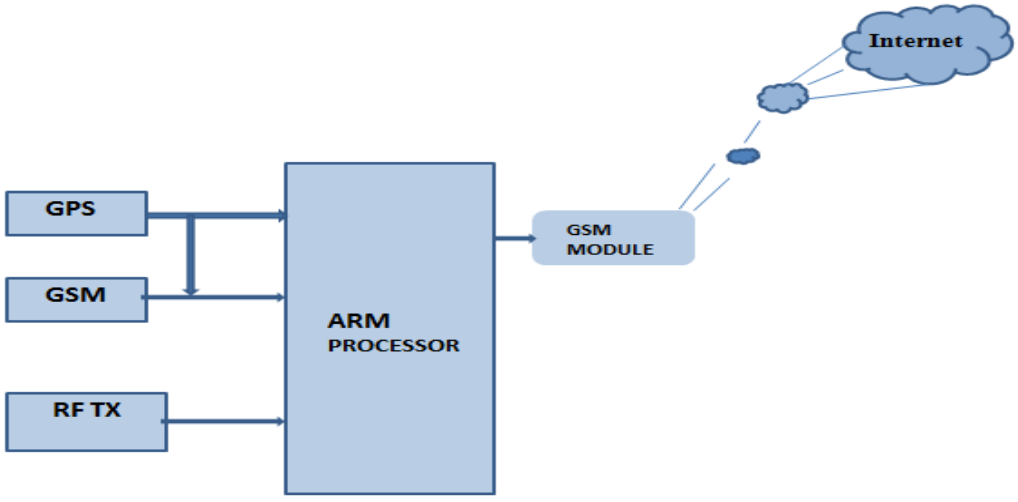

Figure 2: Block diagram of ambulance part

The above figure describes about the ambulance part which is placed within in the ambulance so ambulance driver can access this device through GPS driver traces the location and send the location updates to traffic control management and GPS I connected to the ARM processor and GSM module because to send the message to traffic management and also to get the acknowledgements from the receiver side and this communication should takes place with the high security and information is encrypted and this process is carried away by the internet of things and through IoT information can be sent without delaying the time. The figure 3 illustrates through IoT information is sent to signal logic gate by GSM module and by using Optocoupler circuit all the information is passed and control by PC and through PC controlling of Traffic [5,6] Control LED takes place as shown in figure3

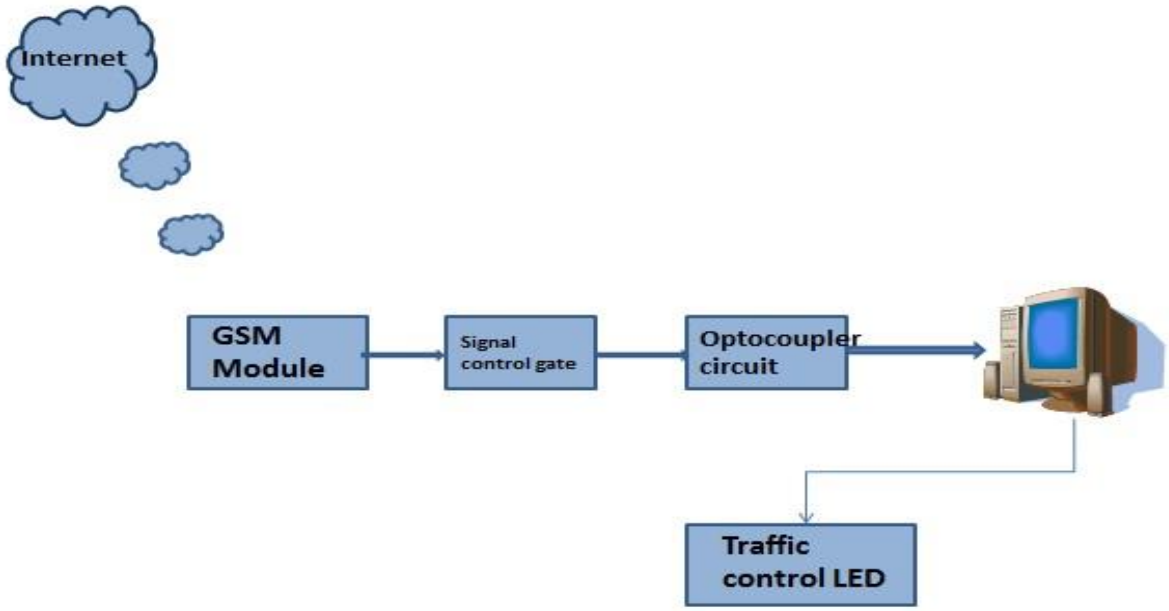

Figure 3: Block diagram of Traffic control management side

4. HARDWARE IMPLEMENTATIONS

GSM module:

The GSM is a cellular network which means that cell phones connect to it by searching for the cells in the vicinity. The coverage area varies according to cells the mobile phones uses. The horizontal radius of the cell varies depending upon the height of the antenna and, gain of antenna and preoperational conditions from few hundred meters to several kilometers. 35kilkometers is the longest recorded distance for which the GSM supports. The network operates in number of different frequencies varying from few 900MHz to 1800MHz which is typically known as 2G. The transmission power is limited to a maximum of 2Win GSM 850/900 and 1W in GSM 1800/1900.

GPS:

The satellite navigation system which is based on space and provides the information about the location and time irrespective of the condition of weather anywhere on or around the earth provided there is an unobstructed line of sight for at least four or more satellites. Typically the GPS provides the accurate location within few meters. The extraction of time information is also possible enabling the frequency and the timing to be maintained very accurately.

Optocouplers:

This is the circuit designed for the provision of complete electrical isolation between the input and the output sources. This provides protection to the output source from high voltage, surge voltage, low level noises that produce erroneous output. The input for this circuit may be the photo transistor, LDR, photo diode etc. As and when the output of input is biased forwardly, the light is emitted from the LED, this light which is transmitted turns the photo sensitive device on and thus producing the same output voltage.

RF Transmitter:

Radio transmitter and receivers are at the heart of the wireless communication. Radio stations, Television remotes, and even the door bells, radio transmitters and receivers have a variety. A small electronic device for transmitting or receiving radio signals between two or more devices. The wireless communications between two devices become a desirable characteristic when it comes to embedded systems. For this purpose we may use optical communication or RF communication. Of these two the RF is generally used because of its advantage of not requiring the line of sight. The RF modules make their usage in the fields of medium and low volume products like door openers, alarm systems, sensor applications etc. the compliance of the RF modules are defined for the communications using Zigbee, Bluetooth etc.

ARM Processor:

The ARM7 (LPC2129) is a general purpose 32-bit microprocessor, which offers very high performance and low power consumption. The ARM architecture is mainly based on Reduced Instruction Set Computer (RISC) principles, and the more instruction set and it has simple related decode mechanism than those of micro-programmed Complex Instruction Set Computers (CISC). The main aim of using ARM is it has more instructions set than any other processor this simplicity results in a high instruction throughput and efficient real-time interrupt response from a small and cost-effective processor core.

5. SECURITY REQUIREMENTS FOR IOT

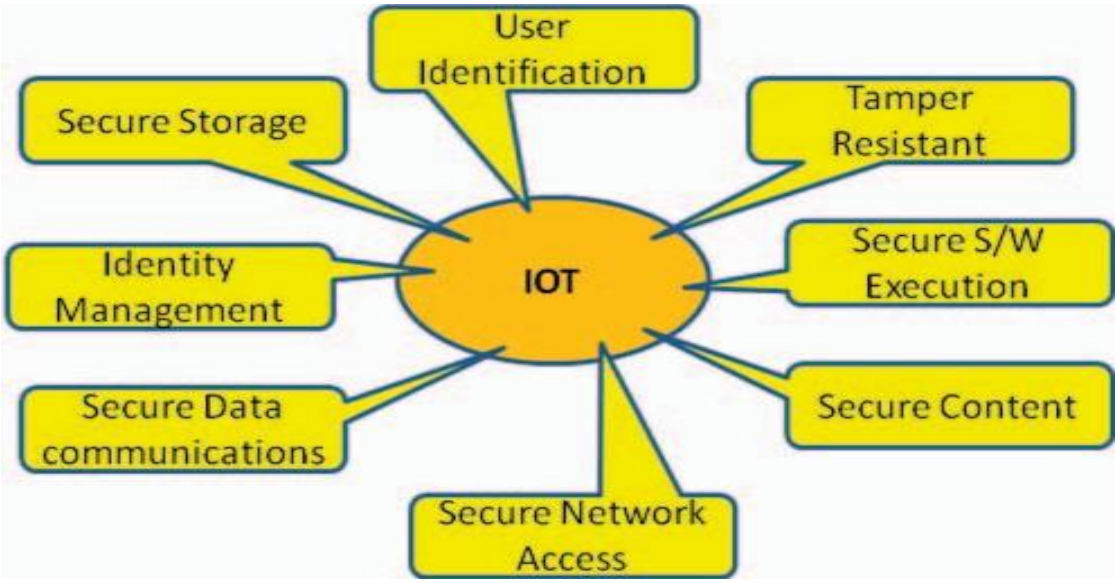

Figure 4: security concerns for IOT.

1. .**User identification**: It refers to the process of validating users before allowing them to use the system.
2. **Tamper resistance:** It refers to the desire to maintain these security requirements even when the device falls into the hands of malicious, and it can be logically solved.
3. **Secure execution environment:** It indicates a secure, encrypted-code, real and runtime environment platformed to protect against deviant applications.
4. **Secure content:** Content security or Digital Rights Management (DRM) protects the rights of the digital content used in the system.
5. **Secure network access:** This provides a network connection or service access only if the device is authorized.
6. **Secure data communication:** It includes authenticating communicating in peers, conveying confidentiality and integrating of communicated the important data, preventing repetition of a communication transactions, and protecting the uniquess of communicating entities.
7. **Identity Management:** It is broad administrative area that deals with identifying individuals or things in a system

and controlling their access to resources within that system by associating user rights and restrictions with the established identity.

8. **Secure storage:** It involves confidentiality and integrity of information stored in the system.

6. HARDWARE AND SOFTWARE SECURITY IMPLEMENTATION AND PERFORMANCE

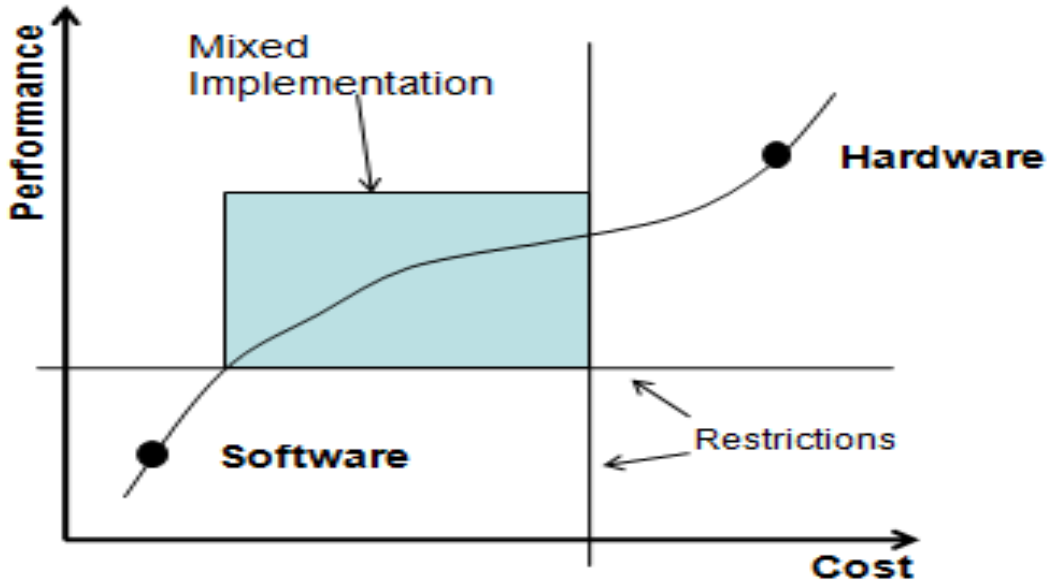

Figure 5: Implementation and performance analysis

For building the embedded security and framework for IoT, we need to look at all of the tradeoffs between performance, security and cost.[6,7] Confidentially, these three concepts are directly at odds with one and another. More performance means the cost increases up, lowering the cost means decreasing security and implementation, and performance higher security means performance will decrease.

An hardware and software based security architecture for IoT is proposed which should be the best trade off cost or efficiency or security/performance as shown in figure 5

A cost effective designs use a mixture of hardware and software to accomplish overall security and performance goals. This provides motivation for attempting the synthesis-oriented approach to achieve security system implementations having both hardware and [8,9,10] software components. Such an approach would be benefited from the systematic analysis of design trade-offs that is common in synthesis while also creating cost effective systems.

Following are the some of key features of the security framework and architecture:

Light weighted cryptography: Cryptographic algorithms and hardware architecture for extreme low power, memory and processing requirements.

Physical Security of network: Trusted and ensured Platform module which will take into account the vulnerabilities of the hardware device at physical level.

Standardizing the security Protocols: Development of standardized protocols which have got both lightweight with respect to the communication and cryptographic computations.

Secure operating systems : It requires Rich operating and well equipped systems with a secure kernel which will ensure a secure communication inside the processor by providing secure runtime execution environment, secure booting, secure content, etc.

Future application Areas: concluding the technical, economic, social context of a given application area,[11,12,14] in order to develop security solutions which are appropriate and acceptable.

Secure Storage: Protecting the rich sensitive information stored in RAM / ROM and secondary storage.

7. CONCLUSION

From the above design specification and analysis, we can obtain the some of the conclusions. Firstly it is fully control of Traffic management control.

GPS, GPRS and network, upon those technologies Internet of Things is found, to construct an intelligent traffic monitoring system, which can serve a good facility to make a path to ambulance in traffic load to reach the hospital which makes the latter as a part of the former. Secondly, intelligent traffic monitoring system based on Internet of Things has a number of advantages such less cost, high reliability, never affected by adverse weather, all weather operations etc. Thirdly, the technologies of Internet of Things makes it possible that a complete automation in monitoring system from data detect to data transmission, and to intelligent decision-making, from vehicle management to highway congestion control. Because fully automatic monitoring and management for vehicles and highways in an intelligent traffic monitoring system based on Internet of Things can completely realized, it will have a broad applying perspective.

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