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# Automatic Accident Detection, Ambulance Rescue and Traffic Signal Controller

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**ABSTRACT:** Nowadays the road accidents in modern urban areas are increased to an uncertain level. The loss of human life thanks to accidents is to be avoided. Traffic congestion and tidal current are major facts that cause delays to ambulance. To bar loss of human life because of accidents we introduce a scheme called ITLS (Intelligent traffic light system). The main theme behind this scheme is to supply a smooth flow for the emergency vehicles like ambulance to succeed in the hospitals in time and thus minimizing the delay caused by traffic congestion. The idea behind this scheme is to implement ITLS which could control mechanically the traffic lights within the trail of the ambulance. The ambulance is controlled by the control unit which furnishes an adequate route to the ambulance and also controls the traffic signal consistent with the ambulance location and thus reaching the hospital safely. The controller identifies things of the accident spot through the sensor systems within the vehicle which determined the accident and thus the controller walks through the ambulance to the spot. This scheme is fully automated; thus, it finds the accident spot, controls the traffic lights, helping to succeed in the hospital in time.

# I. INTRODUCTION

Nowadays Wireless Sensor Networks (WSN) has been applied in various domains like weather monitoring, military, home automation, health care monitoring, security and safety etc. or during a nut shell one can say wireless sensor network are often applied in most of the domains. Traffic Signal System or traffic monitoring may be a vast domain where WSN are often applied to collect information about the incoming flow of traffic, traffic load on a specific road, traffic load at particular period of your time (peak hours) and in vehicle prioritization. WSN installed along a road are often utilized to regulate the traffic load on roads and at traffic intersections. The sensor nodes that are to be deployed along the road are small in size and have low energy consumption. These sensors run on both battery power also as solar power. They have the potential to draw solar power in order that they will use sunlight for functioning in bright and sunny condition and therefore the battery power for working at night or in cloudy or foggy condition. Sensors utilized in the Wireless Sensor Network for traffic light systems are mainly of two types:

i)Intrusive sorts of sensor are kept under the road and sense the traffic waiting at the signal. This type of sensor has an equivalent working rule as that of a detector.

ii)Non-Intrusive sorts of sensor is fitted on the road. The installation of this sort of sensor is straightforward as no cutting of road is required to be done. Non-intrusive sensor includes acoustic sensors or video image processors to detect the presence of vehicles waiting at the traffic intersection. Although Intrusive sensors are very effective still Nonintrusive sensors are preferred over Intrusive sensors as they're cost-effective, easy to put in, resistant to natural corrosion and degradation.

# II. METHODOLOGY

Automatic accident detection using sensors, location tracking using GPS, sending location coordinates to ambulance, finding exact spot of accident using GPS viewer application, starting of operation and traffic light monitoring using RF transmitter and receiver of these steps are executed consistent with response of the circuit.



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VI. METHODOLOGY (FLOWCHART)



Fig. 7: Methodology (Flowchart)

# **III. MODELING AND ANALYSIS**

# **Block Diagrams**

# **Block Diagram of Vehicle Unit**

If a vehicle has met accident, vibration sensor or fire sensor gives the electrical signal to microcontroller through Signal conditioner. Then GPS provides latitude and longitude information about vehicle location to manage section through GSM.



Fig. 1: Block diagram of vehicle unit

Figure 1: Block diagram of vehicle unit



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#### Vibration sensor

According to our system, every vehicle should have a vehicle unit. The vehicle unit consists of a vibration sensor, Microcontroller, an interface, GPS system and a GSM module. There is a need to process the low-level voltage signal properly given by vibration sensor. We will use multiple sensors for detection of accident to avoid any error in detection. These sensors can be installed in vehicle body at the foremost vibration sensitive locations. A central system, often implemented inside vehicle to process the signal coming from sensors and to detect the accident from the signals coming from multiple sensors.



Figure 2: Design of vibration sensor

The predefined data i.e., Peak voltage level or crash waveform data are used to decide whether an accident is occurred or not. The vibration sensor utilized within the vehicle will continuously sense for any large-scale vibration within the vehicle. The sensed data is given to the controller GPS SYSTEM inside the vehicle. The GPS SYSTEM finds out this position of the vehicle (latitude and thus the longitude) which is that the situation of the accident spot and provides that data to the GSM MODULE. The GSM MODULE sends this data to the control unit whose GSM number is already there within the module as an emergency number. We can also use this vehicle unit for health monitoring of the patient using different sensors.

# GPS

It stands for "Global positioning system". it's having 24 satellites it'll transmit the coded information. These 24 satellites will rotate only one occasion over the planet in every 12 hours. so as to provide the knowledge about velocity, time etc. GPS will help us identify the space between the two different places on the planet and it will show the route to achieve the required destination. Figure 2 shows the GPS module. There are three different segments in GPS they are:1) Space segment 2) Control segment 3) User segment

When satellites transmit information and each satellite will have a special code and it also transmit information at different frequencies so as that the GPS can discriminate with the varied signal received by the varied satellites. This condition will help to calculate the time taken to travel the space between the satellite and thus the GPS receivers then the period of time is multiplied by the sunshine speed gives the space between the satellite and thus the GPS receiver. The control segment will identify the satellite and it will guide with the right orbit and proper time taken by the satellite to succeed in the GPS.

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Figure 3: GPS module

It is having four unmanned station with single master control station. These unmanned stations will receive the knowledge from different satellites and this information is send to the master station and this is often sent to the GPS satellite. The user segments contain users and thus the GPS receivers. Working of GPS: When a GPS receiver is began to figure, firstly it'll start to download the orbit information about each and every satellite to download this information it'll take around 12.5 min once this information is completely downloaded it'll be stored within the receivers so on use further. The GPS knows the precise location of the satellite but still it must know the precise distance between the satellite and thus the receiver. This distance is often calculated by the receiver, by multiplying the time taken by the signal to achieve the receiver and thus the speed of the transmitted signal. But the receiver already knows the speed which is 18600 miles/ sec.

# Block diagram of Ambulance / Control Unit



Figure 4: Block diagram of Ambulance/Control Unit



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In control section GSM modem receives message about accident and send it to PC. PC identifies the closest ambulance and ambulance is instructed to select up the patient. Control section transmits the control signal to all or any of the signals in between ambulance and vehicle by RF transmission.

# **Block Diagram of Traffic Unit**



Figure 5: Block diagram of traffic Unit

Whenever the ambulance reaches almost the traffic light (approximately 100m), the traffic light is going to be made to green through RF communication. Thereby the ambulance is suggested to succeed in the hospital in time.

# **IV. RESULTS AND DISCUSSION**

Automatic Accident Detection and Ambulance Rescue with Intelligent traffic signal System are simulated using PROTEUS SOFTWARE and their results are presented here. The circuit model of the above system is shown and sensors are connected to measure output end in normal condition the vibration sensor are going to be but this value. If a vehicle has met accident, vibration sensor gives the electrical signal to microcontroller through signal conditioner. Then GPS provides latitude and longitude information about vehicle location to regulate section through GSM. If a vehicle has met accident, fire sensor gives the electrical signal to microcontroller through signal conditioner. Then GPS provides latitude and longitude information about vehicle location to regulate section through GSM Before ambulance reaching the traffic light junction, the signal are going to be red. Control section transmits the control signal to all or any the signals in between ambulance and vehicle by RF transmission. After ambulance reaching the traffic light junction the assistance of the RF signal. The circuit model of the above system is shown and sensors are connected to live output result.



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# **Normal Condition**

In normal condition the vibration sensor and fire sensor value are getting to be but the preset value.



Figure 6: Normal Condition

# **Accident Condition**

If a vehicle has met accident, vibration sensor gives the electrical signal to microcontroller through signal conditioner. Then GPS provides latitude and longitude information about vehicle location to regulate section through GSM.



Figure 7: Accident Condition



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# **Fired Condition**

If a vehicle has met accident, fire sensor gives the electrical signal to microcontroller through signal conditioner. Then GPS provides latitude and longitude information about vehicle location to regulate section through GSM.



Figure 8: Fired Condition

# Before ambulance reaching traffic signal

Before ambulance reaching the traffic light junction, the signal is going to be red. Control section transmits the control signal to all or any the signals in between ambulance and vehicle by RF transmission.



Figure 9: Before Ambulance Reaching Traffic Signal

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# After ambulance reaching traffic signal

After ambulance reaching the traffic light junction the signal will become green with the assistance of the RF signal.



Figure 10: After Ambulance Reaching Traffic Signal

# V. CONCLUSION

In this paper, a completely unique idea is proposed for controlling the traffic signals in favor of ambulances during the accidents. With this technique the ambulance is often maneuvered from the ITLS are often proved to be effectual to regulate not only ambulance but also authoritative vehicles. Thus, ITLS if implemented in countries with large population like INDIA can produce better results. The ITLS is more accurate with no loss of your time. But there could also be a delay caused due to GSM messages since it's a queue-based technique, which may be reduced by giving more priority to the messages communicated through the controller.

# REFERENCES

[1] Mr.S.Iyyappan ,V.Nandagopal "Accident detection and ambulance rescue with intelligent traffic light system" International Journal of advanced Research in EEIE-2013.

[2] K.Sangeetha, P.Archana, M.Ramya, P.Ramya "Automatic Ambulance Rescue with Intelligent Traffic Light System" International organization of scientific Research journal of Engineering-2014

[3] Mr. Sahil Gadroo Mr. Pinkesh Jodhwani Mr. Gunveer Singh Mr. A. D. Londhe "Automatic accident detection and ambulance rescue system" International journal of scientific & engineering research-2015

[4] Hrishikesh Murkut, Fazal Patil, Vishal Yadav, Meghana Deshpande "Automatic accident detection and rescue with ambulance" SSRG International journal of ECE-2015

[5] A. Hac, "Wireless Sensor Network Designs", John Wiley& Sons, Ltd, 2003.

[6] M. Kuorilehto, M. Kohvakka, J. Suhonen, P. Hamalainen, M.Hannikainen, and T. Hamalainen, "Ultra-Low Energy Wireless Sensor Networks in Practice Theory", Realization and Deployment, John Wiley & Sons, Inc, 2007.

[7] N. Bulusu, "Wireless Sensor Networks", Artech House, Inc, 2005.

[8] M. Lee, C. Yao, H. Liu," Passive Tag for Multi-carrier RFID Systems", IEEE 17th International Conference on Parallel and Distributed Systems, 2011.

[9] Y. Khalil, M. Al-kariki, "Intelligent Traffic Light Flow Control System using Wireless Sensor Networks", Journal of Information Science and Engineering, 26, 753-768 (2010).

[10] R. Kannan, R. Nammily, S. Manoj, A. Vishwa, "Wireless Vehicular Accident Detection and Reporting System", International Conference on Mechanical and Electrical Technology (ICMET 2010).

[11] T. Malik, S. Yi, S. Hongchi, "Adaptive Traffic light control with Wireless Sensor Networks", (2007).

[12] C. Anuran, B. Saumya, C. Anirudh, "An Intelligent Traffic Control System using RFID", IEEE, 2009.

[13] R. Kannan ,V. Mohan ,A. Mohanan, P. Leons, R. Shooja, A Vishwa, "Wireless Sensor Network for Vehicle Speed Monitoring and Traffic Routing System", International Conference on Mechanical and Electrical Technology (ICMET 2010).



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[14] P. Bartłomiej, "Performance Evaluation of Road Traffic Control using a Fuzzy Cellular Model ", 2011.

[15] Kale, Sarika Baburao, and Gajanan P. Dhok. "Embedded system for intelligent ambulance and traffic control management." IJCER 2.2 (2013): 137-142

[16] Athavan,K, et al. "Automatic Ambulance Rescue System. "Advanced Computing & Communication Technologies (ACCT), 2012 Second International Conference on IEEE 2012





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