ACCIDENT DETECTION AND INDICATION USING Wi -Fi

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Abstract *:* This paper illustrates about the accident indication that occur in the highways and also send information about the street light which is damaged using Li-Fi technology. The system can be set to run in automatic mode, which monitors the vibration. The sensors are used in either side of the roads to detect the accidents and the information is sent to the nearby police station and ambulance site through Li-Fi technology in the form of text message. This design saves the time and report about the accident as soon as possible and do the necessary help. Furthermore, this system has a function which will send information if any light is damaged and will show the serial number of the damaged light, thus it is easy to be found and repaired the damaged light using Li-Fi technology. The system can be widely applied in all places which need timely control such as streets, stations, mining, schools, and electricity sectors and so on.

IndexTerms - Li-Fi technology, Sensors, Street lights

I. INTRODUCTION

A.OVERVIEW:

Devices that can use Wi-Fi technology include personal computers, video-game consoles, smartphones, digital cameras, tablet computers, digital audio players and modern printers. Wi-Fi compatible devices can connect to the Internet via a WLAN network and a wireless access point. Such an access point (or hotspot) has a range of about 20 meters (66 feet) indoors and a greater range outdoors. Hotspot coverage can be as small as a single room with walls that block radio waves, or as large as many square kilometres achieved by using multiple overlapping access points.

B.LITERATURE SURVEY

Abhishek Patni et all [9], described an efficient method of highway detection using Li-Fi technology. Li-Fi is a bidirectional, high speed and fully networked wireless communication. Li-Fi is a based on visible light spectrum which provides a spectrum which is more than 10,000 times to radio wave to deliver described data. These unique characteristics of Li-Fi pose a number of challenges for the implementation of capacity, efficiency, availability, and security in the wireless network system. It makes use of LED's which is a light illuminating device and its intensity can be modulated in a way that is indictable to human eye. LED's are semiconductor electronic device and they are being developed as tiny LED so that many task such as deliver data, display information and provide lightning can be done simultaneously. It is just basically a transmission and reception of information and data in the form of light energy which is used for navigation. The main drawback for using Li-fi is that presence of light is necessary and it also requires clear line of sight (LOS).

Toshihiko Komine et all [10], discussed the fundamental analysis for visible light communications using LED. The author has proposed an optical wireless communication system that employs white LED'S for indoor wireless networks. In this system, LED is not only used as a lighting device but also as a communication device. It is a kind of optical wireless communication that uses the "visible" white ray as a medium. This dual function of LED, for lighting and communication, emerges many new and interesting applications. The function is based on the fast switching of LEDs and the modulation of visible light waves for free space communication. In visible light communication system, it is important to meet the requirements for optical lighting and optical transmission. Moreover visible light communication system makes high data rate possible easily. Since the visible light communication system can be expected for indoor communication, it is not flexible for outdoor applications.

II.EXISTING WORKS

The system is composed of the following phases:

1) Vehicle registration and preparation,
2) Passengers' registration,
3) Monitoring accidents through a web interface located in the PSO headquarter

II.A Vehicle Registration and Preparation

This phase deals with the process of vehicle registration. The vehicle's owner must prepare the vehicle for this system by installing the IoT device. After installing the device, the owner gives the Vehicle ID to the operator responsible for vehicles registration in the headquarter's database. This would lead the PSO to recognize that the registered vehicle satisfies the pre-conditions to be integrated in the system. The IoT device encompasses four modular components: shock sensor, GPS, NFC reader, and cellular IoT

II.B Passenger's Registration

The mobile application aims at providing a one-time only registration form for passengers' personal data. The personal data include: (a) Full name, (b) Blood type, (c) Phone number, (d)Email, (e) Medical history, (f) Date of birth, (g) Reference phone number. The whole record of passenger's information is uploaded to the headquarter's database once the registration process is complete

II.C Monitoring Accidents

When a passenger gets in the car and taps the Near Field Communication (NFC) handheld device (mobile phone), the passenger's ID and the vehicle's ID are transmitted and stored into the head quarter's database (see Fig. 1). Consequently, the database server establishes the mapping between the pre-registered personal information and the passenger's ID. As a result, the headquarter can recognize exactly the information of the passenger inside the vehicle.

II.D Design And Architecture

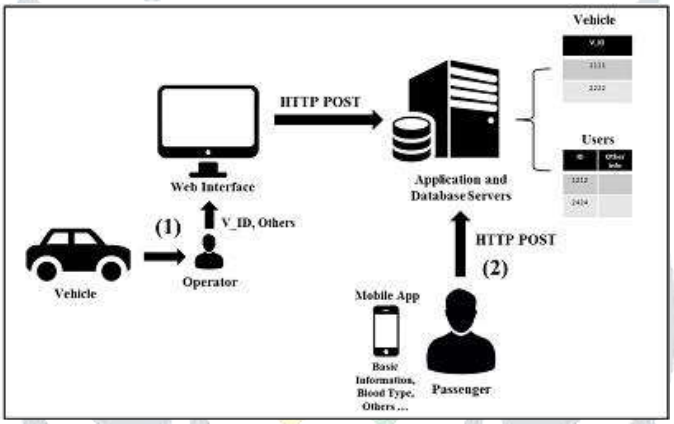


Fig 1: Registration Phase Architectural Diagram

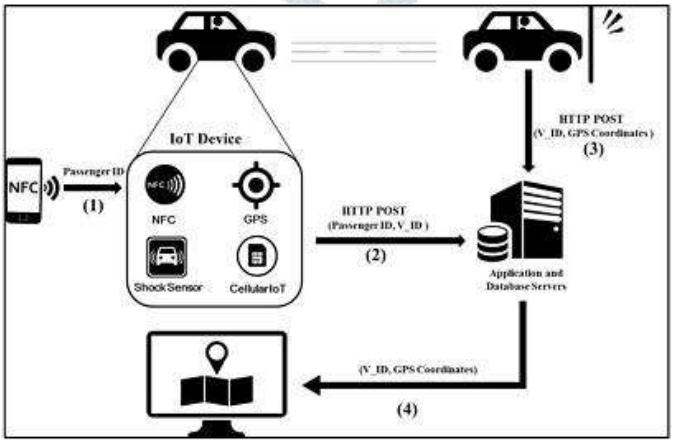


Fig 2: Monitoring Phase Architectural Diagram

II.E Disadvantages of The Existing System

1)Internet is necessary for reporting the accident.

2)Atleast three alarms should be sent to confirm the accident, if one alarm is sent it is considered as fault.

3)Number of reporting is not immense comparing to any normal application in the market hence it is not flexible.

III.PROPOSED SYSTEM

In the proposed work the accident occurred at highways are intimated to the nearby control station through Wi-Fi using Intelligent street light system.

The system consists of two parts namely

1) Transmitter section

2) Receiver section

III.A **TRANSMITTER SECTION**

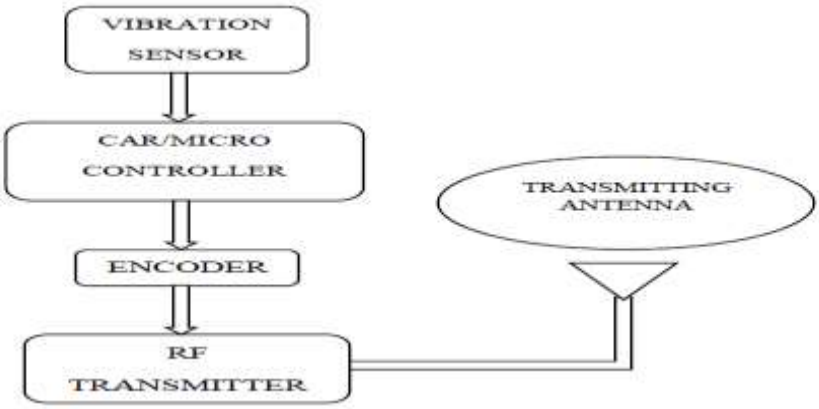


Fig 3. Block Diagram of Transmitter Section.

III.A.A Vibration Sensor

The vibration sensor is fixed in four corners of car or two corners in two wheelers. It senses the vibration continuously and the threshold value is fixed. The unit of measurement for vibration is given in Hz (Hertz). The Symbol is given as 'f' and it refers to the number of times a vibrating object vibrates per second. The inverse of a vibration frequency is referred to as the period (T), T= (1/f). The input of sensor is vibration and output is electrical signal. When two vehicles are colliding with each other the vibration exceeds the threshold value of 50%, then the force of vibration is converted into electrical signal. This signal is given as input to the microcontroller ATMEGA8A.

III.A.B ATMega 8A

The Atmel ATmega8A is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega8A achieves throughputs close to 1MIPS per MHz. The external power supply of 5v is given to microcontroller from car. When the electrical signal is given as input to microcontroller the data is encoded by encoder which is transmitted through antenna.

III.A.C Encoder

The encoder converts the information from one code or format into another for the purpose of standardization. It converts the analog signal into the digital form by sampling and quantization process.

1)Sampling Process

Sampling is a process of converting a signal (for example, a function of continuous time and/or space) into a numeric sequence (a function of discrete time and/or space).The continuous time signal can be represented in its samples and can be recovered back if the sampling frequency is twice of the highest frequency content of the signal. The formula is given as $B < fs/2$.

2)Quantization Process

Quantization is the process of mapping a large set of input values to a (countable) smaller set. Quantization is involved to some degree in nearly all digital signal processing, as the process of representing a signal in digital form ordinarily involves rounding.

III.A.D Transmitting Antenna

The transmitting antenna works with 434 MHz frequency range makes simple wireless data link with microcontroller. It converts the electric power into radio waves. This radio signal is transmitted to the Raspberry-pi board fixed in street light. It is received by receiving antenna.

III.B RECEIVER SECTION

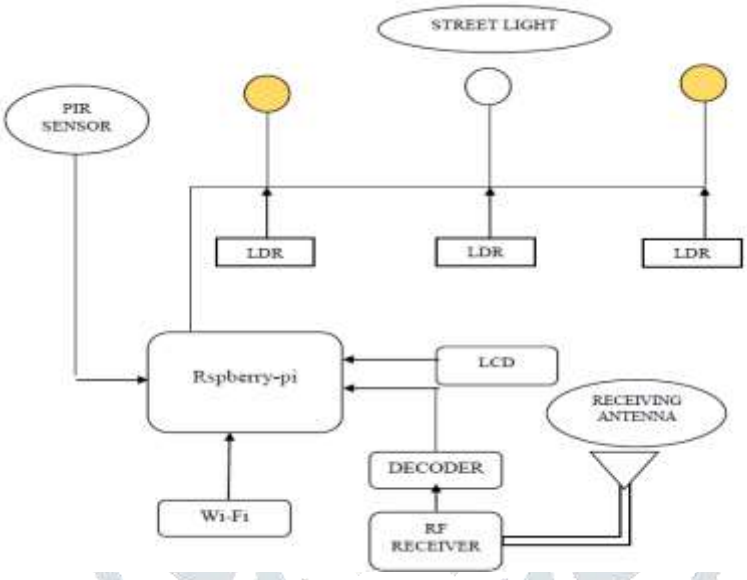


Fig 4. Receiver Block Diagram

III.B.A PIR SENSOR

Passive Infrared Sensor is simply called as PIR or PID (Passive Infrared Detector). PIR based motion detector is used to sense the movement of vehicles and pedestrians. A passive infrared (PIR) sensor measures infrared light emitted from objects that generate heat, and therefore infrared radiation, in its field of view. Crystalline material at the centre of a rectangle on the face of the sensor detects the infrared radiation. The sensor is actually split into two halves so as to detect not the radiation itself, but the change in condition that occurs when a target enters its field. These changes in the amount of infrared radiation on the element in turn change the voltages generated, which are measured by an on-board amplifier. When motion is detected the PIR sensor outputs a high signal on its output pin.

III.B.C RASPBERRY-PI

Raspberry-pi is the portable and powerful minicomputer. Here it is the intelligent system act as server for intimation about accident to nearby control station. The Android App installed in user mobile phone when accident condition in that coverage area, it is interfaced with the Raspberry-pi for the location of nearby rescue system. The system controls the lamp intensity to raise or fall with help of PIR sensor and also indicate fault lamp with its serial number.

III.B.D LED

A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p–n junction diode, which emits light when activated. In normal condition the intensity of light is made to low and when there is any movement of vehicle or pedestrian is detected the intensity is raised to emit light.

III.B.E LDR

The Light Dependent Resistor (LDR) is fixed under the each of LED. It is made of high resistance semiconductor. The resistance of a photo-resistor decreases with increasing incident light intensity and vice versa. LDR is used to find the fault condition of light.

III.B.F RF RECEIVER

RF receiver receives the radio signal from the transmitting antenna which is converted into electrical signal. It works at 434MHz.

III.B.F DECODER

Decoder converts compressed data into uncompressed data. It is the reverse of encoding that is it converts digital into analog signal.

III.B.G LCD

Liquid Crystal Display is used to show the accident detected result in case of accident and street light condition of normal and fault condition. The displaying is done by blocking the light rather than emitting it.

III.B.H ACCIDENT APP

This app is installed in user mobile. During accident stage the vibration sensor exceeds the vibration of 50%, it is interfaced with the Raspberry-pi for location tracking to the control station with the help of Wi-Fi.

III.B.I CONTROL STATION

The control station is the rescue system which is located in that coverage area for instant ambulance arrangement. Control station receives information along with the latitude and longitude from the accident spot and immediately sends the rescue team in order to provide emergency service.

IV. WORKING OF THE PROPOSED SYSTEM

IV.A Transmitter Setup

The control station is the rescue system which is located in that coverage area for instant ambulance arrangement. Control station receives information along with the latitude and longitude from the accident spot and immediately sends the rescue team in order to provide emergency service

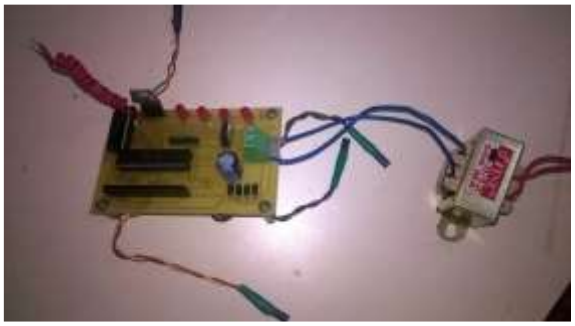


Fig.5 Transmitter Setup

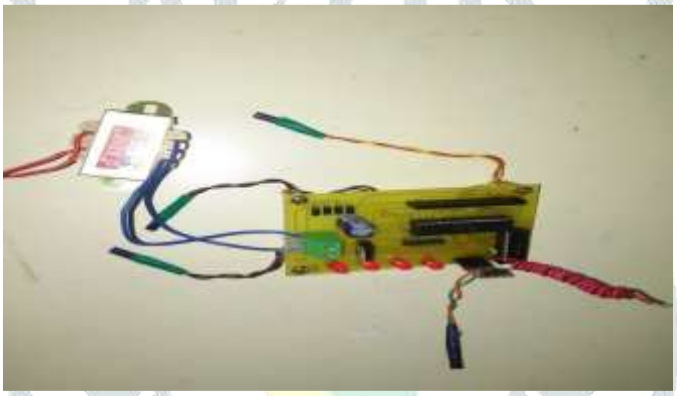
IV.B Receiver Setup

The receiver setup consists of Raspberry pi 3 mod B, PIR sensor, LED, LDR, LCD and receiving antenna. PIR sensor, LCD and lamp setup are interfaced with the Raspberry pi board.

Fig 6 : Receiver Setup

IV.C ACCIDENT DETECTION OUTPUT

The vibration sensor senses the vibration. When two vehicles collide with each other the vibration exceeds the threshold value of 50%. This accident detected by raspberry pi is displayed on the LCD



. **Fig 7. Vibration indication of LED**

Fig 8. Accident indication in LCD

IV.D SOFTWARE CONFIGURATION

The software is fully configured on the Raspberry pi module.

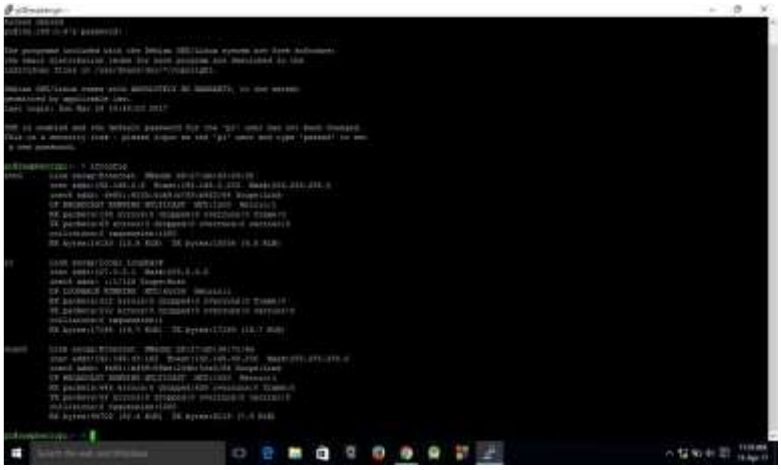


Fig 9 Software Configuration

IV.E ACCIDENT INDICATION TO CONTROL STATION

The message received by the control station, indicates the latitude and the longitude of the accident spot.

Fig 10. Screenshot of Accident Indication.

IV.F LAMP CONDITIONS

Our proposed system has two conditions the Normal Condition and the Fault Condition.

IV.F.A NORMAL CONDITION

Fig 11 Lamp 1 in normal condition

Fig 12: LCD display of lamp1

IV.F.B Fault Condition

Fig 13 Lamp 3 in fault condition

Fig 14 LCD display of lamp 3 condition

V. CONCLUSION:

The accident detection and indication system makes use of a popular wireless networking technology called wi-fi. this system consists of a raspberry3 pi model b version2, atmega8, vibration sensors, transmitter and receiver antennas. whenever an accident occurs it is detected using a piezoelectric vibration sensor. the sensor outputs are then processed using the atmega8 microcontroller. the information is immediately sent to the nearby control station and an emergency rescue team is rushed to the spot. also this system is used to send information about the failed street lamps in highways by sending the serial number of the corresponding lamp post. wi-fi makes use of radio waves that are used to transmit the data at a much faster rate. thus the proposed system is used to provide emergency services at the accident site at the right time. this is economical and can be a one- time installment in the vehicles.

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