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Location Tracking System for Vehicular Emergency using IOT

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Abstract- Transportation plays a major role in everyone's daily routine. Tremendous development in city infrastructure has major challenges in Transportation. In day to day leave, Vehicle accidents are more critical and results in injuries, loss of line & damages to vehicle. To overcome it, Emergency assistance to be reached to the incident spot in short span for improving survival rates. An accelerometer is used in vehicle for detection of rash driving & it communicates to authenticated person through GSM. The location of the spot is been sent to authorized email which results in detecting the accident and theft of the vehicle in efficient manner.

Keywords: Accelerometer, GPS, Location tracking, Circuit diagram, and vehicle accident not occurred vibration sensor circuit D1 LED glows

I. INTRODUCTION

The term Internet of Things, IoT can be defined as physical devices or sensors connected to an internet for collecting the data and sharing it. The Kevin Ashton in 1999 coined the phrase "Internet of Things" (IoT) and it has taken a decade to capture his vision [1]. The growth of the IoT as predicted by the Gartner will be crossing more than 5.8 billion devices by the end of 2020, by the year 2025 the total may cross 41.6 billion connected devices [2]. The growth is possible due to the cheap sensors, computer chips and availability of internet. IoT had made the world around us smarter, responsive, and helping to merge digital and physical spaces. Internet of Things on a whole works in this way. (i) Gadgets or appliances have sensors that gather data. (ii) The gathered data is then shared through the cloud incorporated with software program. (iii) This software packages examines the data and communicates it through a website or an app with the user.

Internet of things applications has spread into different fields [3], used in smart kitchen [4], detecting the poisonous gases [5], water quality monitoring [6], prosthetic applications [7], Ionosphere monitoring [8] etc., The IoT is also useful in the healthcare monitoring systems and it has become today a common practise for the people to use the wearable devices on their body to monitor their activities. This helps in keep in check of their body activity and health care can be monitored easily by the person himself. The use of IoT in the smart home helps in decreasing the expenditure and thereby helping in saving the environment [9].

Development in current Transportation system has made individual's lifestyle to comfortable & affordable. Vehicle tracking system is need of the hour and it's been extensively used in day-to-day life in terms of electronic maps or specialization software's. If any accident occurs, it should be alerted to the authenticated person and its current location to be shared immediately for emergency assistance to save lives [10]. Information to be sent by GSM device and location to be determined by GPS.GPS continuously obtains its position and saves the latitude and longitude values. The messages received by control room forwards it to nearest recovery center. Sensing devices are also placed and monitored on critical periods. IoT is the interconnection of uniquely identical embedded computing devices to connect and exchange data with the available Internet infrastructure. By 2020, it is been estimated that 30 billion devices will be using IoT. The vast applications of IoT are broadly classified into Consumer, Enterprise & Infrastructure.

The issue with the IoT is the security, privacy, safety, and trust. The growth of the technology also required standardizing, and protocols should be developed as there is a need because of the heterogeneous sensors

is connected to each other. The authors in [11] developed a strategy for the affirmation of security and intrusion in the IoT and have successfully explained in his literature. They also developed Traffic flow features as metrics (TFFM) for the detection of DDOS attacks in the application layer in the IoT traffic flows [12]. The need for the light protocol for tracking the security in the IoT is discussed for implementing security for the data security [13]. A light weight one time password is developed for security in the IoT [14] this is used in smart learning. Providing the security in IoT using honey pots are developed in [15] in which the authors has used honey pots which act as decoys and they are also cost effective. As the IoT devices are light weight normal cryptographic algorithms cannot be implemented as these are complex, hence the authors in [16] has developed a novel signature method which uses CL-PKC to generate and verify the signature in a message in an IoT ecosystem. This method reduces the signature and also it is certificate less.

II. SYSTEM DESIGN

Raspberry Pi 3[17] is used as key module for monitoring and sending the vehicle information to control room. It also uses GPS module, Heart rate sensor, Camera, Temperature sensor & Accelerometer sensor [18]. Temperature measurement is done through Temperature sensor. Heart rate is monitored and measured in real time by Heart rate sensor [19]. Current location is determined by GPS module during emergency times.

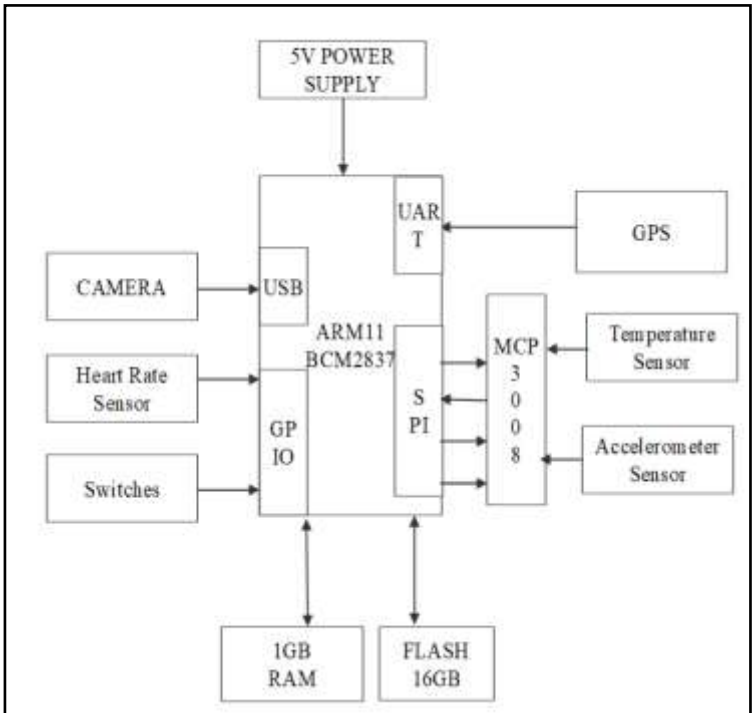

Figure 1. Circuit diagram

The circuit diagram of the proposed method is shown in the figure.1 it represents the location tracking system of the vehicle. The main processor used is the Raspberry Pi3 which uses a Broadcom chip, the core runs at 1.2GHZ. This processor helps to increase the speed of the device at least by 50% compared to the previous processors from the same family. The Raspberry Pi has several peripherals that are preconfigured so that they can be used to connect the different devices to it. The Raspberry Pi3 uses a +5v DC power supply, contains 1 GB RAM and 16 GB Flash memory. The different sensors are connected to the Raspberry Pi using the ports available in it.

III. HARDWARE MODULE

Raspberry Pi 3[20] model is 3rd generation development board is faster than previous models and it includes wireless technologies on a single board. Figure 2 is the snapshot of the hardware module. Open Source Computer Vision library (Open CV) language is used and it runs in ARM Linux OS.

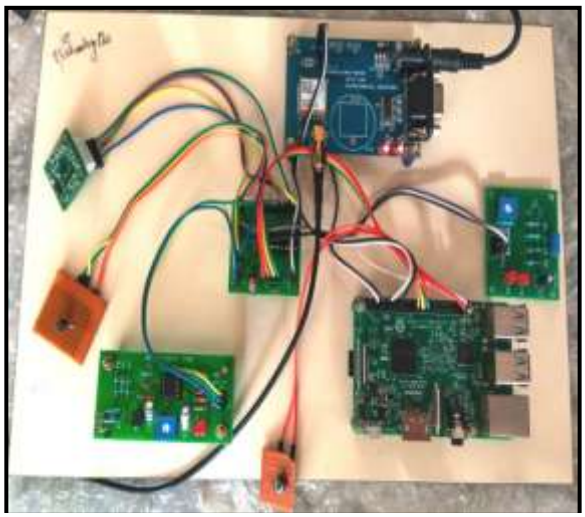

Figure 2. Block diagram

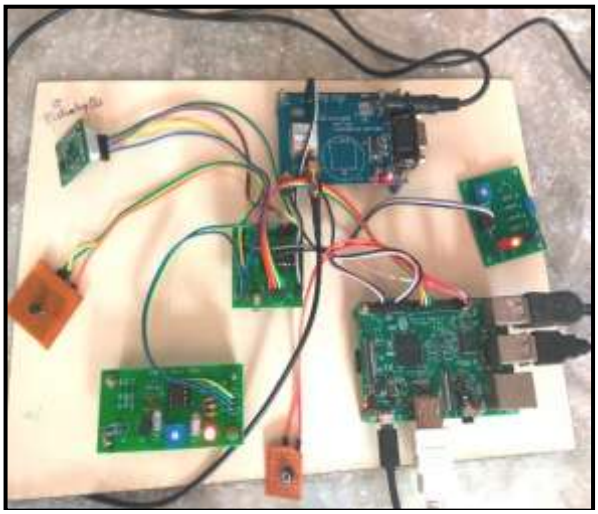

Figure 3. Vehicle accident not occurred vibration sensor circuit D1 LED glows

IV. RESULT & DISCUSSIONS

The proposed system can communicate with the people and the control center automatically in the case of emergency, by sending the messages to them. The system also sends the location so that the emergency team can come to the location at the earliest and can save the life of the person met with an accident. With the help of heartbeat sensor, the heart beat rate is also shared along with the temperature as the temperature reading can be known using the temperature sensor. The main advantage is that it cans takes a snapshot of the location and it is also communicated with the center or the people added in the system.

The system can also be used to identify the vehicle in case of the theft, as location can be identified easily the vehicle can be tracked easily by the owner. Figure 3 displays the entire setup when no accident occurred and vibration sensor D1 LED glows. Figure 4 displays the normal status in Control room PC. Figure 5 shows the Heart rate sensor. Figure 6 shows during accident where vibration sensor D2 LED glows. Figure 7 displays the various sensor parameters as Heart rate, Temperature, Accelerometer when accident occurred. Figure 8 displays the latitude and longitude of the vehicle position when accident occurred. As shown in table 1. Comparison of proposed method with the existing methods

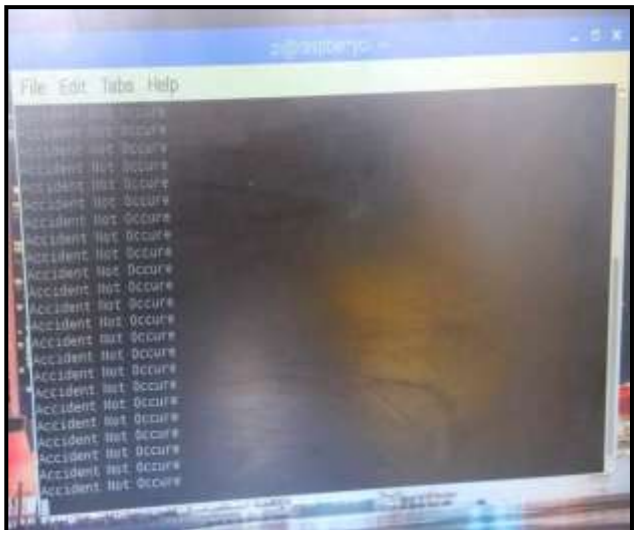

Figure 4. Vehicle accident not occurred displayed in PC

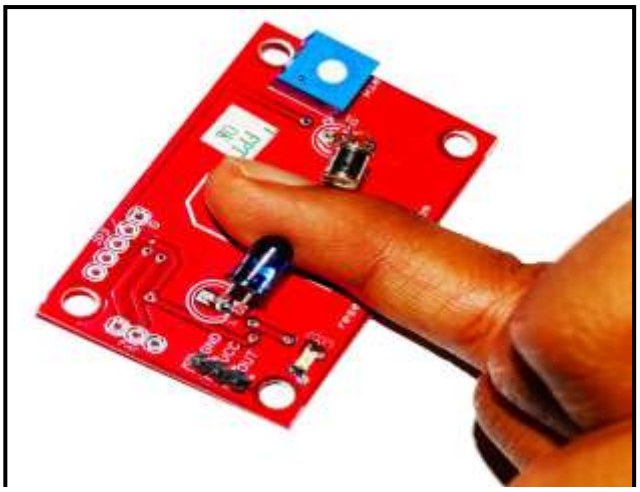
Figure 5. Heart rate Sensor

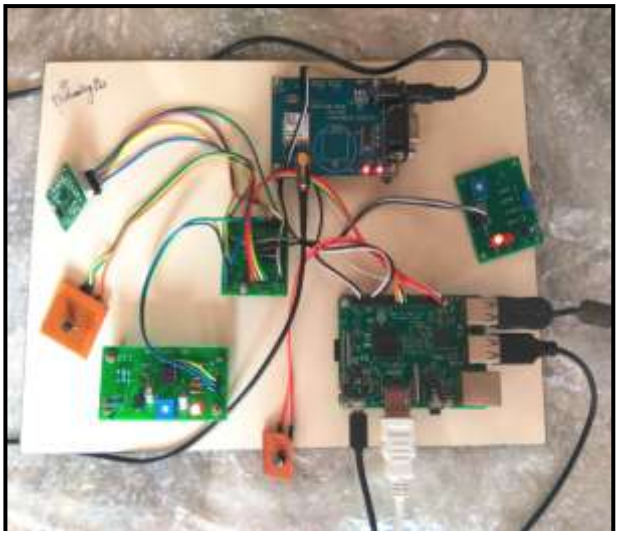
Figure 6. Vehicle accident occurred, vibration

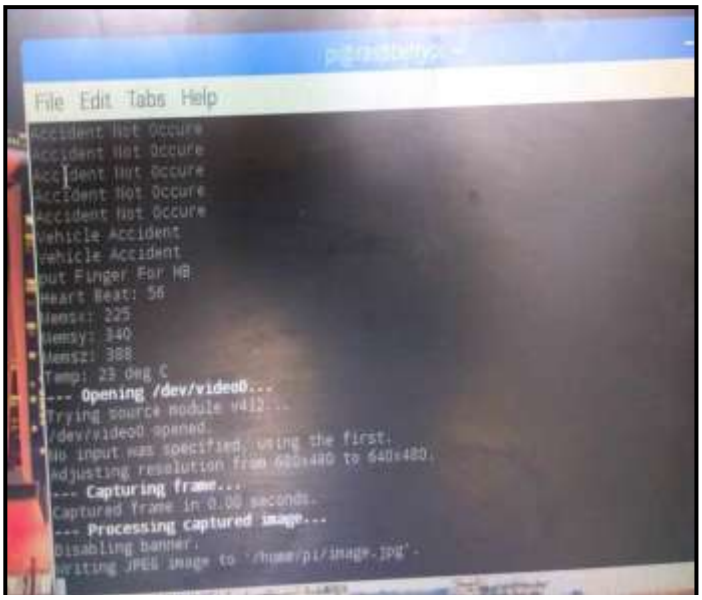

Figure 7. Sensor measurements display in PC when sensor CircuitD2 LED glows accident occurs

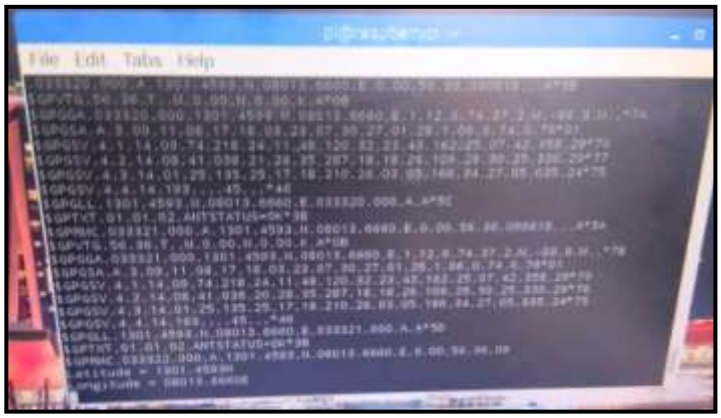

Figure 8. Latitude and Longitude of Vehicle display in PC when accident occurs

Table 1. Comparison of proposed method with the existing methods

Emergency System	Automated/ Manual	Nature of Emergencies	Contact authorities
Proposed Method	Fully automated	Five	Directly to the SOS Person
On Star by GM[21]	Partially automated	One	Respective Customer care
Ford Sync [22]	Partially automated	One	Respective Customer Care
ARRS [23]	Fully automated	One	Respective Organization

V. CONCLUSION AND FUTURE SCOPE

The proposed system uses the IoT for location tracking during emergency situations for providing immediate attention to the needed with the help of messages received from vehicle. Implementing of the proposed system will avoid accidents in future and also controls the traffic is specific cases. The system can be used in the existing vehicles as it does not need any modification in the vehicles and this system is helpful in building smart cities. The system helps to identify the vehicles location in the case of the accident and reduces the time for the rescue team to reach the location, thereby helping to save the lives of the people. It also gives the information of the heartbeat of the person met with the accident so the rescue team can get the advice from the specialists so that the life can be saved even at the time of danger

to the accident met person. It also helps in identification of the vehicles when they are stolen by a thief. In future a better sensor can be used in it, a networking sensor can also be included, a method to identify the nearest rescue location can be included and a secured message transmission can be built.

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