Vol. 5, Issue. 3, 2018, ISSN 2349-0780

Smart Motorbike Integration Using IoT

R Nithya Kumari
kumari.r5@gmail.com
Abdul Bari
abari286@gmail.com
Gaurav V Achar
vgauravachar@gmail.com
Ashish Kumar R
ashkr110@gmail.com
Harshavardhan K
harshavardhankanji@gmail.com

Electronics and Communication Department,
Kammavari Sangham Institute of Technology, Bengaluru.

***Abstract*- In this paper, a technique is showcased to create a model of motorbike security system using IOT as the number of bike thefts in the country is increasing. This is due to the fact that the motorbikes are not provided with enough security system. In our paper, devices like GPS are used to locate the motorbike and GSM are used to send emergency alerts to Police and even guardians in case of theft or accidents. Therefore, to promote and encourage the use of this integration, an embedded system can be designed to not only enhance the safety of the bike but also aims to reduce the risk of losing a life on the road. For Vehicle Security, Fingerprint authentication is used. If the user wants to access the vehicle, Fingerprint Authentication should be done and if any person attempts to unlock the motorbike by physically dismantling the lock, then a vibration sensor detects this and an alert message is sent to the user. The other aspect of this paper is to intelligently monitor the emission of the motorbike by detecting the amount of CO present in the exhaust and upload information to the cloud which could be accessed by authorized persons. The integration of IOT into vehicles has allowed users to help in monitoring the real-time data, GPS-based tracking, routing information, emission detection, security systems and much more benefits throughout the system.**

Keywords*- *Fingerprint, Emission Detection, IoT, embedded system, Real Time Data, GPS, GSM, Accelerometer, Bike sharing, Accident, Wi-Fi.

1. INTRODUCTION

A unique identity is a key attribute for identification of a person. Automated systems incorporate access control mechanisms which are based on specific options for unique identification. These specific options include biometric systems identifying individuals based on fingerprints (FP). This project discusses the biometric systems based on FP enhancement and matching. FP is recognized as an exclusive and unique attribute of an individual and is one of the first biometric parameter used for identification and this is used for the security purpose to start the engine of the motorbike [1]. Statistics show that the leading cause of death by injury is road traffic accidents. There are number of causes for which an accident can occur, some of them are; lack of training institutes, use of mobile phone while driving, unskilled drivers, driving while intoxicated, bad road condition, overloading, and poor traffic management.

For our project, we briefly review road accident detection technique, using an accelerometer sensor [3]. To decrease the present high statistics of accidents caused by collisions, many ideas have been proposed for essential advancement in developing system meant for collision warning. But with the help of accelerometer sensor we can identify the position of motorbike, if it is tilted more than a threshold angle an emergency messages are sent to the guardians and other authorities, with the coordinates (latitude and longitude), where the accident has taken place [6]. Also, the information of the rider can be accessed through the application.

In this project, we have also discussed on the emission detection of motorbikes. Taking into account in developing countries like India, the air quality has reached to an extremely harmful level. So proper monitoring and analysis should be carried out for the reason behind the excess gas emissions [2]. When the suitable gas sensors detect the amount of emitted gases, three analysis can be done which are the main reasons for exhaust gas. Firstly, to identify mechanical problems and engine performance,

secondly to test the running efficiency of the engine and the last one is exhaust emissions test for against federal standards and state. Here, we concentrate on CO (Carbon Monoxide) gas sensor for the emission detection [8]. The sensor is mounted near by the vehicle exhaust pipe, which sense the emission of gases from exhaust.

As the number of urban vehicles are growing rapidly vehicle theft has become an important concern for all vehicle owners. However present anti-theft system lacks the tracking and monitoring system. Whenever bike-theft has occurred or even in case like severe accidents, this GPS system can be used to locate the place where the event has occurred [5]. One more aspect that we are concentrating in our project is the hard-handling of the bike by an unknown user. Here we use Vibration sensor to detect this and the Buzzer gets ON which acts as a Burglar Alarm [6].

Overall, this study is implemented using IoT system to facilitate the onboard data collection and wireless transmission and is materialized using sensors and microcontrollers with built-in Wi-Fi chip to connect user's Internet to the system modules so that the data collected from the processor are constantly updated in the Cloud [17].

2. EXISTING SYSTEMS

In the existing systems, we have come across through different systems which are used to detect the emitted gases from vehicles, wherein few systems are bulky to implement on motor bikes and some are not efficient to detect the amount of gas emitted from the motor bikes. Various vehicle anti-theft devices have been developed lately, however the result is still disappointing since all kinds of devices have its drawbacks. There are different security systems which have more impact on the application they are being used, whereas in real time scenarios more effective security system has been done through mechanical locks, passwords etc. which can be easily accessed by intruders [12]. And systems proposed, developed and implemented so far, hardly enable us to detect accident and have less efficiency in different practical situations. In all the above systems the access of the data has been done by using the on-board LCDs' and getting messages through GSM module. The commonly used vehicle tracking/recovery systems are based on radio signals [18]. These systems fail to access the real time data in remote places with harsh climatic conditions.

3. PROPOSED FRAMEWORK

A. SMART MOTORBIKE SYSTEM

To address the above stated problems, we propose a portable system, attachable to any vehicle and the real time data can be accessed using GSM and through internet of things as shown in Fig 1. The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data [7]. IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer-based systems, and resulting in improved efficiency, accuracy and economic benefit.

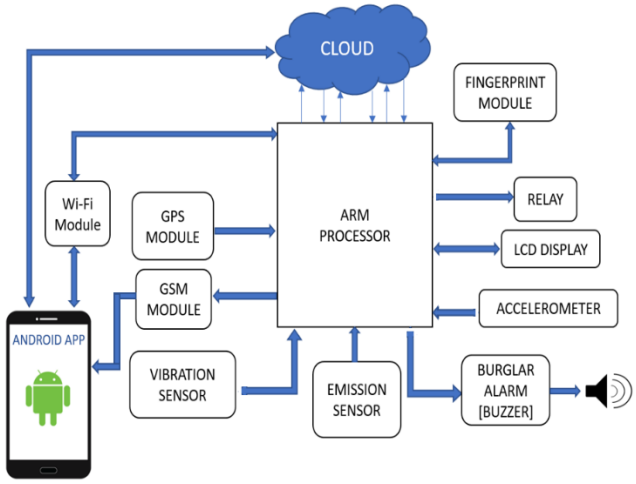

Fig 1: Block diagram of proposed system.

The security system of bikes is done by using a fingerprint scanner which is more secure and efficient than any other security systems which is implemented on motorbikes [1]. By using the fingerprint of a user, the sensor will authenticate the access of the bike as shown in Fig2, if not authenticated then an alert message is sent to the owner of the motorbike via GSM and through TCP client App as shown in Fig 3.

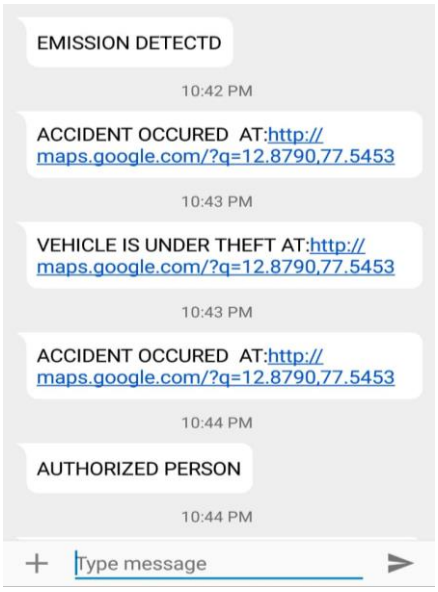

Fig 2: Data collected by the processor from the modules are sent to registered user as a message via GSM.

By using the gas sensor, we can detect the amount of CO gas emitted from the motorbike which is fixed at the exhaust of the motorbike. CO sensor is a device that detects the presence of the CO gas in order to stop the poisoning from CO. MQ-7 CO gas sensor is mounted on the vehicle, which will be giving automatic update of the status of the vehicle continuously [11]. So, we can easily detect the gas emission status of the vehicle and prevent the engine and canny the user as shown in Fig 2. An accelerometer sensor is used to detect the accident and send alert messages to the nearest health center and guardians of the user with the coordinates of the place where the accident has happened as shown in Fig 2 and Fig 4.

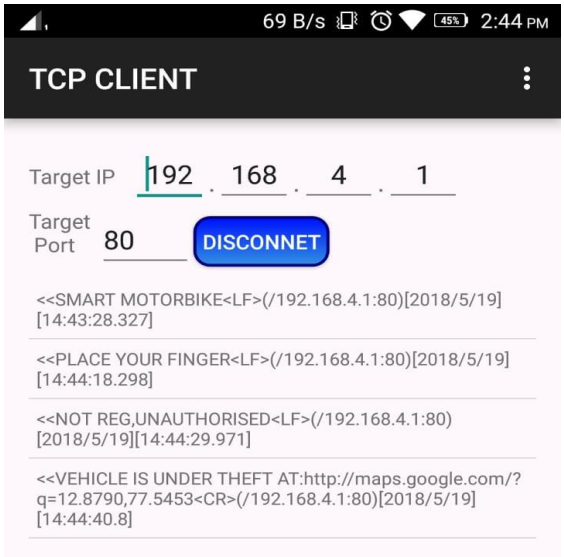

Fig 3: Alert message updated in TCP client App of an Unauthorized user.

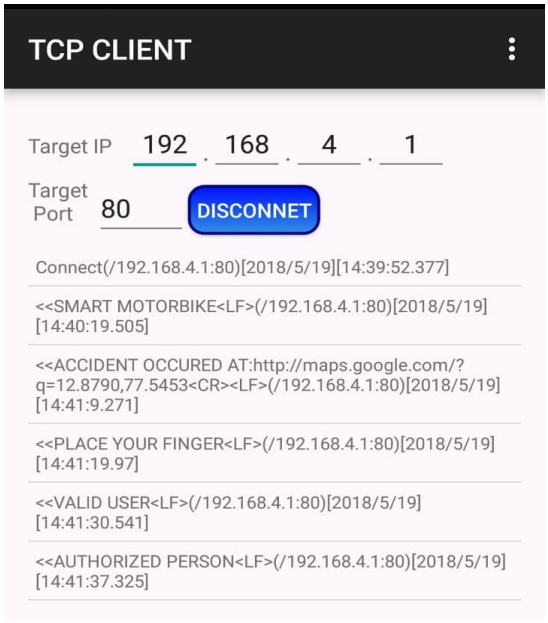

Fig 4: Data collected by the processor from the modules are updated in the App.

B. HARDWARE ARCHITECTURE

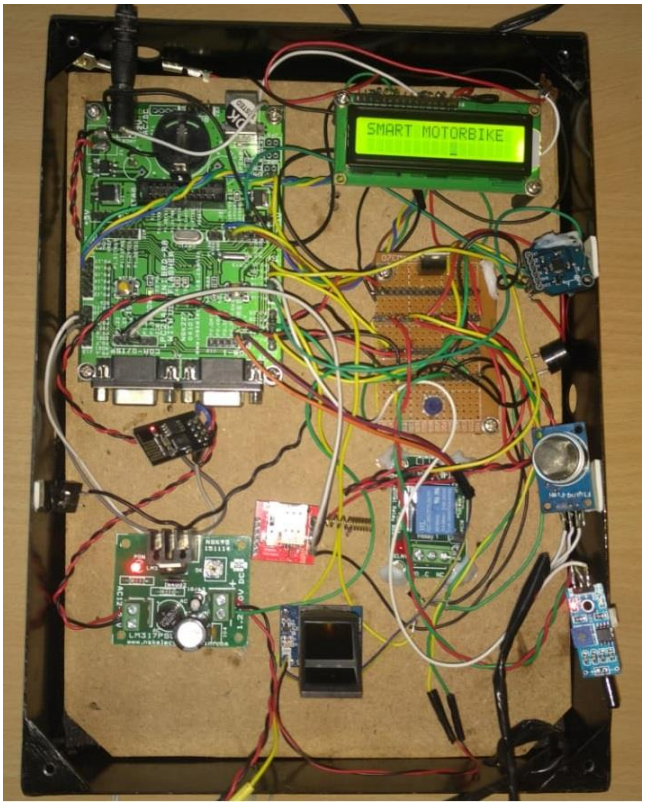

Fig 5: Smart Motorbike System

The prototype of the system consists of a number of interacting units that form a smart embedded system as shown in Fig 5. The computational core of the system is ARM Microcontroller LPC 2148 that provides all peripheral interfaces and is responsible for controlling the system. Due to their tiny size and low power consumption, LPC2148 is ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low-end imaging, providing both large buffer size and high processing power. The system makes use of the ARM processor to control all the components interfaced to it which are as listed below:

- **Fingerprint Module:** The user registers with the system by placing his finger in the Fingerprint module.

- **Relay:** When user places his registered finger in the Fingerprint Module, this Relay gets ON and the Motorbike engine is enabled to start.

- **LCD Display:** This component will display any kind of activities that is currently happening in text format.

- **Accelerometer Sensor:** Used to detect any kind of Accident happened with the bike when it has crossed any given Threshold values.

- **Vibration Sensor:** Used to detect vibrations which are caused by external hard-handling on the bike when the system engine is not yet started.

- **Emission Sensor:** Use to detect exhaust gas coming out of the bike when it crosses a certain threshold value of Carbon Monoxide (CO).

- **GSM Module:** It is used to send necessary messages to the registered user about the activities of the bike.

- **GPS Module:** Used to send Latitude and Longitude Coordinates of the bike when any abnormal activities have been occurred.

- **WI-FI Module:** Used to connect the system hardware modules to the Internet to get updates of events.

- **Buzzer:** When there are any events like theft and unauthorized access, the Buzzer gets ON.

C. WORKING ALGORITHM:

Step 1: Start.

Step 2: When the system hardware gets ON, the ARM Processor checks for GSM and WI-FI signals.

Step 3: Receive confirmation about GSM and WI-FI modules that they are ready.

Step 4: Send a message through the GSM and WI-FI module on to the mobile device of the owner and also send notification in the mobile App.

Step 5: Check for vibration sensor for any input from it to the processor.

Step 6: If there is any input from the vibration sensor go to step 13.

Step 7: Request the user to place his finger onto the Fingerprint module for registration.

Step 8: After the user has been registered it gives him access to start the bike through Relay.

Step 9: User needs to place his finger to start the bike.

Step 10: Send SMS through GSM and App notification through WI-FI to the registered owner's mobile device.

Step 11: If there is any input from Accelerometer sensor go to step 14.

Step 12: If there is any input from Gas sensor, go to step 15.

Step 13: If any input received from the Vibration Sensor report it to the registered owner by sending SMS to mobile and notification to the App. Also turn ON the Buzzer Alarm.

Step 14: If any input received from the Accelerometer Sensor for crossing the threshold value, send the appropriate message to the owner with GPS Coordinates.

Step 15: If any input received from the Gas Sensor of crossing any given threshold value send the appropriate message to the owner.

Step 16: Stop.

4. CONCLUSION

The study conducted in this paper presents a comprehensive review of motorbike security system, accident detection and emission detection approaches and its applications which is implemented on smart motorbike systems, with a specific focus on the remote access of real time data using IoT has been proposed. Wherein implementing a motorbike with smart technologies has attracted much attention in past decades and will remain an active research area in the coming years. From different technologies for security systems, detection of exhaust from motorbikes and detection of accident of many approaches summarized above, we get the conclusion that as and when other automobile is being upgraded with smarter technologies, but not in case of motorbikes. So, a system has been proposed which considers the above factors and is also attachable to any automobile and can become a universal method to effectively increase the security and efficiency of motorbikes.

5. FUTURE ENHANCEMENT

In this paper, we have provided detailed design, implementation plan and use of smart Motorbike system. Bike sharing system (BSS) is our future work that can be achieved as our system permits multiple users. Motorbike sharing can provide us the communal environmental sampling. The Collected real-time data could be presented both to the rider and to the registered people like Police as well, through back-end services [10].

Bike sharing concept will promote social and friendly network among the people. Our smart bike system can be used in such a way that, the users can easily book a bike using the App at any time without human intervention. There is no need of human interference for conducting this smart Motorbike sharing system. A user can take the Motorbike from the station registering with his/her Fingerprint (i.e., creating an account in the App will be given Authorization to the user after the Signup) and start the ride. The user can drop the Motorbike to the station which is near to his/her destination when the trip is done. The data collected from the Motorbike will benefit the operator in solving the redistribution problem, saving operational cost as well as the time of users. In the near future when conventional sources of energy would be scarce, Motorbike sharing system will provide us an effective means of transport when people travel through Public Motorbikes.

REFERENCES

1. Sajid Bashir, Mubeen Sabir "Aiding biometric system based on fingerprint enhancement and matching" 2018.
2. Ratan R.Tatikonda, Vinayak B. Kulkarni Department of Electronics & Telecommunication "FPGA based Exhaust Gas Analysis for Automotive Vehicles"2016.
3. Adnan Bin Faiz, Ahmed Imteaj, Mahfuzulhoq Chowdhury, "Smart Vehicle Accident Detection and Alarming System Using a Smartphone", 2015.
4. Elie Nasr, ElieKfoury, David Khoury, "An IoT Approach to Vehicle Accident Detection, Reporting, and Navigation", 2016.
5. N. Watthanawisuth, T. Lomas and A.Tuantranont "Wireless Black Box Using MEMS Accelerometer and GPS Tracking for Accidental Monitoring of Vehicles",2012.
6. Fahim Bin Basheer, Jinu J Alias, Mohammed Favas C, Navas V, Naveed K Farhan, Raghu C V, "Design of Accident Detection and Alert System for Motor Cycles", 2013.
7. Hossam M. Sherif, M.AmerShedid, Samah A. Senbel," Real Time Traffic Accident Detection System using Wireless Sensor Network", 2014

8. Sameer Khare1 and K. P. Peeyush2 Automotive Drive Recorder as Black Box for Low End Vehicles 2017.
9. Maria Geme B. Palconit1, Warren A. Nuñez2 CO2 Emission Monitoring and Evaluation of Public Utility Vehicles Based on Road Grade and Driving Patterns with Internet of Things application 2017.
10. Mohammad Shahriar Rahman, ShinsakuKiyomoto "Secure Bike Sharing System for Multi-modal Journey", 2016.
11. Sneha S. Kamalakar, Mousami S. Vanjale,Department of Electronics Department of ElectronicsAISSMS IOIT Pune, Maharashtra, India "Notifying and Inspecting Vehicle emission and Temperature of vehicle engine",2017.
12. Manjunath T K, N Maheswari "Locking and Unlocking of Theft Vehicles Using CAN", 2013.
13. Hammad Afzal, Dr. Vrajesh D. Maheta" Low Cost Smart Phone Controlled Car Security System", 2014.
14. Kishwer Abdul Khali, Amir Qayyum Jurgen Pannek "Prototype of Automatic Accident Detection and Management in Vehicular Environment Using VANET and IoT" 2017.
15. Vinay R.G. Dubey, SGSITS Indore Vikas Jain, SGSITS Indore Sandesh Agrawal, SGSITS Indore Avirup Das,"Automated Security and Rider Safety System for Two Wheelers"2016.
16. Roland Hostettler, Member, IEEE, and Petar M. Djuri ´ c, Fellow, IEEE "Vehicle Tracking Based on Fusion of Magnetometer and Accelerometer Sensor Measurements With Particle Filtering "2015.
17. Abdallah Kassem and Sami El Murr, Georges Jamous, Elie Saad and Marybelle Geagea, "A Smart Lock System using Wi-Fi Security"2016.
18. "TareqMonawar, Shafayat Bin Mahmud and AvijitHira"Anti-Theft Vehicle Tracking And Regaining System With Automatic Police Notifying Using Haversine Formula"2017.