iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** VII **Month of publication:** July 2021

DOI: https://doi.org/10.22214/ijraset.2021.36274

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

Smart Device for Bikers to Prevent from Accident and Motorcycle Security

Atharva Mane[1], Pradnyesh Bhisikar[2], Raj Shinde[3], Ganesh Shinde[4], Shantanu Patil[5]
[1, 3, 4, 5] *Student,* [2] *Professor, Computer Engineering, Sandip Institute of Technology and Research Centre, Nasik, Maharashtra*

Abstract: ***In the current situation many people lost their life due to accidents and the main reason behind it is they are not wearing helmets. So, by wearing a helmet people can save their life and for compulsory use of a helmet, it should be linked with a bike. With this reason, bikemet project is specially developed. This is a combination of a bike and helmet that has become smarter and safer than before with the aid of IoT. The BikeMet has a Proximity sensor which makes the user compulsorily wear the helmet and if still there is an emergency, then there is a keypad provided which will allow the user to use the bike by entering a Pin so it is convenient for the user to rid out from the situation. In the mechanism of bikemet, bike and helmet are linked together and they transmit the data from the helmet to the receiver of the bike and hence if the user wears a helmet, then only the user will be able to turn on the bike. The bike has various sensors like track if the bike gets stolen then automatically off the ignition of the bike and like Accelerometer to detect accidents and send messages to respective people for giving information. So, this application can save many lives.***

Keywords: IOT (Internet of Things), Proximity, GPS, Helmet, Bike, BikeMet

I. INTRODUCTION

In the real world, motorcycles have become very crucial for travelling in small distances and are easy to reach on destinations in nearby places as compared to any other vehicle. Motorcycles give the freedom and flexibility for the riders to move anywhere they want and at any time. Owning a vehicle today is not merely a symbol of luxury but has become a necessity [6]. Riders no longer have to be dependent on the public transportation services, which in most of the cities and countries are extremely unreliable [3]. However, motorcycle riding has its own risks involved, especially when the rider does not follow the rules and do not take the necessary precautions to avoid unfortunate situations, which can lead to accidents, which are sometimes fatal [3]. Savings A survey indicates that more than 70% of the riders avoid wearing helmets without any specific reason [7]. Speeding and not wearing a helmet are the main reasons of fatalities and injuries [12]. On the other hand, bikers have to face difficulties such as theft of bikes. Therefore currently, people are getting technology dependent [2]. As a result, vehicle security systems are becoming essential day by day [2]. At the same time there are many problems which are faced by local authorities or the government that some bikers deny to follow government rules like drunken driving or neglecting the speed limits. So, to overcome from all the problems not only bikers but also helpful local authorities, this smart helmet using IoT is being introduced which helps to reduce the number of accidents that occur every day and also helps to get medical service as soon as possible so it can save lives.

II. LITERATURE SURVEY

There indeed numerous works to be published that prevent the accident. Some of the surveys mentioned here. In [1] the author discusses a Smart Helmet for the safety of bike riders which includes an alcohol sensor to ensure the one who is driving the bike is sober and a rider authenticates using face recognition to control theft which is completely focused on theft control and alcohol detection by using face recognition. In [3] the author focuses on smart helmet with GPS and GSM model and also the rider will not be able to start the vehicle if the rider is drunk and is not wearing the helmet. In [8] the author proposed a solution that a helmet uses a simple cable replacement for wirelessly switching a bike, so that the bike will start only with both the key and the helmet. A simple Bike tracking system using GSM and GPS modules is implemented in [6][4] which uses GPS values to get the location of bike send alerts using GSM. Smart Helmet implemented in [7][5] consists of Arduino and other sensors which are used to prevent drink and drive, to detect an accident and bike tracking using GPS. Authors of [9] implemented a smart helmet system which prevents bikers from over speeding. Accident notification feature has been implemented in [10], in which they used accelerometer readings and GPS values to send notification about the accident. As per survey of various papers, they focus on different parameters of security for bikers and motorcycles. In this paper, combine all the features with some additional benefit of this system.

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ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

III. PROPOSED METHODOLOGY

'BikeMet' is basically a combination of a Smart Bike and Smart Helmet. So, to make the safety of drivers more secure, 'BikeMet' is developed covering six features like Helmet Compulsion, Anti-Theft, Drink and Drive Prevention, Live Bike Tracking, Accident Detection, and alarm after certain speed limit. These features together as a bundle provide a mechanism to prevent accidents as well making the riders follow the traffic rules too. The aim of this project is to make daily life more secure and protect people from an accidental situation with the help of some components. The helmet side of BikeMet consists of a proximity sensor for human presence detection, MQ-3 gas detector (alcohol sensor) is suitable for detecting alcohol content from the breath [11] and a Transmitter to send data from the helmet's Arduino to the bike's Arduino. After receiving the data from the helmet, the GSM module sends data to the cloud including the location tracked by GPS [5] and also the signal from the Accelerometer. The GSM is used also when the user sends a text message indicating a signal which will turn off the bike. To do the processing an Arduino Mega and Nano is used at bike and helmet side respectively. Bike side kit includes an Arduino Mega, GPS module and GSM module. It also consists of a Relay Module which is responsible for turning the bike on and off. BikeMet will force the rider or user to wear the helmet before one ride on the road for a ride. The helmet will have sensors which won't allow the user to start the bike without wearing a helmet. Also, there's an exception which is designed by keeping emergency situations in mind i.e., there's an arrangement using which in an emergency the user will be allowed to start the bike even without putting the helmet on, but the rider will have to pay a fine or face legal charges. Drink and drive is one of the main causes of road crashes worldwide. Focusing on the death rate due to 'drink and drive', BikeMet provides the feature which will prevent these deaths by using IoT. Bike will not start if the rider is drunk and this will be detected using the alcohol sensor. In today's world the population is getting more dependent on the technology for their sophisticated living, even when it comes to the security of their loved ones. Keeping such points in mind 'Live Bike Tracking' is one of the best features of BikeMet, using this feature of BikeMet one can track the bike and always be sure about the safety of their own and their loved ones. Accidents are unfortunate incidents which happen unexpectedly and unintentionally, resulting in damage or injury, and no one knows when and where they are going to be caught in an accident so there must be someone or say something that be looking after them. As a solution to the mentioned problem the BikeMet comes with another feature 'Accident Detection'. BikeMet has this sensor which after some delay time checks the angle or a bike, if an angle is below than as expected for more than 30 seconds it will alert the user and related ones

IV. PROPOSED ARCHITECTURE

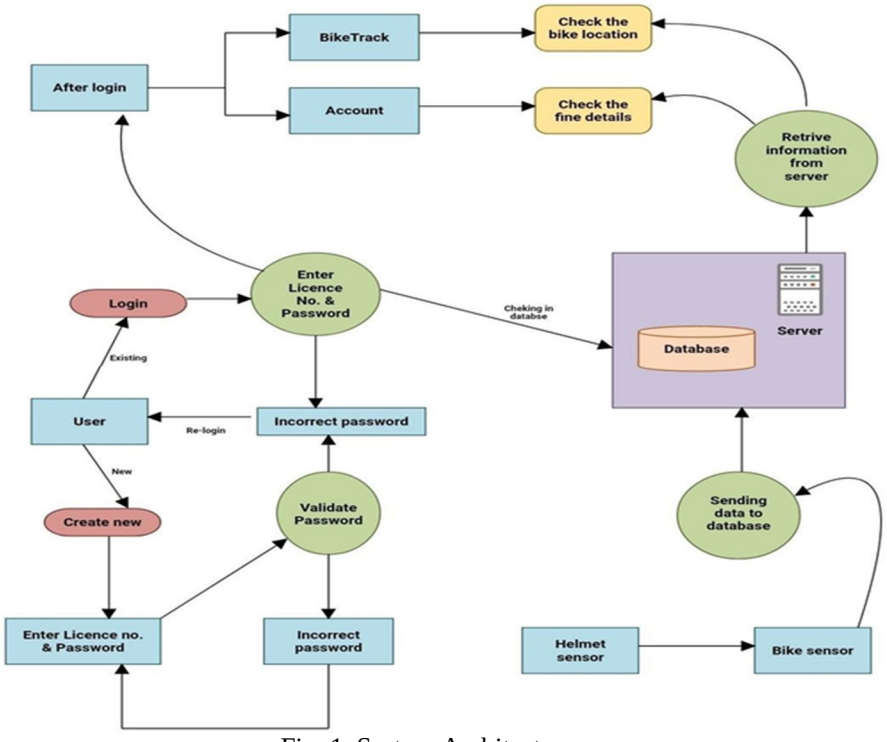


Fig. 1. System Architecture

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This is the architecture diagram for the working module of this project. In this approach, the user will have two choices, one is to Login if he is the existing user or Sign Up for the new user. After creating an account, the user needs to login with their credentials. Welcome screen will be displayed after successful validation of login id and password. On the welcome screen there will be two options for the user, 'Bike Tracking' and 'Account Details'. Bike Tracking will show the live location of the bike. Account Details will show the user information and fine details. Date which is collected from the sensors is directly sent to the website. All the data will be fetched through a cloud database and displayed to the user. Data from the helmet kit will be sent to the cloud and displayed using the website.

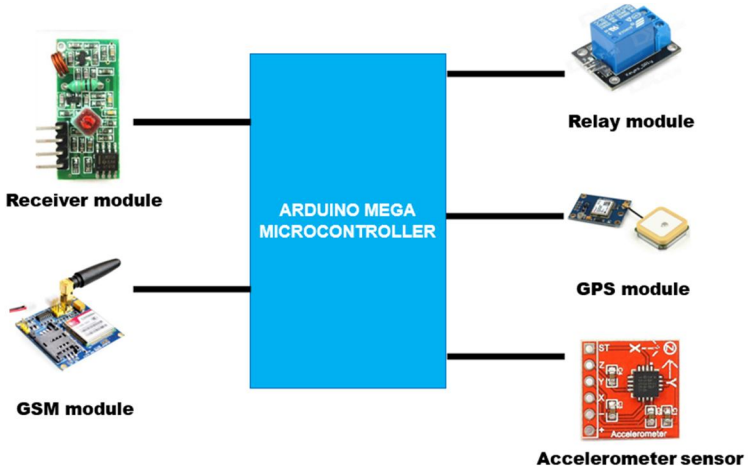


Fig. 2. Bike Side Microcontroller

In this system Arduino Mega is used along with Receiver Module, Relay Module, GSM Module, GPS Module and Accelerometer. Receiver receives the signals from the helmet side which are sent by the transmitter present in the helmet. GSM module will send notifications about the events like accidents, along with location of the bike using GPS values from the GPS sensor. Accelerometer will itself detect the accident and then the signal will be sent by using the GSM module. Relay module controls the ignition of the bike depending upon the signals received from the helmet side.

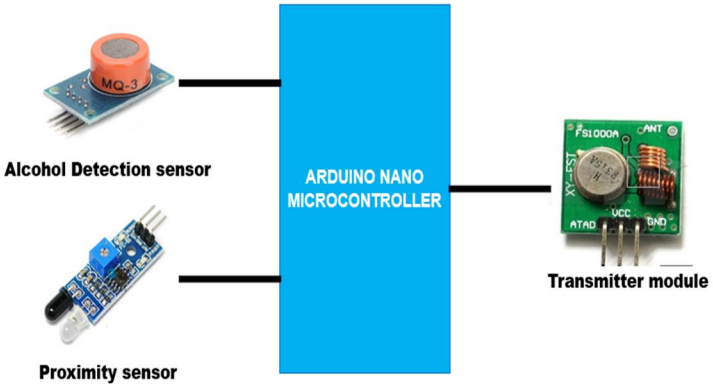


Fig. 3. Helmet Side Microcontroller

In this system Arduino Nano is used along with Alcohol Detection Sensor, Transmitter Module and a Proximity Sensor. Alcohol Detection sensor will be used to check if a rider is drunk or not. Proximity Sensor will be used to check if the rider is wearing a helmet or not. Both of these signals will be sent using the transmitter module to the receiver module which is present in the bike side kit.

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V. CONCLUSION

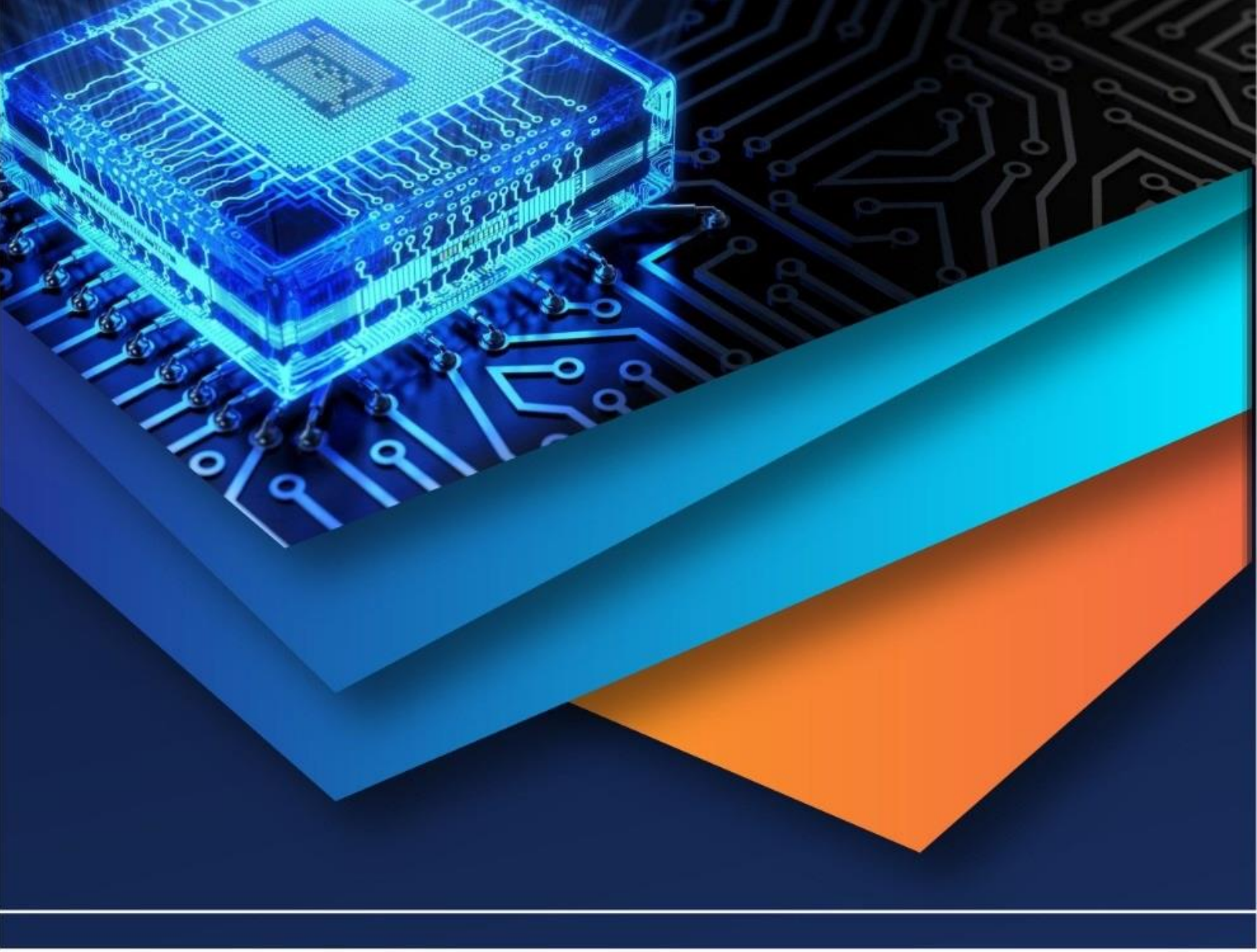
This project is made in such a way that it is cost effective and also is an individual kit that can be used directly onto a bike i.e. it is totally flexible. All the sensors and Arduino are an open-source system which means it can be configured as required. If this developed system is being implemented it can become a business model. In India, this type of system has not successfully developed till now. This can help the user to avail the facility using the internet which is in boom right now. The present situation in our country is that even after enforcing laws on helmet compulsion people do not use helmets so to break this attitude of people the concept of BikeMet is developed which will not only implement helmet compulsion but also avoid deaths occurring due to accidents in addition to preventing drink and drive.

This will also help the rider in an accidental situation as by informing the parents about any accident if it occurs. BikeMet is bundled as a system which also will come in handy in theft situations where you can at least turn it off and track it.

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