Infotainment Helmet with Integrated Bluetooth System and Customized Application using Database Services

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Abstract— In India, 4, 80,652 accidents occur in a year and nearly 1, 50,785 people die. Most of the accidents occur because of answering the calls for long time while driving and sometimes hearing music in a high volume which could affect the environment sound. Also people find it difficult to use Google map as it always require an eye on it to check if they are moving as directed. Also, at the time of any accident, it would be very useful to help the victim by knowing his/her blood group, age and his/her emergency contact number by scanning the QR code available on the helmet via cloud data services. So, we have developed an application interfaced with the IoT that can be installed in android mobile phones and we can also respond to the call over for a minute through Bluetooth speaker provided in the helmet.

Keywords: Infotainment Helmet, QR-code, MVVM

I. INTRODUCTION

In the year 2018, our world recorded 4, 64,674 two wheeler accidents and 1,48,707 are considered to be dead which is about a rate of 0.8 per 1000 vehicles. On the statistical data analysis of the Indian two wheeler accident, we found the following from the 'www.indianenvironmentalportal.org.in

S.NO	YEAR	ACCIDENTS	CASUALTIES
	2015	15,036	14,223
	2016	12,202	10,536
	2017	17,756	16,228
	2018	16,224	13,298

Table 1: Accidental Statistics Reported By Indian Government

This bar graph significantly shows the selling of various bikes in India starting from the lower budget to higher budget:

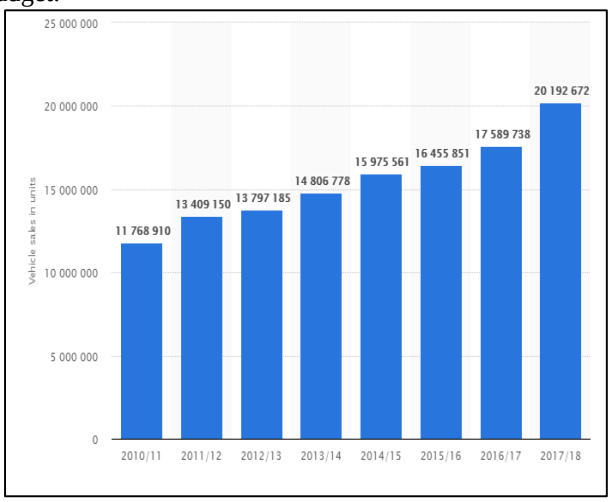

Fig. 1: Two Wheeler Sales in India

Later, an act under Section-2015 was been published and it stated that, "The two wheeler driver and the pillion must wear the helmet mandatorily". People lack an entertainment system while riding and their complete vision has to be on the map while exploring or travelling to new places.

So we developed our project by providing some constraints such as environmental recognition along with the audio play in the helmet. Also, we ourselves designed a new android application using Xamarin.Forms (a platform available on the internet). To be technical, our project dealt with Android Application Development and Data managing through cloud/local server.

II. OBJECTIVE

The key objective of our project is to ensure customer safety with high class of entertainment in the helmet
We provide the following three features in our helmet:

1) QR code
2) Digital sound support system
3) Customized Mobile App that provides service to user in one touch

III. XAMARIN.FORMS

We have used Xamarin.Forms for mobile application development which has the ability to build cross- platform applications using C# programming language. Thus, we code once and deploy the same in both Android and iOS.

The design architecture for the application that we have followed is MVVM (Model – View – ViewModel). This design architecture is used to provide separation between the presentation/view layer and business logic layer.

This also allows us to reuse the back-end functionality logics and design the UI view portable for Android and iOS separately if necessary.

Login credentials and user information are collected via Application and stored in cloud database. Thus when a dual user exist for the same helmet, we will be able to provide the current user details at the time of scanning the QR code from the helmet.

After designing and developing the application we go for testing the application by using emulators. The process called 'Testing with Emulator' is been followed here. This is illustrated as follows:

IV. TESTING THE APPLICATION WITH EMULATORS

At the time of testing the application, we assign the Android project file as startup page and provide the version details in the Manifest. Testing has to be done separately for Android and iOS. We have option to debug while running the emulator else we can just make our app installed in the emulator by using the release build option.

V. BLOCK DIAGRAM

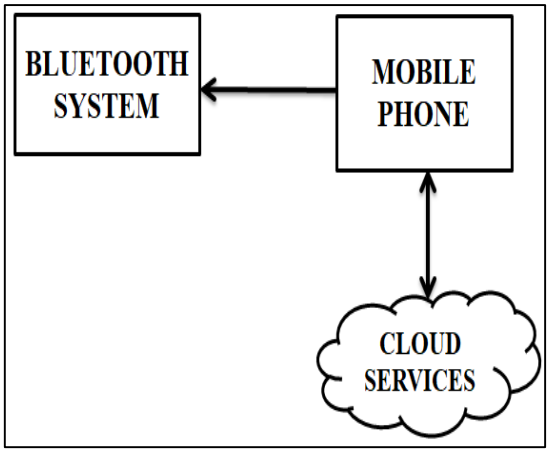

Fig. 2: Block Diagram

From the above shown block diagram, Fig 2, consist of three blocks namely Bluetooth, Mobile Phone and Cloud Server. Before starting the ride, the driver has to login into the application which provides high priority over other applications available on the mobile phone. When the connection is established between the Bluetooth module and mobile phone it enables the audio data transmission such as call, music etc.., The Bluetooth module is powered by a Lipo battery of 200mAh and it has buttons on it for power ON/OFF, increasing/decreasing volume, seek/reverse and for attending calls.

A two way communication is set between the Cloud services and our mobile phone. His/Her username and password is stored in cloud that helps us in viewing the number of user's using this product. Once the mail-id and password is registered, it will be available in the cloud and does not provide access to unregistered users. Thereby, storing the data in cloud becomes globally accessible whereas it is not possible with a local server.

VI. HARDWARE DESCRIPTION

The entire project is based on software development and has much less dependence on the hardware. Thereby, we are using a Bluetooth headphone system to synchronize with the mobile phone. Thus, a direct communication is established between the mobile system with inbuilt libraries and the Bluetooth system. According to our project we looked up for the following specified Bluetooth system such that it becomes more convenient to use.

S.NO	TYPE	SPECIFICATION
	Frequency response	20Hz-20KHz
	Charging voltage	5V, DC
	Battery	2000mAh
	Charging time	1-1.5 hours

Table 2: Hardware Specifications

Fig. 3: Bluetooth Module Powered by LIPO Battery

VII. IMPLEMENTATIONS AND OUTPUT

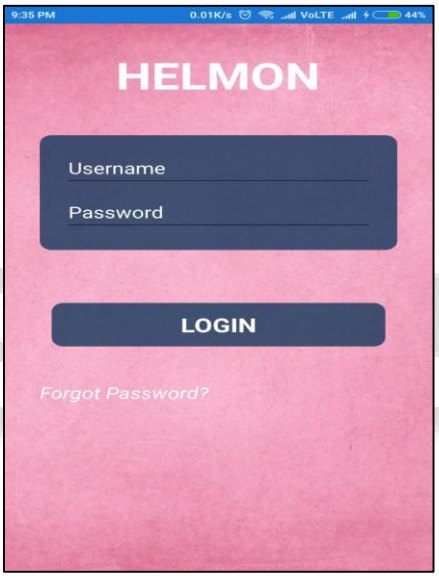

Fig. 4: Login Screen

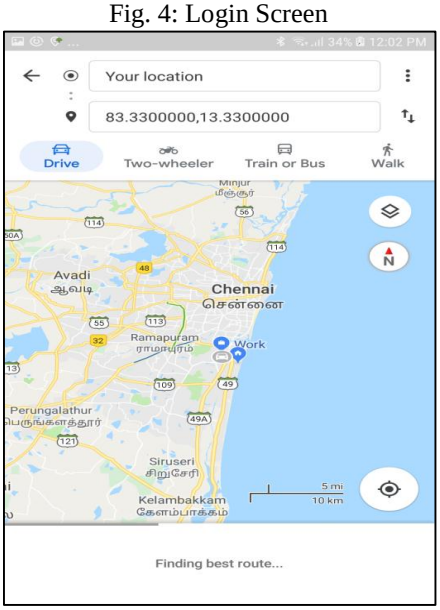

Fig. 5: Map Rendered Screen

Fig. 6: QR-Scanner Screen


Fig. 7: Hardware Implementation

VIII. QR-CODE GENERATION

A. Cryptography

Cryptography, a cipher is an algorithm for encrypting and decrypting data by following a set of procedures or steps.
DATA ENCRYPTION
In cryptography, encryption is a process of encoding message or information in such a way that it is accessible by only certain authorized people and restricts unauthorized persons. Encryption maintains the confidentially of messages. These are also known as 'protection of digital signatures'.

IX. TYPES OF DATA ENCRYPTION

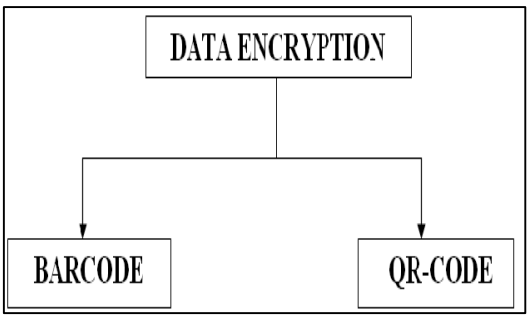

Fig. 8: Types of Data Encryption

X. QR-CODE

The term QR stands for 'Quick Response' and was designed in 1994 for matrix encryption of data. QR-code is a machine readable optical label. The algorithm to generate the QR-code is shown below:

A. Algorithm

1) STEP 1: Visit the website
2) STEP 2: Click on Vcard and enter the person details
3) STEP 3: Click on 'Generate QR-code' option that is available on the website
4) STEP 4: Print the QR-code and paste it on the helmet
5) STEP 5: Using any scanner verify the QR-code and check for the details of the user

Following is an image of sample QR-code that we created:


Fig. 9: Sample QR-Code

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