DEPLOYMENT OF IOV FOR SMART CITIES

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Abstract : The Internet of Vehicles (IoV) is a convergence of the mobile internet and the Internet of Things (IoT) where vehicles function as smart moving intelligent nodes or objects within the sensing network. This paper gives contributions to the state-of-the-art for IoV technology research. We present a comprehensive review of the current and emerging IoV paradigms and communication models with an emphasis on deployment in smart cities. Applications for intelligent transportation like driver safety, traffic efficiency, and infotainment. This paper presents a more inclusive review of the IoV for also serving the needs of smart cities for large-scale data sensing, collection, information processing, and storage.

KEYWORDS : *Internet of Vehicles, Internet of Things (IoT)*

INTRODUCTION

The recent advanced growth of larger scale networked sensors, Computation and communication technologies and could infrastructure has made the realization of smart cities possible in the near future. In a smart city scenario, many physical object, or more precisely 'smart' objects with its own processor, computing and communication power can Interact with each other. These smart objects which would provide a safe and smart environment through increased interconnection and interoperability is also called the Internet of things (IOT). Within the objectives of the IOT, many such objects will be connected vehicles or cars which can communicate and interact wirelessly with various types of devices connected to the Internet, devices in car. This leads to a specific type and customized IOT called the Internet of Vehicles (IOV) which achieves unified management in intelligent transportation and other applications in smart cities. The IOV can be considered as the convergence of the mobile Internet and the traditional IOT. As a huge network of interaction, IOV technologies refers to dynamic mobile communication system or models that communicate between the vehicles and other objects using V2V (Vehicle to Vehicle), V2R (Vehicle to road),V2B(Vehicle to Building) and V2P(Vehicle to Person), and interactions. It also allows information exchanges between V2D(Vehicle to Devices),V2S(Vehicle to Sensors). A deployment of IOV in smart cities enables information sharing and gathering of Big data information on vehicles, roads, infrastructures, buildings, and their surroundings

I. LITERATURE SURVEY

Title: "Visible Light Communication Applied to Intelligent Transport Systems"

Authors: R. M. Marè, C. L. Marte and C. E. Cugnasca1

Year of publication: 2016

Description: The growing use of mobile devices, besides contexts as the Internet of Things, are demanding all the efforts to provide wireless communications alternatives. Optical wireless communication is posing as a promising complementary technology to radio frequency, especially due to considerable deployments in solid-state lighting technology and its adoption in many domains.

Title: "Collaborative positioning and embedded multi-sensors fusion Co-operation in advanced driver assistance system"

Authors: N. Salameh, G. Challita, S. Mousset, A. Bensrhair, S.Ramaswamy

Year of publication: 2013

Description: In this paper, they propose two different applications in the area of V2V communications. First, they present a method for better car tracking using GPS information shared through the V2V communication and a vision system in order to support accurate positioning. To accomplish this, they propose to use particle filtering techniques, and when GPS data is unavailable, or of poor quality, they couple GPS data with vision data collected from the vehicles. Second, they present a new simulated framework for prototyping the whole process by combining embedded data, vision data and V2V simulations to progress toward an anti-collision application. This framework could provide a better understanding of road security.

Title: “Content Sharing in Internet of vehicle :Two matching-based user-association approach”

Authors: Franceso Chiti, Romano Fantacci.

Year of publication: 2016

Description: This paper discusses the user association methods to optimize the information dissemination in IoV. With joint consideration of vehicles’ quality of service (QoS) requirement and the information gained through, the user association problem is formulated as a mix integer linear programming (MILP).

Title: “Vehicle to Vehicle Communication using RFID along with GPS and WAP”

Authors: A.VanithaKatherine, R.Muthumeenakshi, N.Valliekha.

Year of publication: 2014

Description: The main objective of this is to turn every participating vehicle into a wireless router or node, allowing vehicles approximately 100 to 300 meters of each other to connect and, in turn, create a network with a wide range.

II. BLOCK DIAGRAM

VEHICLE UNIT

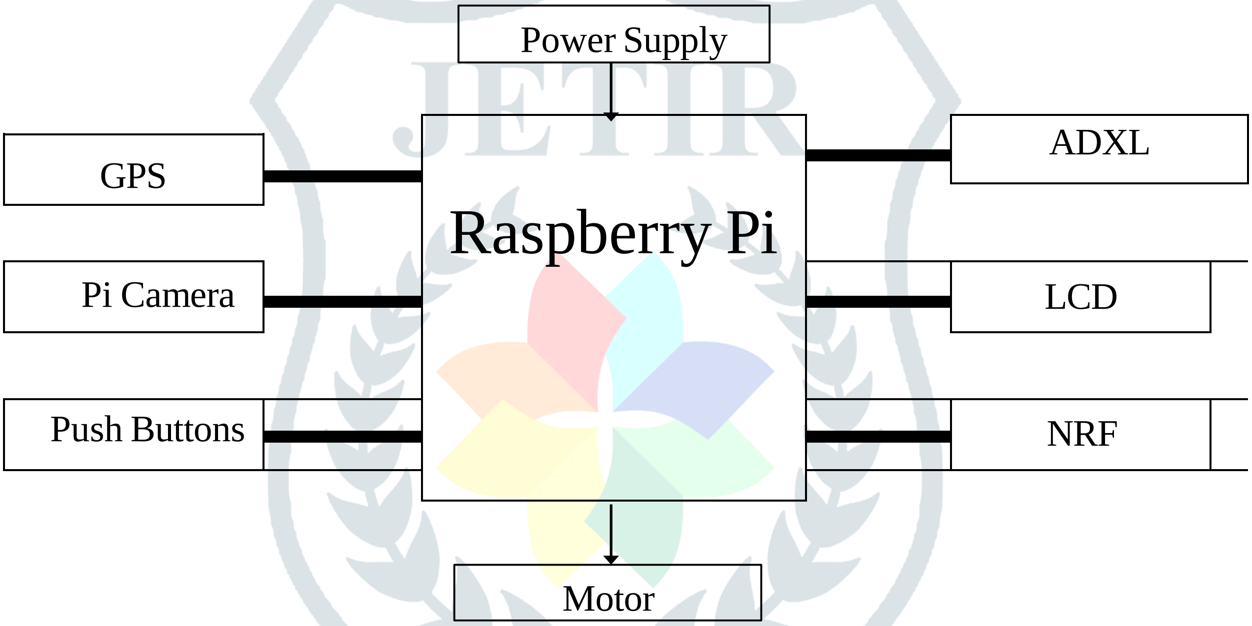

FIG 1: Vehicle unit

BUILDING UNIT

Working

IOV comprises a wireless network where automobiles send messages to each other with information about what they're doing. This data would include speed, location, direction of travel, braking, and loss of stability. IOV works with DSRC (Dedicated Short Range Communications), which is a type of Wi-Fi that sends brief messages up to 10 times a second over short distances, about 1,000 feet. On a busy highway, vehicles might send automated messages to each other communicating things like “Road is slippery,” or “Ambulance coming!” or “Travelling 63 mph, road clear”.

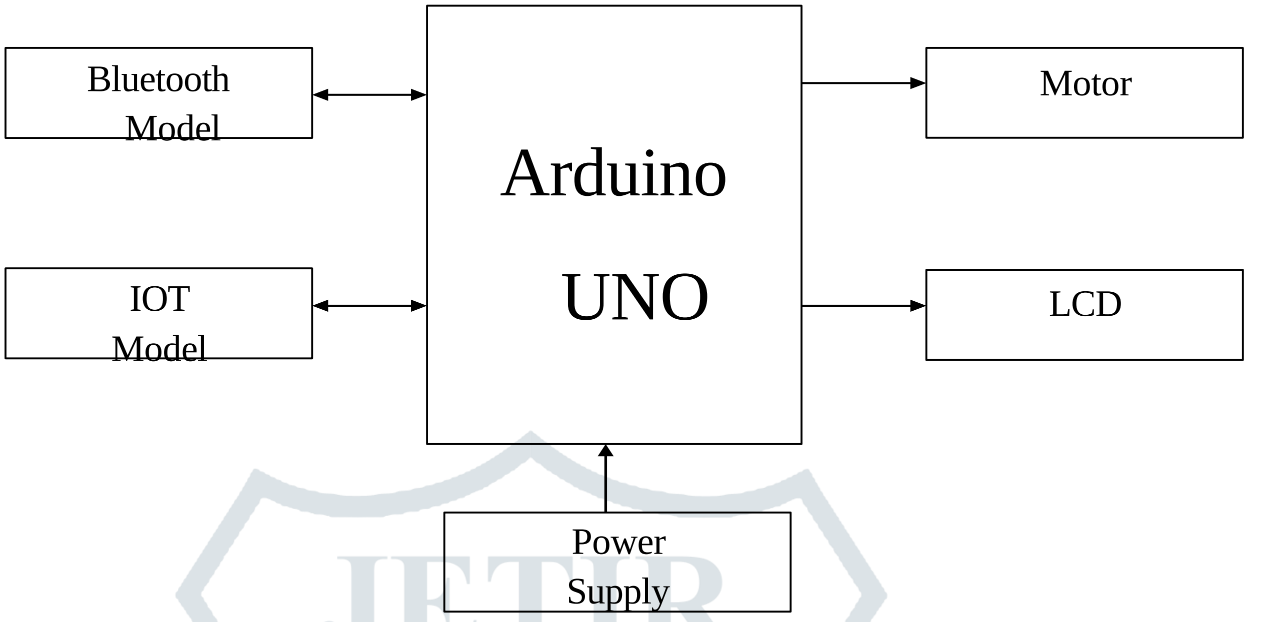

FIG 2. Building unit

HARDWARE REQUIREMENT:

1. Raspberry Pi
2. Pi Camera
3. GPS
4. NRF transceiver
5. LCD display
6. ADXL
7. Motor driver and motors
8. Arduino
9. ESP8266

SOFTWARE REQUIREMENTS:

1. Arduino ide
2. Python
3. Raspbian OS

IV METHODOLOGY

This model is designed using a Raspberry PI single board computer used for embedded application. The Interfacing components used are PI camera, GPS Modem, Door Sensors, Wi- Fi Dongle, NRF transceiver module, LED display, Push buttons, Bluetooth model, motor. USB mouse and key board can be used for user-friendly usage of the Board. The 32 bit ARM controller on the Raspberry Device supports the Functionality as the CPU core. The Linux OS is used as the Default operating system responsible for handling the tasks and peripheral on chip components. Python scripting is used for the programming the device and Functionalities

i. . VEHICLE TO VEHICLE COMMUNICATION

This section presents an implementation of the overall system. Figure 3. shows the block diagram of our proposed system which consists of raspberry pi as a central unit and various sensors connected to it.

In real time vehicle are moving in the one direction, we don't know what is going on inside the vehicle. If any problem occurs, only the person in vehicle can know about what problem occurred to the vehicle. In proposed system we extend our data transmission to devices for transmission data from one vehicle to another using NRF transceiver module from which we can get information like what the situation is goingon inside the vehicle. we will get the information through NRF transceiver module communication we are sending the data. By this we can overcome many problems.

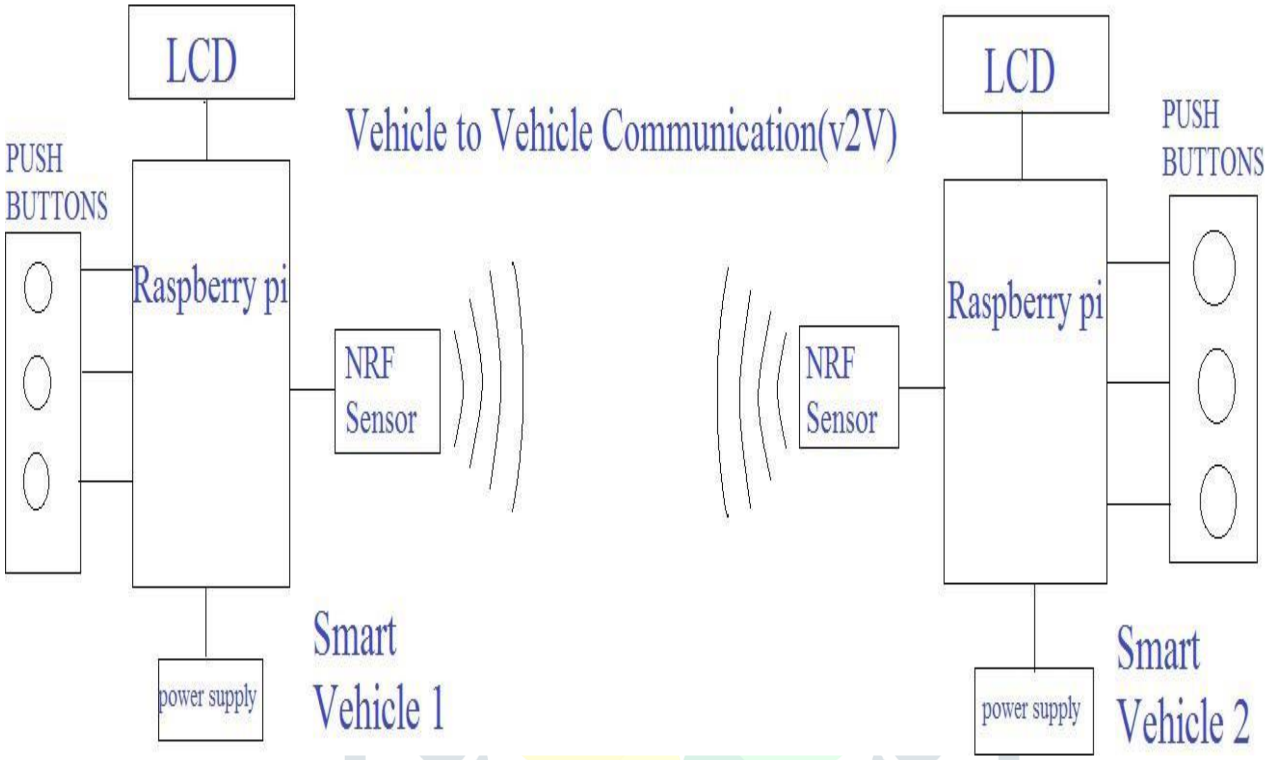

Fig 3.: Block diagram for Vehicle to Vehicle Communication.

ii. VEHICLE TO ROAD COMMUNICATION

This section presents an implementation of the overall system. Figure 4. shows the block diagram of our proposed system which consists of raspberry pi as a central unit,LD to display message and GPS.

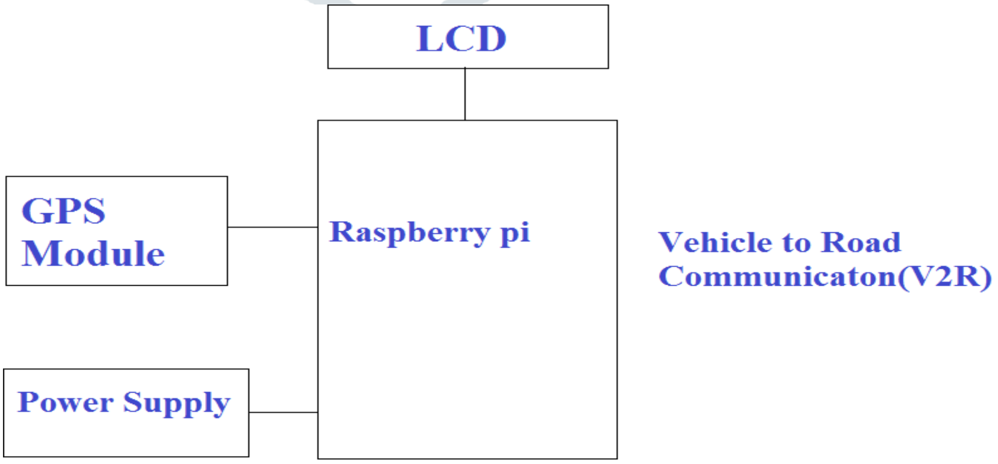

Figure 4 Block diagram for Vehicle to Road Communication.

iii. VEHICLE TO PERSON COMMUNICATION

The Door Lock is unlocked using face detection algorithms. In case of unauthorized entry the driver is notified through the email that the vehicle has been stolen/mishandled and the driver can activate the Tracking system which will enable the camera and start tracing the GPS location. The user can select whether he needs the Internal or External Image captured and saved over the device. The Mailing System utilizes the Hotspot Connection and Populates a mail to the users mail ID at a specified periodic interval.

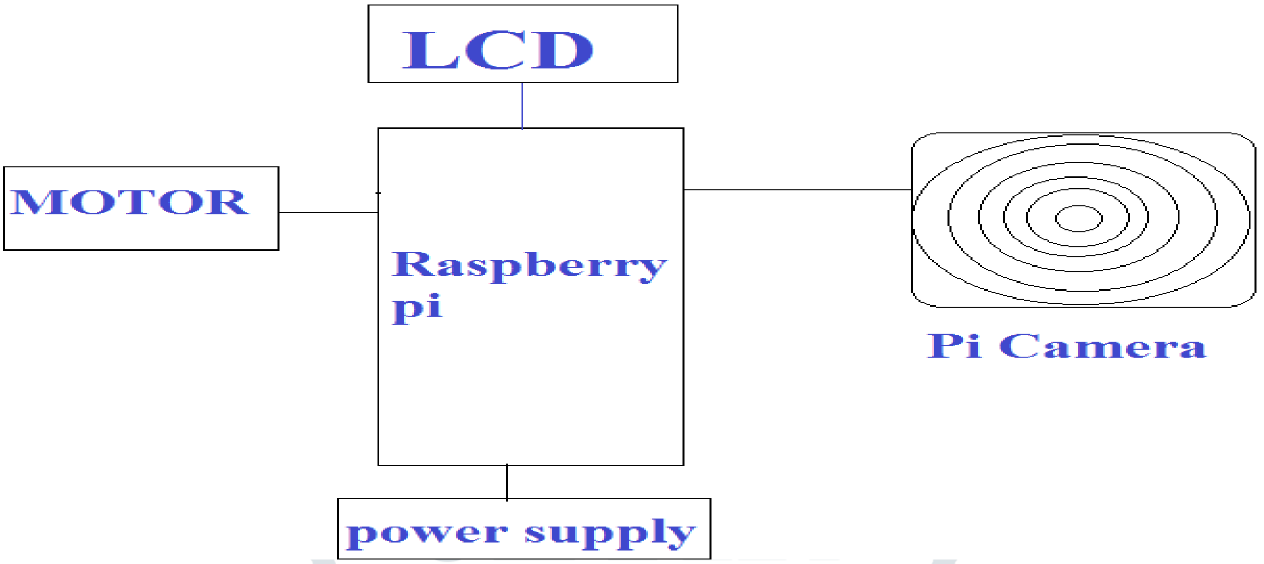

Figure 5: Block diagram for Vehicle to Person Communication.

iv. VEHICLE TO INFRASTUCTURE COMMUNICATION

The V2I enables vehicles in transit to interface with the infrastructure like home, logistic, bus stations. Commonly, V2I communications are wireless, bidirectional. This information is sent from the elements of the infrastructure to the vehicle, or vice versa, raspberrypi and aurdino. In the VTI, V2I sensors can acquire infrastructural data and provide travelers with real-time advice, sending information on road conditions, traffic congestion, any accidents in the roadway, the presence of construction sites and the availability of parking spaces. Likewise, traffic supervision and management systems can use the data collected from the infrastructure and vehicles to set variable speed limits and adjust the Signal Phase and Timing (SPaT) to achieve fuel savings and facilitate traffic flows.

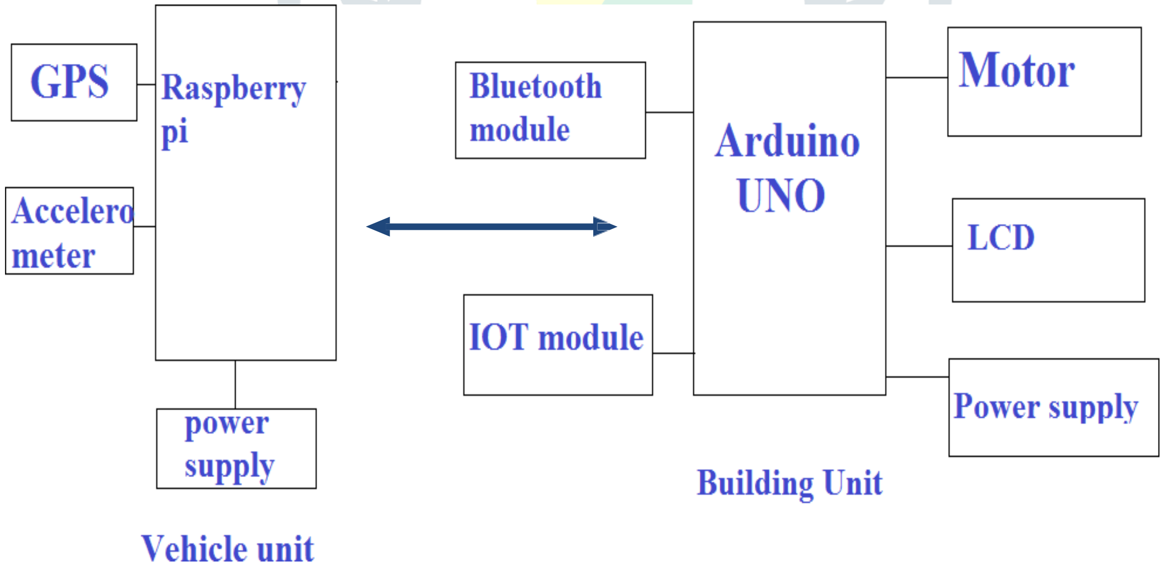

Figure 6: Block diagram for Vehicle to Infrastructure Communication.

V RESULTS AND DISCUSSION

In this project, we got our required output and a working prototype was implemented. The figure 5.1 shows output screen is the Python Shell where the debug output of the python code for raspberry pi is shown. The code for the IOV is debugged without any error.

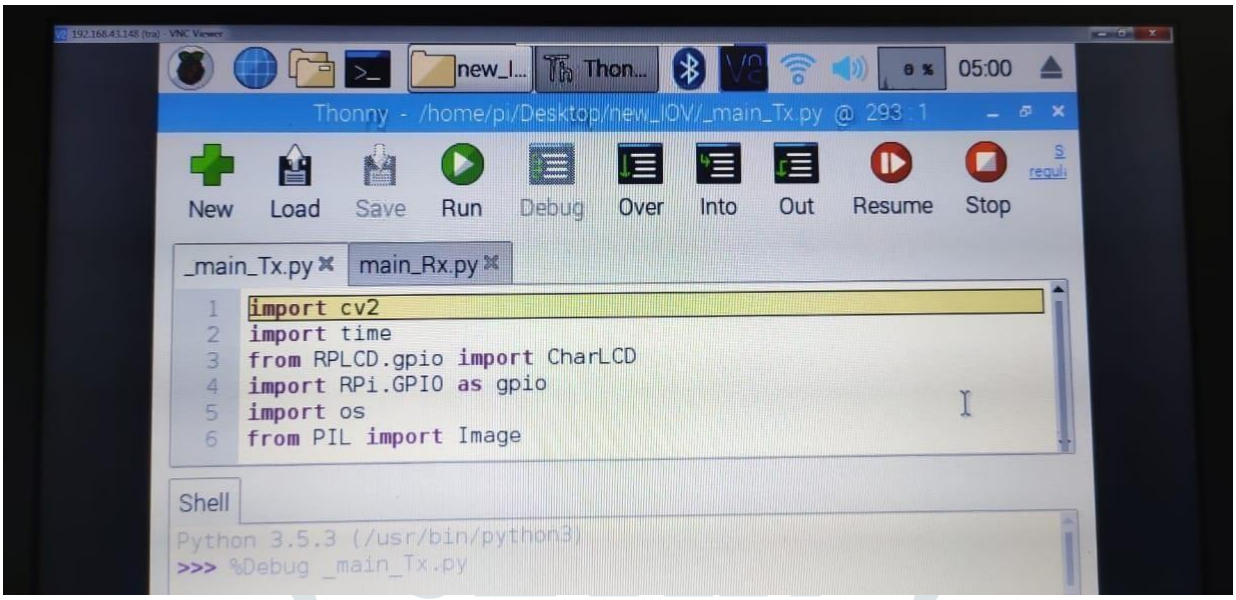

Figure 5.1: Output screen of python shell.

Vehicle tracking

The proposed system hence made good use of Smartphone technology by providing safety and secure traveling to the traveler using wrong path alert mechanism. The proposed system plays an important role in real time tracking and monitoring of vehicle by updating vehicle real time information after certain interval of time in order to monitored vehicle continuously. Whenever driver drives vehicle on the wrong path or in case of vehicle's accident situation occurs, the proposed system provides the vehicle's current location to the owner mobile. Hence this benefits to track the vehicle as early as possible. Student's safety mechanism also gets provided using tracking system. In the certain situations, as per student's safety concern, the proposed system also gives alert massage on student parents mobile so that parents also know about their children's safety.

Figure 5.2: Hardware connection for location tracking.

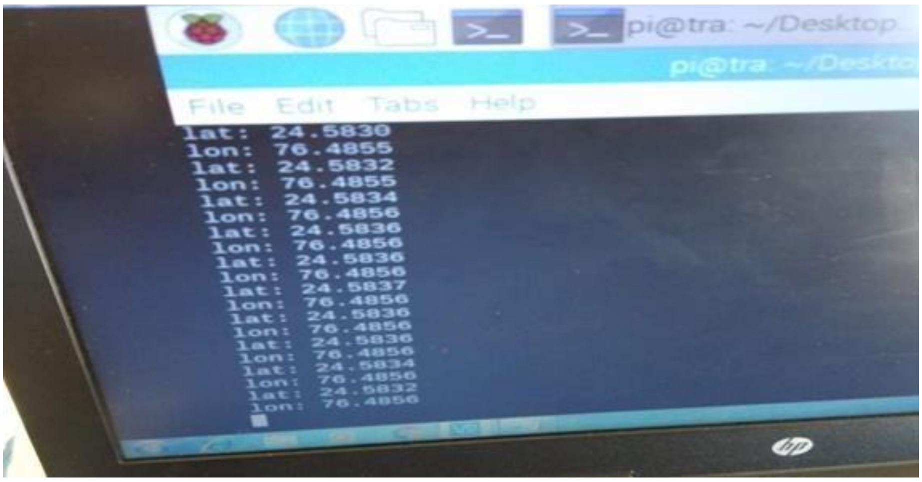

Figure 5.3: Output screen of GPS location.

Figure 5.4: Fetched GPS location to feed Raspberry pi.

Figure 5.2 shows the hardware connection to track the gps location. The figure 5.3 shows the display in which the continuoud latitude and lagitude of the current location are displayed. This is locations are used to continuesly track the vehicle location. Figure 4.4 shows the location that which are predefined for a specific purpose and these are stored in the raspberry pi. The tracked location are compared with stored stored location to give alert to driver and the owner

The intimation message in the proposed system is sent to the authorized person over email. Finally, this proposed system can be used for multiple vehicle automation rather than a single vehicle. We can install a panic button into the system especially for rented cabs and school/college buses thus helps in alerting someone in the emergency situation. We also proposed a Smart Car based application which can secure the car from theft and track the Missing Vehicles.

Vehicle to Person

Figure 5.5: Hardware connection of PI cam with raspberry pi.

Figure 5.5 shows the hardware connection to track the gps location. The figure figure 5.6 shows the console output about database creation. This database is created using the owners images. The database is shown in fig 5.7.The figure 5.8 shows the console output about training the database.After collecting the sample inputs, the machine is trained with the sample faces and creates the trainer.yml file shown in figure 5.9. This figure 5.10 and 5.11 shows the face recognization output for know and unknow users.

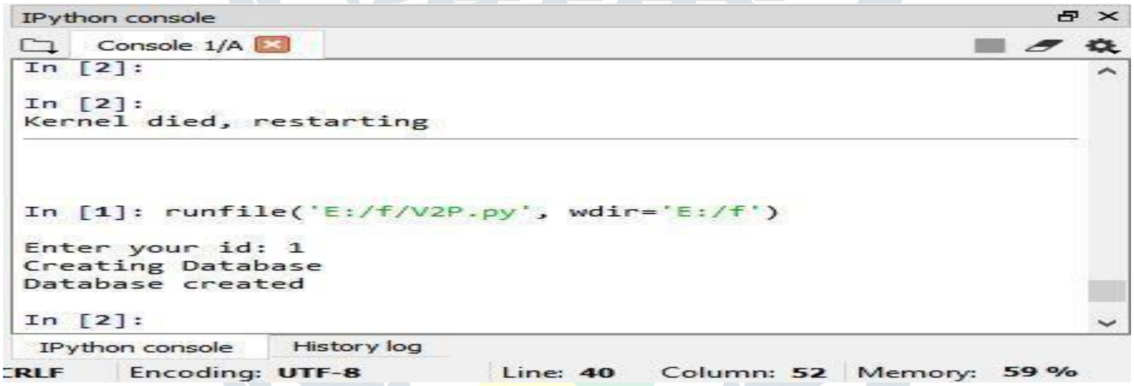

Figure 5.6: Database creation.

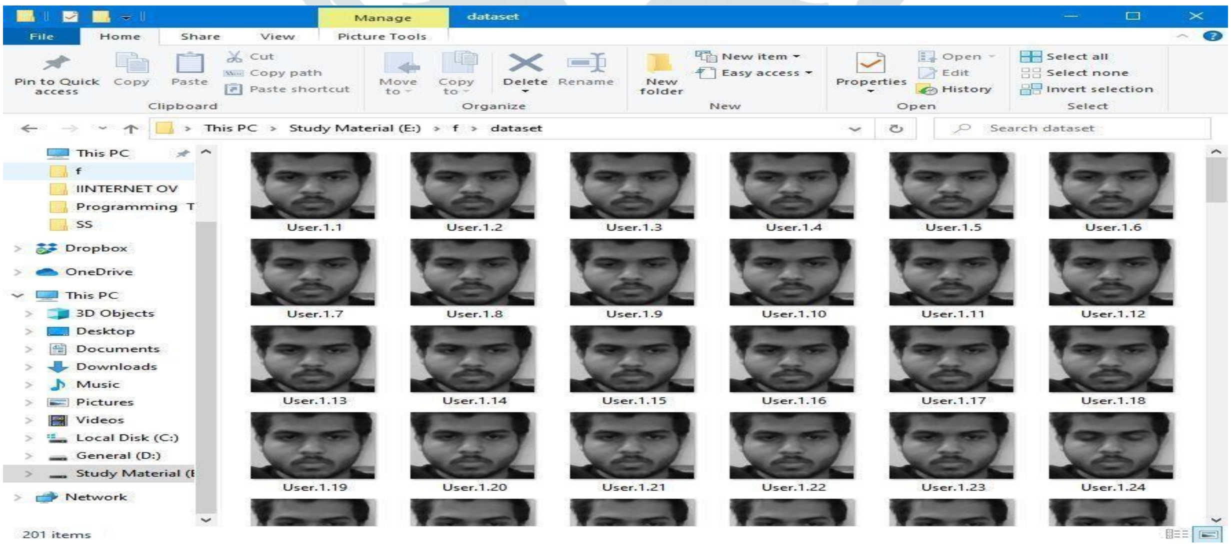

Figure 5.7: Database created.

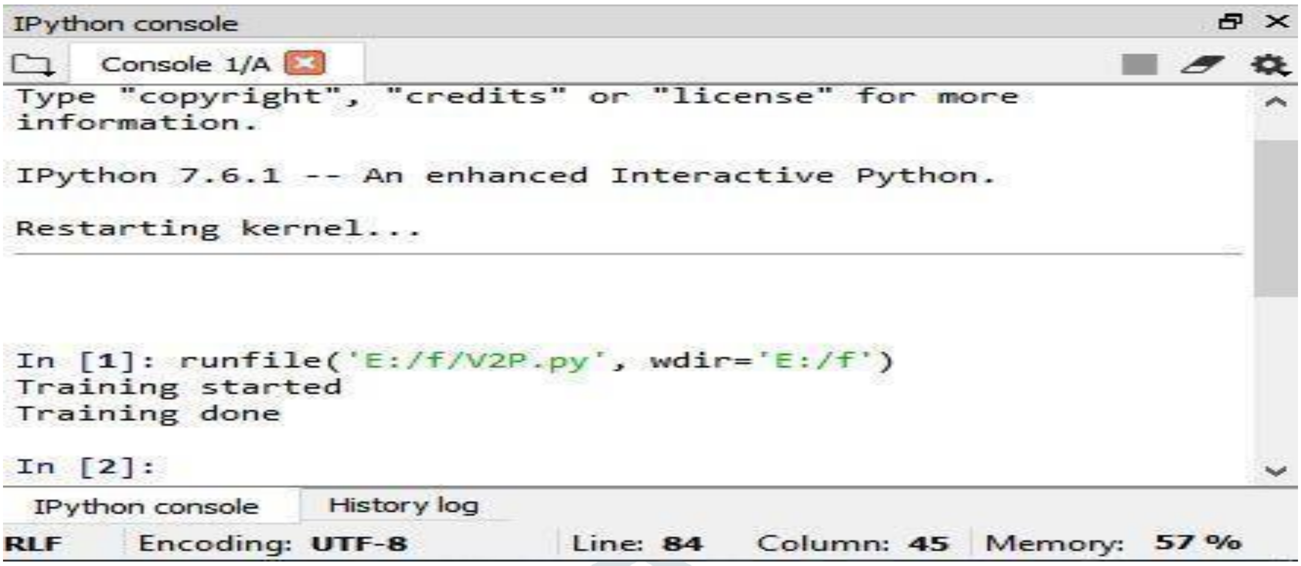

Figure 5.8: Training the Mechine.

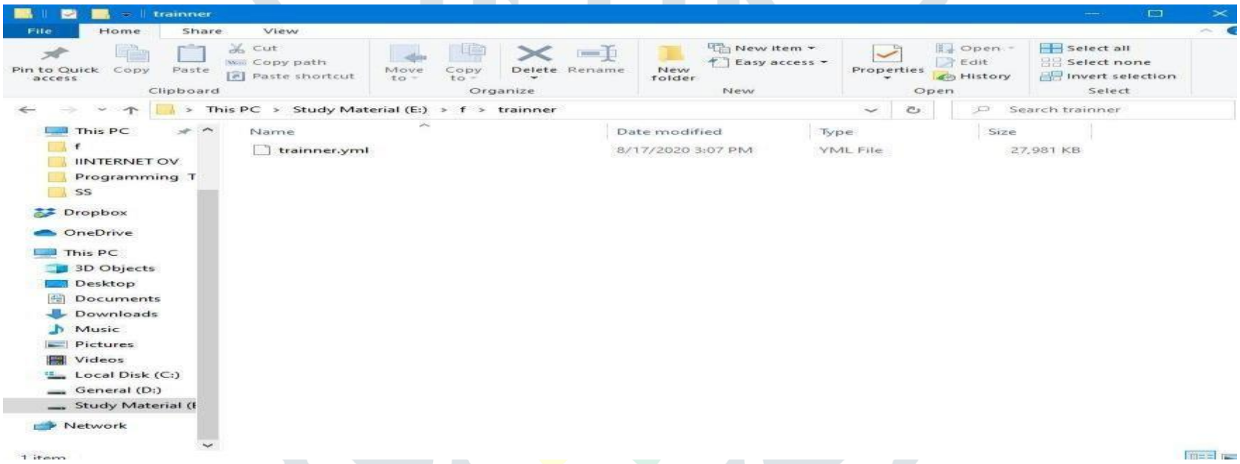

Figure 5.9: Trainer.yml file

If the face is recognized the door is opened and a message is shown as shown in figure 5.1. If the face is no recognized an unauthorized message is displayed on the screen as shown in fig 5.11.

Figure 5.10: Face unlocked.

Figure 5.11: **Unknown authorization , failed to unlock.**

Vehicle to Infrastructure.

In v2i, if any accident occurred to the vehicle, the location of the spot and a image of surrounding is captured and sent to the registered mail. The fig 5.12 shows the console output. The figure 5.13 shows the received email containing the image and GPS location of the accident spot.

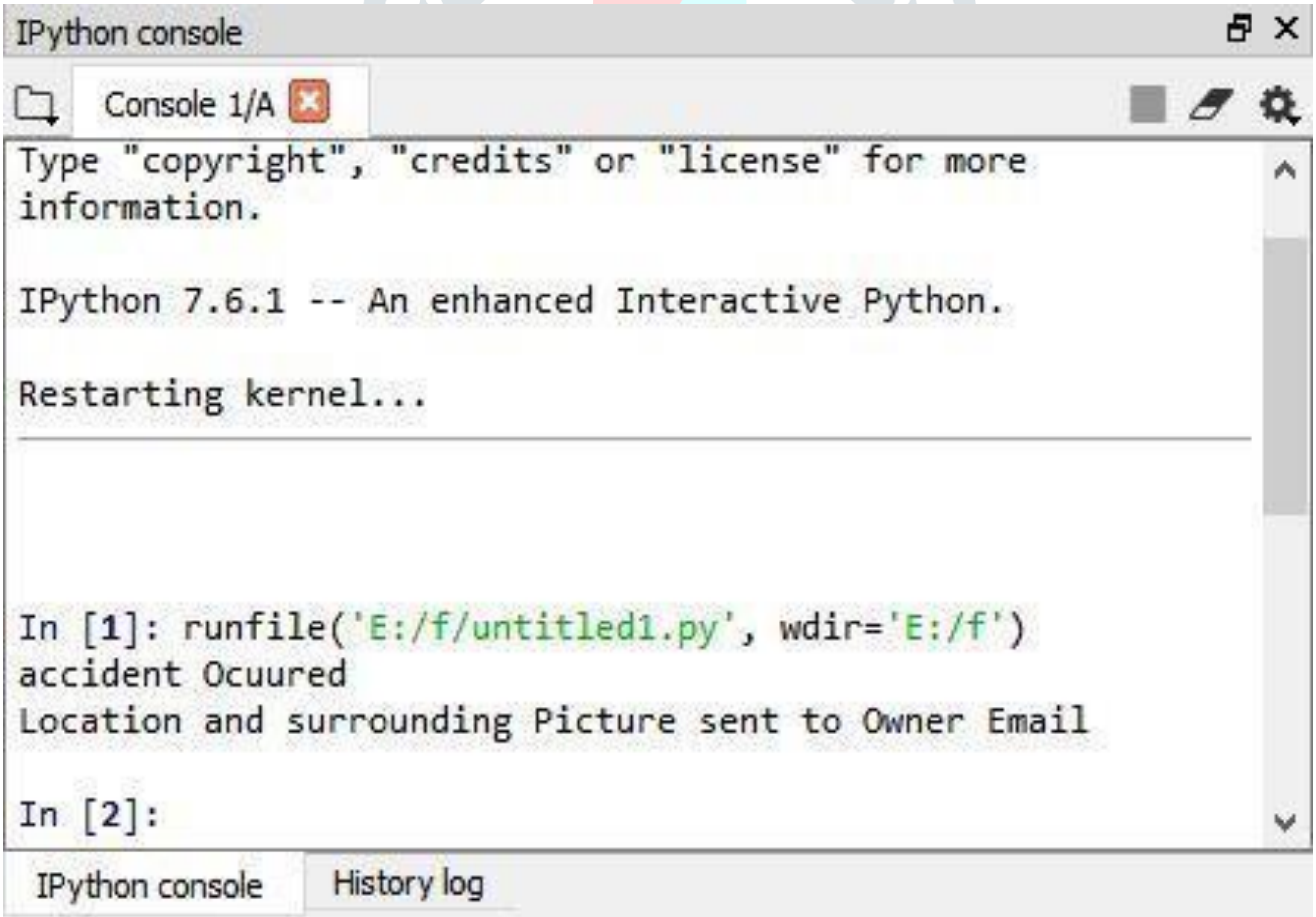

Figure 5.12: Accident detection and mail sending output.

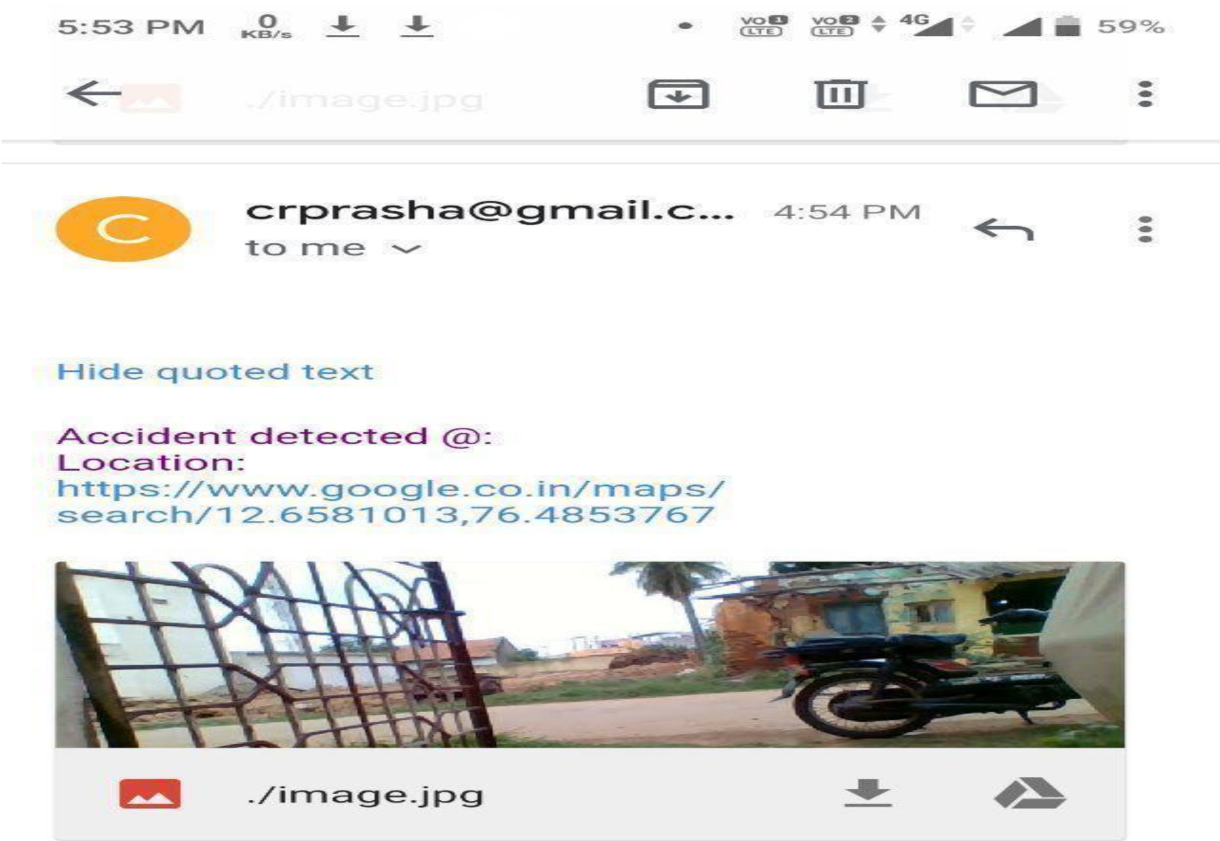

Figure 5.13: Email received with accident location and image.

VI. CONCLUSION

This paper has presented a comprehensive survey of research works on applications and vehicle interaction and communication models. In this paper we identified the potential advantages posed by the concept of IoV over the tradition VANET. We suggest a much efficient way of traffic management, and making road travel better for everybody. We make an impact on the effectiveness of monitoring and emergency response to Traffic incidents. Pi based Vehicle monitoring, tracking and controlling uses internet to track the vehicle position, monitor certain datas and controlling action like ON/OFF the motor. The role of embedded system for accurate and reliable transmission of data using wireless technology in the real world vehicle automation is important. This concept of embedded system in wireless technology is applied in the proposed work for vehicle automation by using Internet and GPS, along with Pi and Arduino Controllers. The proposed system has a broad application foreground in the real application field to remotely track and monitor the driver activity along with certain important sensor datas of the vehicle. The stored data on spreadsheet helps the vehicle round trip and can have the exact information of the vehicle condition and driver activity.

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