

Smart Car System using Raspberry pi

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Abstract—Today's modern cars are becoming more and more connected to online world through the cloud. The main motivation is that the connected cars are able to access, collect and process a wide range of data through the cloud. There is an urgent need for improvement in the delivery of services. Smart car system allows lower traffic congestion by rerouting the vehicles to alternative roads and traffic is reduced significantly. Medical emergency needs can be met by uploading the information to cloud. Similarly vehicle breakdown problems can also be solved. In this paper a smart car system is implemented by using Raspberry pi. Two raspberry pi modules have been used. Either one of two modules can be used as, for transmission or reception of information. Python is the programming language used to implement the system. Four buttons are used to send four different information. Dropbox account has been created and is used as a cloud to upload the information. The required message is sent by pressing the right button. The information gets transferred from one raspberry module to another module and also gets uploaded to dropbox account in the form of excel sheet which is accessed through smart phone.

Keywords-Python,Raspberry Pi,dropbox,Keys,Smartcar.

I. INTRODUCTION

In this world everyone needs a comfort in driving. While today's vehicles are already able to sense the surrounding environment. We expect that future cars will communicate with a roadside communication infrastructure and with each other. Connected vehicles create a fundamental building block of intelligent transport systems (ITS). This provides numerous application services to improve safety and comfort of driving. Now a day's people prefer wireless connection because they can interact with people easily and it requires less time.

Communication between vehicles can be used to realize driver support and active safety services like collision warning, up-to-date traffic and weather information or active navigation systems. Communication between vehicles and RSUs(Road side units) can also increase safety. Traffic lights or road signs could be equipped with a communication device to actively inform vehicles in the vicinity. Hence, drivers can receive information on traffic flow, road conditions or construction sites directly from the respective RSU. In addition, static hazard areas, e.g. construction sites, could be equipped with a RSU to warn surrounding vehicles. RSU-based services will play an important role during the introduction phase, since they are almost unaffected by the penetration rate.

A smart car system avoids the traffic congestion by sending the traffic information to drivers. Roadside assistance, medical emergency help can also be provided by updating the information. This paper discusses about the implementation of the work done.

II. BLOCK DIAGRAM

The Block diagram of "Smart Car System" is shown in Figure-1. Here one raspberry pi should be fit into the car which acts as a transmitter of information and other should be fit into other car which receives the information. RFID reader is used to read roadside signboard. K1,K2,K3,K4 are four different keys used to send four different messages and hence four different services like vehicle breakdown, medical emergency, traffic information & any roadside assistance.

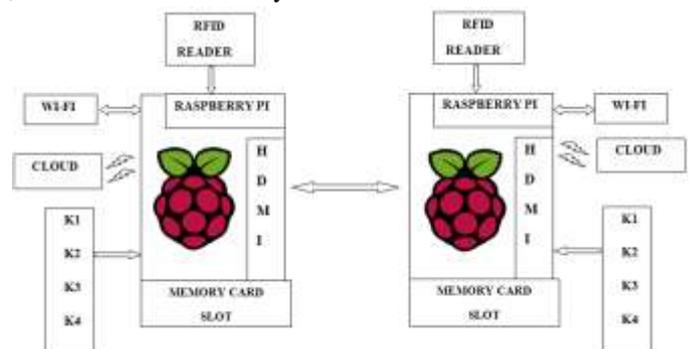


Fig 1: Block diagram of smart car system

III. WORKING PRINCIPLE

- Connection of Raspberry pi to the HDMI : For connecting the raspberry Pi to the projector, there is HDMI port available on Raspberry Pi. If the projector doesn't have HDMI input then by using HDMI to VGA converter , connection can be made.
- SD card Formation and Installation of OS on it: Raspberry pi doesn't have memory .So SD card has to be inserted . OS has to be installed before inserting SD card in Raspberry Pi. There are different OS available on Raspberry Pi official website. In this system Noobs OS is installed. The OS is available on its official website. This OS can be downloaded and then that can be installed on SD card using Win 32 disk imager. Then SD card will be inserted into Raspberry Pi.
- Switch on Raspberry Pi and Create Network Connection : After inserting SD card into the Pi, 5V power supply can be given to Pi using adapter. Also for network connection use Ethernet cable or USB Wi-Fi dongle which can be connected to one of the USBs of Raspberry pi. On Raspberry Pi window , the WIFI icon is available. Turn it on and connect to the network.
- Installation of Softwares required for the system : some software is required to be installed on it for creating the system. Install LibreOffice once on Raspberry Pi. For that , enter instruction in terminal window "sudo apt-get install libreoffice". Also to install python instruction is "sudo apt-get install python". Install other softwares like VLC player, Adobe reader by entering similar commands.
- Creating account in Drop box cloud : By creating drop box at www.dropbox.com, sign in using created account then create an app for accessing the files, images, videos. Next note down the application key and application secret key and then copy those keys, paste it in the program.
- Executing the program : After executing the program the respective URL will be obtained. Copy and Paste in the website where in the authentication key will be generated for that URL at the drop box. Paste that key at the executing screen to check whether it is valid or not , if it is valid press the key or read the RFID tag such that to the near by cars and for the cloud, the same message will be transmitted and similarly it will be received.

IV. COMPONENTS OF SYSTEM

- Raspberry pi 3 : The Raspberry Pi 3, as shown in Figure 2 is the third generation Raspberry Pi[4]. It replaced the Raspberry Pi 2 Model B in February 2016. Main features are Broadcom BCM2837 64bit

ARM Cortex-A53 Quad Core Processor SoC running at 1.2GHz, 1 GB RAM, 10/100 Ethernet (RJ45) , 4 x USB2.0 Ports with up to 1.2A output ,Storage: microSD, 27 x GPIO, Supports Raspbian, Windows 10 IoT Core, OpenELEC, OSMC, Pidora, Arch Linux, RISC OS[4].



Fig 2 :[4] Raspberry Pi 3

- Keys/Buttons : For keys or buttons are used to deliver four different messages from one car to another car or from one car to cloud in the form of excel sheet. The circuit which is used to deliver the four different messages is shown in Figure-3.

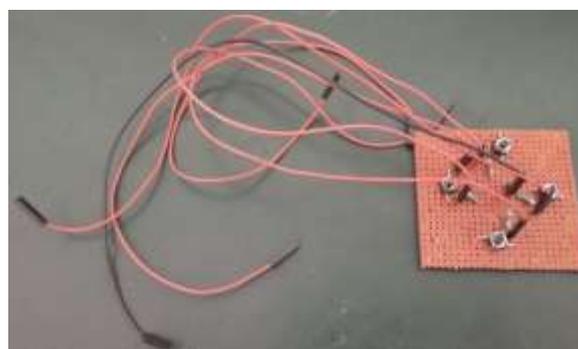


Fig 3:Keys circuit

V. ALGORITHM

- Step 1 : Start
- Step 2 : Include (import) all libraries to program.
- Step 3: Signing into cloud with proper ID.
- Step 4: Creating application in cloud in order to load files.
- Step 5: Checking authentication whether application key is correct or not and if correct, go to generated URL and get access token key.
- Step 6: Monitor entire system after valid token key is detected

Step 7: Checking whether key is pressed or not if pressed , then search nearest IP address and send information to searched IP address and load information to cloud.

Step 8: Cloud information would be shared to searched IP address.

Step 9: RFID tags are used to get sign indication, if RFID card is detected , then respective key information will be displayed.

Step 10: Send respective key information to searched IP address and load information to cloud.

Step 11: Check whether other device has sent information or not, if sent then display the information.

Step 12: Stop

VI. RESULTS

When any of the key is pressed respective information will be transmitted and received. when the button is pressed, the message `emergency` is shown, that emergency call is transmitted to another Pi as shown in Figure- 4

```
>>> ***** RESTART *****
>>>
My IP- 192.168.225.73 5002
[INFO] Authorize this application: https://www.dropbox.com/1/oauth2/authorize?response_type=code
&client_id=cppv6p7ggy6mr3
Enter auth code here: 9hTCwM9zZYAAAAAAAAAb71edQJL3x1fQwfbC19QLE
[SUCCESS] dropbox account linked
Running On Netmask: 192.168.1.
Please Wait : Scan IPs ...
('IP : ', '192.168.225.1', 'Is available')
('IP : ', '192.168.225.21', 'Is available')
[UPLOAD] Thursday 20 April 2017 06:25:35AM
link - a https://www.dropbox.com/s/pakbdn5lnb5gho/sample.xlsx?dl=0
link - a Tue, 01 Jan 2030 00:00:00 +0000
Running On Netmask: 192.168.1.
Please Wait : Scan IPs ...
('IP : ', '192.168.225.1', 'Is available')
('IP : ', '192.168.225.21', 'Is available')
Running On Netmask: 192.168.1.
Please Wait : Scan IPs ...
('IP : ', '192.168.225.1', 'Is available')
('IP : ', '192.168.225.21', 'Is available')
I have sent request for EMERGENCY
```

Fig 4: Message sent as Emergency.

The transmitted emergency call is received in another pi as shown in Figure-5.

```
Python 2.7.9 (default, Sep 17 2016, 20:26:04)
[GCC 4.9.2] on linux2
Type "copyright", "credits" or "license()" for more information.
>>> ***** RESTART *****
>>>
My IP- 192.168.225.21 5002
[INFO] Authorize this application: https://www.dropbox.com/1/oauth2/authorize?response_type=code
&client_id=cppv6p7ggy6mr3
Enter auth code here: 9hTCwM9zZYAAAAAAAAAbQBrU09mCSUN_I3iBsiKMs
[SUCCESS] dropbox account linked
('EMERGENCY CarNo-KA06 EK-3813 Contact-num-7259218706', ('192.168.225.73', 5002))
('https://www.dropbox.com/s/pakbdn5lnb5gho/sample.xlsx?dl=0', ('192.168.225.73', 5002))
('Tue, 01 Jan 2030 00:00:00 +0000', ('192.168.225.73', 5002))
```

Fig 5: Message received as Emergency.

When the button is pressed, the message traffic' is shown, and is transmitted to another Pi as shown in Figure-6.

```
[INFO] Authorize this application: https://www.dropbox.com/1/oauth2/authorize?response_type=code
&client_id=cppv6p7ggy6mr3
Enter auth code here: 9hTCwM9zZYAAAAAAAAAbQBrU09mCSUN_I3iBsiKMs
[SUCCESS] dropbox account linked
('EMERGENCY CarNo-KA06 EK-3813 Contact-num-7259218706', ('192.168.225.73', 5002))
('https://www.dropbox.com/s/pakbdn5lnb5gho/sample.xlsx?dl=0', ('192.168.225.73', 5002))
('Tue, 01 Jan 2030 00:00:00 +0000', ('192.168.225.73', 5002))
Running On Netmask: 192.168.1.
Please Wait : Scan IPs ...
('IP : ', '192.168.225.1', 'Is available')
('IP : ', '192.168.225.73', 'Is available')
[UPLOAD] Thursday 20 April 2017 06:26:48AM
link - a https://www.dropbox.com/s/pakbdn5lnb5gho/sample.xlsx?dl=0
link - a Tue, 01 Jan 2030 00:00:00 +0000
Running On Netmask: 192.168.1.
Please Wait : Scan IPs ...
('IP : ', '192.168.225.1', 'Is available')
('IP : ', '192.168.225.73', 'Is available')
Running On Netmask: 192.168.1.
Please Wait : Scan IPs ...
('IP : ', '192.168.225.1', 'Is available')
('IP : ', '192.168.225.73', 'Is available')
I sent there is Traffic
```

Fig 6:Message sent as Traffic.

The transmitted traffic call is received in another pi as shown in Figure-7.

```
[INFO] Authorize this application: https://www.dropbox.com/1/oauth2/authorize?response_type=code
&client_id=cppv6p7ggy6mr3
Enter auth code here: 9hTCwM9zZYAAAAAAAAAb71edQJL3x1fQwfbC19QLE
[SUCCESS] dropbox account linked
Running On Netmask: 192.168.1.
Please Wait : Scan IPs ...
('IP : ', '192.168.225.1', 'Is available')
('IP : ', '192.168.225.21', 'Is available')
[UPLOAD] Thursday 20 April 2017 06:25:35AM
link - a https://www.dropbox.com/s/pakbdn5lnb5gho/sample.xlsx?dl=0
link - a Tue, 01 Jan 2030 00:00:00 +0000
Running On Netmask: 192.168.1.
Please Wait : Scan IPs ...
('IP : ', '192.168.225.1', 'Is available')
('IP : ', '192.168.225.21', 'Is available')
Running On Netmask: 192.168.1.
Please Wait : Scan IPs ...
('IP : ', '192.168.225.1', 'Is available')
('IP : ', '192.168.225.21', 'Is available')
I have sent request for EMERGENCY
('TRAFFIC CarNo-KA06 EK-9607 Contact-num-9742429663', ('192.168.225.21', 5002))
('https://www.dropbox.com/s/pakbdn5lnb5gho/sample.xlsx?dl=0', ('192.168.225.21', 5002))
('Tue, 01 Jan 2030 00:00:00 +0000', ('192.168.225.21', 5002))
```

Fig 7 : Message received as traffic

The information is also uploaded to the dropbox account, which is taken to be of cloud, as shown in the Figure-8 in the form of excel sheet.

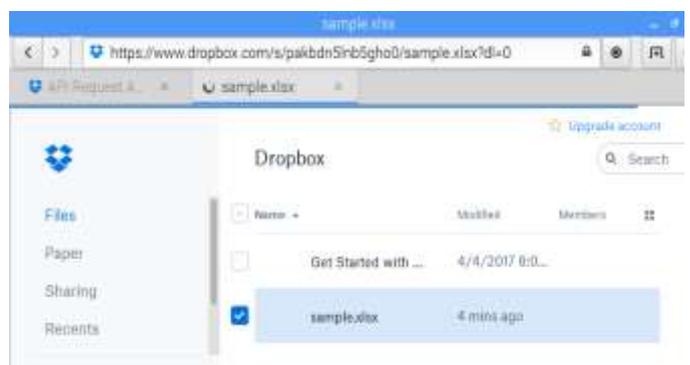


Fig 8: Message uploaded to dropbox

VII. CONCLUSION

Smart Car System using Raspberry Pi has been implemented two Raspberry Pi modules have been used, one is used to send

the information and other is used to receive the information. Four keys are used to deliver four different information such as traffic congestion , medical emergency , vehicle break down and any other help .This information can be sent from one car(one Raspberry Pi module) to another car(other Raspberry Pi module) and also to the cloud in the form of excel sheet, where information can be accessed from the link given. In this way smart car system helps in the dissemination of services by communicating with other cars.

VIII. FUTURE SCOPE

There is a scope for the further enhancement of this project which has been implemented.GPS device can be connected to Raspberry Pi module so that location information could be sent to nearby cars and also to the cloud. GSM module can also be used to send message about car information to mobile phone. Communication between nearby cars can also be made possible with wifi modules so that internet connection is not required all the time. A number of technology based systems have evolved to support transportation operations, traffic management, traveller information, fleet management, and incident control.

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