



Vehicle Aware – IoT Based Security for Parked Vehicle

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ABSTRACT: This project is mainly about the safety for the reserved vehicle. We are all working in the busiest metropolitan cities. Here parking the vehicle plays a consequent role. Due to this, the traffic congestion will occur. The parking slot have to be reserved in advance. The reservation will be done by mobile application. The reserved slot won't be used by other persons to reserve. Though we reserved, the vehicle should be safe. The existing system is only for reservation and payment for parking. The built-in alarm will be ON only if any trespasser touches the vehicle. But our concept is to alert the user with photograph and message when an intruder enters into that parking lane. This will reduce the theft or abusing the vehicle. The detection will be done by Pi Cam and LDR with Laser which plays major role in the project module.

KEYWORDS: Internet of Things, Security, PI Cam, Raspbian, VNC server

I INTRODUCTION

The Internet of things (IoT) refers to a type of network to connect anything with the internet by some protocols through sensing equipment to conduct information and communication in order to achieve smart recognitions, positioning, tracing, monitoring, and administration. IoT refers to the general idea of things especially everyday objects that are readable, recognizable, locatable, addressable through information sensing device and/or controllable via the internet, irrespective of communication means (whether via RFID, wireless LAN, WAN and other means). The IoT concept was coined by a member of the Radio Frequency Identification (RFID) development community and it has recently become more relevant to the practical world largely because of the growth of mobile devices, embedded and communication, cloud computing and data analytics.

In the world there are billions of objects can sense communicate and share information all interconnected over public and private Internet protocol (IP) networks. These interconnected objects have data regularly collected, analyzed and used to initiate action, providing a wealth of intelligence for planning, management and decision making. This is the world of IoT. Internet of things is internet of three things: (1) People to people, (2) People to machine/things, (3) Things/machine to things/machine, interacting through internet.

Characteristics of IoT:

1. Interconnectivity: With regard to the IoT, anything can be interconnected with the global information and communication infrastructure.
2. Things related services: the IoT is capable of providing thing related services within the constraints of things, such as privacy protection and consistency between physical things and their associated virtual things. In order to provide thing related services within the constraints of things, both the technologies in physical world and information world will change.
3. Heterogeneity: The devices in the IoT are heterogenous as based on different hardware platforms and networks. They can interact with other devices or service platforms through different networks.
4. Dynamic changes: The state of devices change dynamically, e.g., sleeping and waking up, connected or disconnected as well as the context of devices including location and speed. Moreover, the number of devices can change dynamically.
5. Enormous scale: The number of devices that need to be managed and that communicate with each other will be least an order of magnitude larger than the devices connected to the current internet.



Creating a Smart City is now becoming possible with the emergence of the IoT. One of the issues that smart cities facing is car parking facilities and traffic management systems. It has been found that finding an available parking spot is always difficult for drivers. It becomes harder with the increasing number of private car users. This concern attracted strategic investments from dedicated industry sectors to boost parking revenues through technology-enabled solutions like reduction in searching times, traffic congestion and road accidents. Problems related to parking and traffic congestion can be solved if the drivers can be informed in advance about the availability of parking spaces before reaching to their intended destination. More number of drivers are preferring paid parking. But what about the safety of the car. We came up with idea of providing security in some way to make the parking even easier. This directly adds value to the car parking business. It is stimulus for the development of intelligent car parking services for smart cities. Security System plays an important role to prevent unknown user entry into a secured place, which may include physical and any other such property, without being authorized. The security system is basically divided into two types, usual lock system and use of electronic automatic identification system. General lock system can be easily hacked by unwanted people thereby allowing unauthorized people into secured premises. There are several automatic identification technologies including barcode, magnetic stripe and Radio Frequency Identification (RFID) applied in security system.

II LITERATURE SURVEY

An overall IoT users in smart city ranging up to 8900 in China. Compels to focus on the parked vehicle and parking places. It ensures that the vehicle network deployed on an intricate metropolitan area reaches the desired seals for gathering data. Communication between networks is difficult. Hence Simulcity tool, which assist the design of a smart cities' communication convergent network. In case of providing power for some area where there is no sufficient power the distributed energy is fully used to provide energy for the smart parking system.

Getting a free space for parking one's car especially in populated areas, has not only become difficult but also results in several issues such as traffic congestion, wastage of time, environment pollution and most importantly unnecessary fuel consumption. On the other hand, car parking spaces in urban areas are not increasing at the same rate as the vehicles on the roads. Therefore, smart car parking system have become an essential need to address the issues significant work has been done in the domains of wireless sensor networks, cloud computing, fog computing and IoT to facilitate the advancement in smart parking services.

Thousands of interconnected IoT services produce an enormous volume of data termed as big data. However, privacy protection has become one of the biggest problems with the progress of big data. Personal privacy is usually challenged by the development of technology. An existing system focus on privacy protection for location trajectory data, which is collected in intelligent transportation system.

An existing system attempts to build "Parksense" which is a system that allows a smart phone top accurately and automatically sense and later navigate to the position at which the vehicles was parked to prevent the loss of vehicle.

An around view monitor (AVM) with deep learning approach is used to detect two essential elements for automated parking systems such as slot marking and obstacles. An evidence filter is used for simultaneous localization and mapping (SLAM) .

III PROPOSED SYSTEM

Working of Proposed system

This project is implemented on basis of IoT and we have used Python as major software tool to design the coding part. As we already discussed the exciting system provide a complete structure for parking the vehicle. The normal security for high end users was provided by a closed environment with surveillance camera. Here the new technique was implemented using simple tool of LDR module. LDR module usually senses light and send 1 as input, if an intruder crossing it then the input fluctuates. Taking this a first point we have designed a security for parked vehicle for high end users.

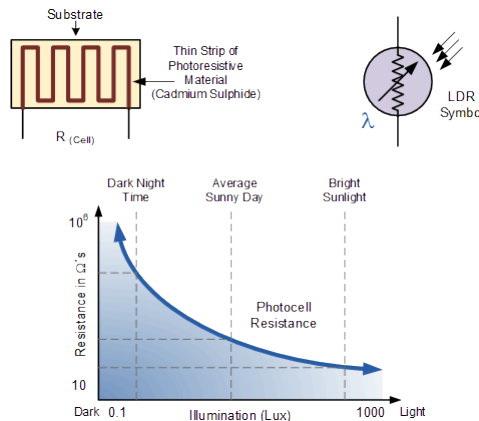


Fig 1. LDR sensing depending on light source

The LDR working will vary with respect to the Light source and atmospheric lights. The LDR sensing depending on the source is shown in the above graph. Fig 1.

The Laser of very small frequency is used as the light source to the LDR. The security system is using Laser and LDR are of many patterns. This Laser and LDR system issued in several home and industrial security. Considering the security for parked vehicle certain pattern is used. IoT is included after the detection of LDR input fluctuations. Raspberry Pi as core tool, it receives the input from LDR. The Pi Camera interfaced with Raspberry Pi will be initiated to take photo of intruder.

The **Pi camera module** is a portable light weight camera that supports Raspberry Pi. It communicates with Pi using the MIPI camera serial interface protocol. It is normally used in image processing, machine learning or in surveillance projects. It is commonly used in surveillance drones since the payload of camera is very less. Apart from these modules Pi can also use normal USB webcams that are used along with computer.

Features of Pi Cam

1. 5MP colour camera module without microphone for Raspberry Pi
2. Supports both Raspberry Pi Model A and Model B
3. MIPI Camera serial interface
4. Omni vision 5647 Camera Module
5. Resolution: 2592 * 1944
6. Supports: 1080p, 720p and 480p
7. Light weight and portable (3g only)

Using IoT a message and a picture of intruder will be sent to the owner. A converter is used to convert HDMI to VGA. The message is sent on prior followed by picture through e-mail with below block diagram. Fig 3.

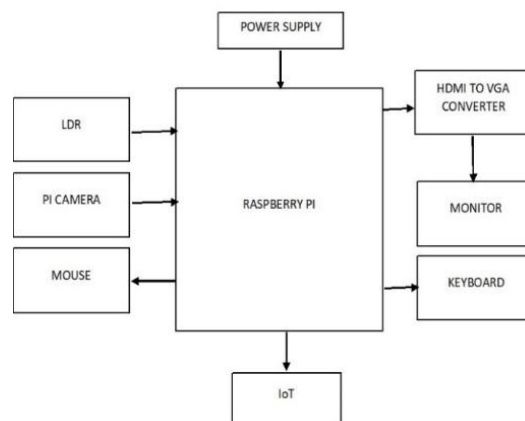


Fig 2. Block diagram of proposed system



Introduction to Raspberry Pi

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated, selling outside its target market for uses such as robotics. It does not include peripherals (such as keyboards and mice) and cases. However, some accessories have been included in several official and unofficial bundles.

The organization behind the Raspberry Pi consists of two arms. The first two models were developed by the Raspberry Pi Foundation. After the Pi Model B was released, the Foundation set up Raspberry Pi Trading, with Been Upton as CEO, to develop the third model, the B+. Raspberry Pi Trading is responsible for developing the technology while the Foundation is an educational charity to promote the teaching of basic computer science in schools and in developing countries.

Hardware

The Raspberry Pi hardware has evolved through several versions that feature variations in memory capacity and peripheral-device support.

Performance

1. While operating at 700 MHz by default, the first generation Raspberry Pi provided a real-world performance roughly equivalent to 0.041 GFLOPS. The graphical capabilities of the Raspberry Pi are roughly equivalent to the performance of the Xbox of 2001.
2. Raspberry Pi 2 V1.1 included a quad-core Cortex-A7 CPU running at 900 MHz and 1 GB RAM. It was described as 4–6 times more powerful than its predecessor. The GPU was identical to the original. In parallelized benchmarks, the Raspberry Pi 2 V1.1 could be up to 14 times faster than a Raspberry Pi 1 Model B+.
3. The Raspberry Pi 3, with a quad-core ARM Cortex-A53 processor, is described as having ten times the performance of a Raspberry Pi 1.

IV SOFTWARE DESCRIPTION

Raspbian

Raspbian is the recommended operating system for normal use on a raspberry pi. Raspbian is a free operating system based on Debian (32 bit), optimised for the Raspberry pi hardware. Raspbian comes with over 35,000 packages precompiled software bundled in a nice format for easy installation on your Raspberry pi. Raspbian is a community project under active development, with an emphasis on improving the stability and performance of as many Debian packages as possible. It is operated on LINUX and UNIX.

Software can used in Raspberry

- ✓ Scratch
- ✓ Python
- ✓ Sonic pi
- ✓ Terminal
- ✓ GPIO

Virtual Network Computing (VNC)

VNC is a graphical desktop sharing system that allows one to remotely control the desktop interface of one computer (running VNC server) from another computer or mobile device (running VNC viewer) . VNC viewer transmits the keyboard and either mouse or touch events to VNC server and receives updates to the screen in return. VNC connects from RealVNC is included with Raspbian. It consists of both VNC server, which allows one to control raspberry pi remotely and VNC viewer, which allows one to control desktop computer remotely from raspberry pi.

However, one can use VNC server to gain graphical remote access to raspberry pi if it is headless or not running a graphical desktop.



Global System for Mobile Communications

The Global System for Mobile Communications (GSM) is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation (2G) digital cellular networks usued by mobile devices such as mobile phones and tablets. It was first deployed in Finland in December 1991. By the mid-2010s, it became a global standard for mobile communications achieving over 90% market share, and operating in over 193 countries and territories. Subsequently, the 3GPP developed third-generation (3G) UMTS standards, followed by fourth-generation (4G) LTE Advanced standards, which do not form part of the ETSI GSM standard. "GSM" is a trade mark owned by the GSM Association. It may also refer to the (initially) most common voice codec used, Full Rate.

Python

Python is an interpreted, high-level, general-purpose programming language. It provides constructs that enable clear programming on both small and large scales. Python features a dynamic type system and automatic memory management. It supports multiple programming paradigms, including object-oriented, imperative, functional and procedural, and has a large and comprehensive standard library. Python is a multi-paradigm programming language. Object-oriented programming and structured programming are fully supported, and many of its features support functional programming and aspect-oriented programming (including by metaprogramming and metaobjects (magic methods)). Many other paradigms are supported via extensions, including design by contract and logic programming.

V RESULTS

In this paper the security for the reserved system was proposed on the IoT communication between the mobile phone and the Raspberry Pi. The main function of the system is to provide security for the parked vehicle. In our experiments, the proposed system had shown the image of the intruder. The Fig 3 and Fig 4 shows the real time results of our project.

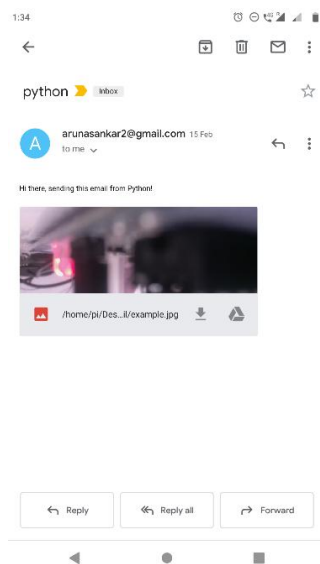


Fig 3. Picture of intruder through mail

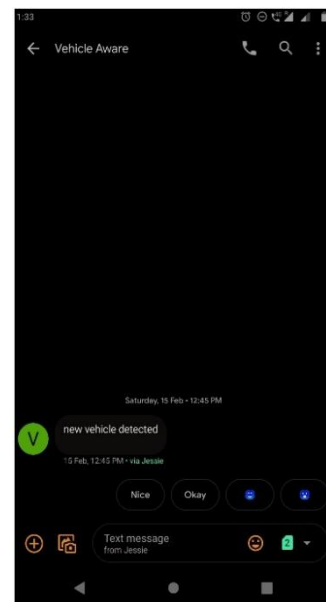


Fig 4. Alert message for user while Offline

VI CONCLUSION

Since smart phone and internet is widely used by all people it has become easier for the customer to get aware of security of their vehicle. This will be helpful for the customer to know the reason for the damage of their vehicle.



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