

# SMART OBJECT IDENTIFIER AND STATUS MONITORING SYSTEM

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**Abstract** - Internet of Things (IoT) conceptualizes the idea of remotely connecting monitoring real world object(things) through the Internet. Radio frequency identification (RFID) technology, has been widely applied in manufacturing environment. This technology can bring convenience to production control and production transparency. Meanwhile, it generates increasing production data that are sometimes discrete, uncorrelated, and hard-to-use. Furthermore, a near big data approach is used to excavate hidden information and knowledge from the historical production data. The most popular way for identifying and tracking object is by adding labels or tags, which have evolved remarkably over the last years from pure hand-written labels to barcodes, QR codes, and RFID tags. In this project, we discuss an innovative concept of Multiple Radio Frequency Identification (RFID) tags based smart object identifier and status monitoring system. Each product has an RFID tag on it. Each object holder has an RFID receiver. As soon as the user takes the object required, RFID receiver will read all tags of all the objects taken, simultaneously the objects details and the corresponding user's details will be generated. A demonstrative case is studied to verify the feasibility of the proposed model and methods. The proposed work will provide a different insight into the smart object identifier and status monitor system.

**Key Words:** IoT, RFID, Labels, Status monitoring, Smart Object.

## 1. INTRODUCTION

IoT is a system connecting any device to the Internet and to other connected devices. It is a giant network of connected things and people that allows sharing of data within the network. The Internet of Things is not a concept. It is a network, the true technology-enabled network of all networks. When we're talking about developments in the IoT world, Software- As-a-Service is now considered a hot subject for debate. SaaS is a platform for service. The service provider hosts the desired application in this model and delivers it to the customers for use over the Internet. It helps companies outsource programs for the IT infrastructure. IoT developments like these make companies a marketing tool for selling their goods. That's why Stewart Butterfield, Slack's co-founder, a cloud-based instant messaging platform said every contact with customers is a marketing opportunity. If you go above and beyond the side of customer service, people would recommend you much more. With less resources being spent, SaaS has become the preferred choice for the IT gaming market. SaaS's emergence has made a major contribution to the technology field. The IoT phenomenon

that is growing on the market will soon make people's lives better than ever. The rising appeal of IoT-using smart home devices is hard to resist even by those who first rejected smart home technologies and later accepted them as a blessing. In 2020, these devices will soon become very popular and dominate the other upcoming IoT trends for 2020. Gradually, these smart devices will become more creative with the introduction of advanced technologies, and provide consumers with great assistance.

Not only do smart home apps provide you with great comfort but they also make your family safe and secure at home.

## 2. PROJECT OBJECTIVE

The project was carried out to satisfy two main objectives:

- Design a system that identifies and tracks objects.
- To create a statistic analysis for specific applications where object identifying and tracking is used.

## 3. LITERATURE SURVEY

### A. Review on Human-Centred IoT-Connected Smart Labels

Human centered smart systems, in accordance with the design concepts of the Industry 4.0 model, propose various alternatives to resolve the a fore mentioned issues, requiring the link between all the actors in the production chain, from semi- finished goods to workstations, as well as machines and staff. And if a organization decides to become "smart". This needs to have real-time access to goods and objects.

### B. Product Identification using Multiple RFID Tags

Fitted with RFID tags, the items in the shopping cart are read by the RFID receiver. The extracted data is then used for bill calculation. The shopping process and the experience offered to the customers need to be revolutionized. Although there are other current identification and data-carrying technologies, such as magnetic stripes, bar code, vision systems, RFID is more powerful because it trumps bar codes with functionality it can provide. RFID needs no specified line of sight. Using this strategy together with an algorithm that allows the RFID receiver to simultaneously accept values, the check-out phase can be significantly decreased and the time taken to bill can be reduced. This framework also connects the stock log, which holds the inventory,

directly.

#### 4. SYSTEM DESIGN

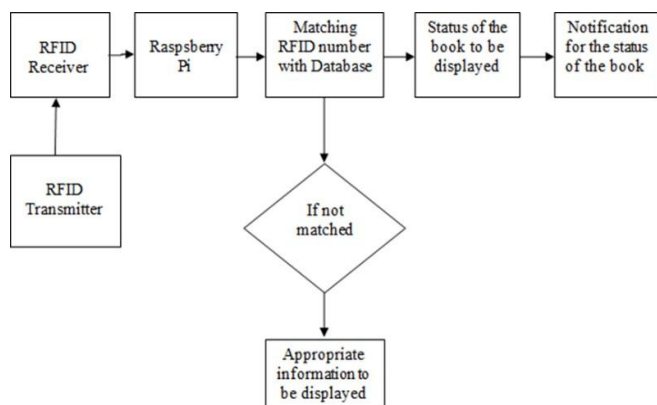


Fig -1: System architecture

#### 5. RFID MODULE DETAILS

##### A. RFID RECEIVER

A radio frequency identification receiver is a device used to gather information from an RFID tag. It is used to identify individual object. Radio waves are used to transfer the data from the tag to the receiver. It receives and decodes unique tag data from active RFID transmitter operating at 433 MHz and outputs serial data containing tag ID at 9600 baud rate.

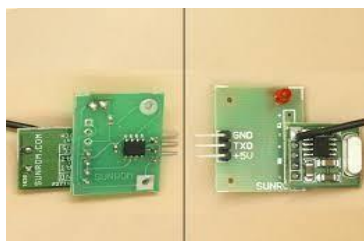


Fig -2: RFID RECEIVER

##### B. RFID TRANSMITTER

RFID transmitter receives serial data and transmits to the receiver through an antenna which is connected to the 4th pin of the transmitter. When logic 0 is applied to transmitter then there is no power supply in transmitter. When logic 1 is applied to transmitter then transmitter is ON and there is a high power supply in the range of 4.5mA with 3V voltage supply.

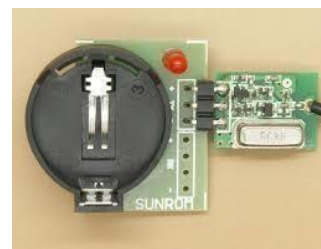


Fig -3: RFID RECEIVER

#### 6. RASPBERRY PI

The Raspberry Pi is a very cheap computer that runs Linux, but it also provides a set of GPIO (general Purpose Input/Output) pins that allow you to control electronic components for physical computing and explore the Internet of Things (IOT). Raspberry Pi® is an ARM based credit card sized SBC (Single Board Computer) created by Raspberry Pi Foundation. Raspberry Pi runs Debian based GNU/Linux operating system Raspbian and ports of many other OS exist for this SBC. Raspberry Pi Foundation has announced a new version Raspberry Pi3. With on-board Wi-Fi/Bluetooth support and a 64bit improved Processor, Raspberry Pi v3 will be an exciting board for Makers, Engineers and Students.



Fig -4: 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 Eben 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.

### Raspberry Pi 3 - Model B Specification

- Broadcom BCM2387chipset
- 1.2GHz Quad-Core ARMCortex-A53
- 802.11 bgn Wireless LAN and Bluetooth 4.1 (Bluetooth Classic and LE)
- 1GBRAM
- 64 Bit CPU
- 4 x USB ports
- 4 pole Stereo output and Composite video port
- Full size HDMI
- 10/100 BaseT Ethernet socket
- CSI camera port for connecting the Raspberry Pi camera
- DSI display port for connecting the Raspberry Pi touch screen display
- Micro SD port for loading your operating system and storing data
- Micro USB power source -5V

apache file that you can easily manage your sites. To do this, run the following commands:

```
sudo chown -R pi:www-data/var/www/html/ sudo chmod -R 770 /var/www/html/
```

Once the installation completed, we can test that Apache is working properly by going to the Raspberry address. To do this, it's necessary to try to access to the Raspberry from port 80 (this port not being opened from the outside, it will have to do since the Raspberry itself).

Simply open the Raspberry web browser, and go to "http://127.0.0.1". You should then get a page with a message like "It works!" "And plenty of other text. If you do not already have a GUI on your Raspbian, or you use SSH to connect to your Raspberry, the following command is used: wget -O check\_apache.html http://127.0.0.1

This command will save the HTML code of the page in the file "check\_apache.html" in the current directory. So, the file can be read using the command,

```
cat ./check_apache.html
```

If you see marked at a location in the code "It works!" is that Apache is working.

Apache uses the directory"/var/www/html" as the root for your site. This means that when you call your Raspberry on port 80 (http), Apache looks for the file in "/var/www/html". For example, if you call the address "http://127.0.0.1/example", Apache will look for the "example" file in the "/var/www/html" directory.

To add new files, sites, etc., you will need to add them to this directory. You can now use your Raspberry to make a site in HTML, CSS and JavaScript, internally. However, you may want to quickly allow interactions between the site and the user. For example, to allow the user to register, etc. For this, you are going to need PHP.

### 7. CONNECTIVITY

Table-1: Details of connection

RFID Receiver	Raspberry pi	
TX	->	RX
GND	->	GND
+5V	->	5V

INPUT : RFID Card signal.

OUTPUT : RFID Card Number.

### 8. WEB SERVER CONNECTIVITY

Before installing the server, make sure we have an up-to-date machine. To do this we must have administrator rights, either because of the sudo command.

```
sudo apt update sudo apt upgrade sudo apt update
```

Once the Raspberry Pi is up to date, we will install the Apache server

```
sudo apt install apache2
```

By the way, we'll take advantage of it to give rights to the

### 9. CORPORATE SOCIAL RESPONSIBILITY

Our project will be contributing much more to the society by identifying the location of smart objects. RFID Technology is used in many industries and in a wide variety of applications as it can deliver a number of benefits for organizations. RFID technology contributes to the society in many ways such as item level inventory tracking, race timing, materials management, access control, IT asset tracking, tool tracking and many more. It contributes more to medicine industry, logistics, maintenance and railways. In medicine industry, using RFID is an easy way to track, locate and update the service and sterilization history of medical equipment's and surgical instruments. In logistics, it is used as a part of warehouse management system This system makes checking stock levels and their location in a busy warehouse environment easy. In maintenance, conversion of paper-based checklists to a digital format takes time and leads to human error. So, maintenance records can be stored on RFID mobile readers, leading to a

more efficient maintenance process. In railways, trains have to stop at determined position because of safety doors or due to railways legislation. RFID system guarantee precise and reliable positioning of trains over optical sensor which can fail due to debris.

### 10. RESULTS AND ANALYSIS

Our project detects and tracks smart objects efficiently sending their current status and warnings if necessary. We can monitor the objects and visualize the availability status of objects either in text or graph format from our mobile phones.



Fig -8: TIMETABLE WITH SUBJECT CODES



Fig -9: EXTRA BOOK DISPLAY

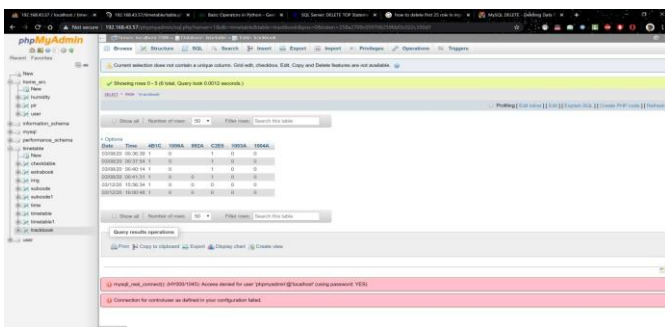


Fig -5: OBJECT TRACKING DETAILS

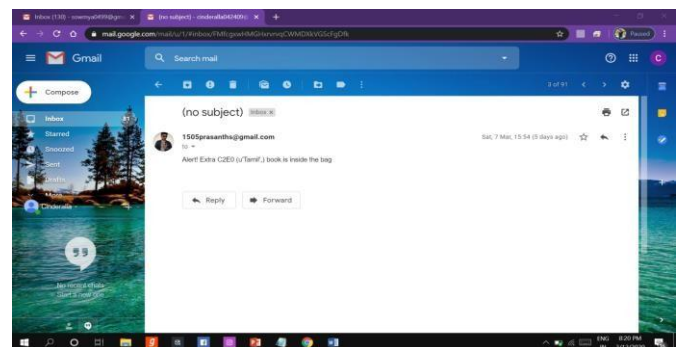


Fig -10: MAIL NOTIFICATION OF EXTRA OBJECT

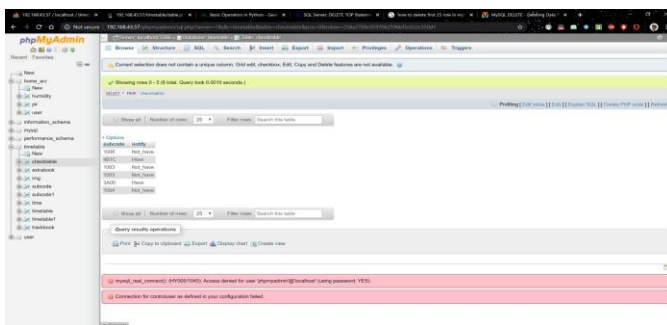


Fig -6: STATUS OF OBJECT

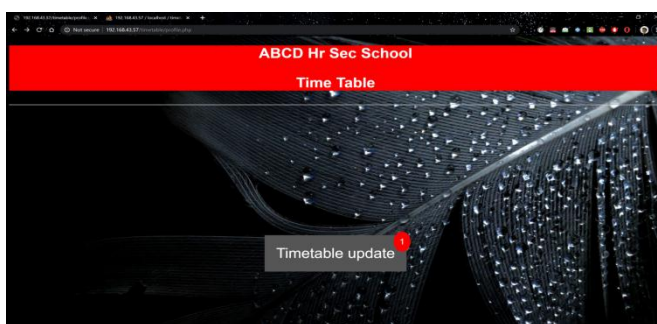


Fig -7: FRONT END OF THE WEBPAGE

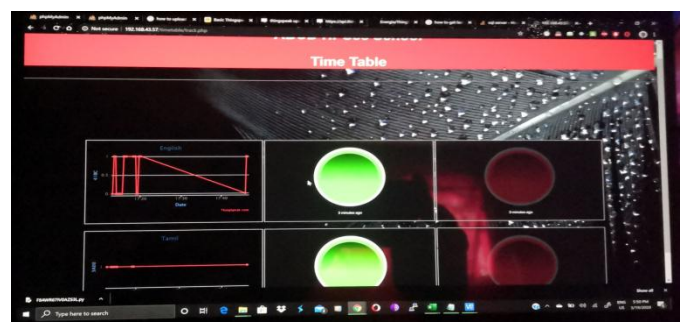


Fig -11: OBJECT TRACKING VISUALIZATION

### 11. CONCLUSION

We have identified the smart object in this project and it is being monitored. Through this, it is easy to detect status of object by means of available and not-available remarks. The objects can be kept highly secured by tracking its status.

Initially, the RFID tag is associated with each object. It will be identified by the RFID reader. The details of the RFID tag will be stored permanently. We can also identify the additional objects. So that, we can infer behaviour data like misplacement of object, status of the objects.

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