

Integrated IoT Solutions

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Abstract—This project is a case study of the IoT(Internet of Things) based integrated indoor and outdoor applications. The indoor applications consisting of IPTV and Local Area Network will be implemented using 4G module. The Outdoor applications consisting of Smart Card based Toll System which features Pollution control and RFID based Vehicle tracking as well as Garbage monitoring system. Arduino controller is used to implement the outdoor models.IPTV will also display the status of all the outdoor models on a website.

Index Terms—Base station, 4G LTE signal, TV dish, Wifi Router, IPTV, Arduino.

1 INTRODUCTION

The internet of things (IoT) is a computing concept that describes the idea of everyday physical objects being connected to the internet and being able to identify themselves to other devices. In 1999, Kevin Ashton, an expert on digital innovation said it best in this quote from an article in the RFID Journal: "If we had computers that knew everything there was to know about things – using data they gathered without any help from us – we would be able to track and count everything, and greatly reduce waste, loss and cost. We would know when things needed replacing, repairing or recalling, and whether they were fresh or past their best."

Our project is a demonstration model showcasing the applications of IoT for both indoor and outdoor purposes. Here we connect all systems to the network and create an integrated IP based monitoring system, which can also act as an IPTV. The modules that have been added include Smart Card based Toll Booth, Air & Noise Pollution Control system, Smart Garbage Can and RFID based Vehicle Tracker.

2 PROPOSED METHODOLOGY

2.1 Indoor Applications

A local area network (LAN) is created using the signal received from the Network Receiver using an Ethernet cable. The Network Receiver acts as an interface between the WiFi Router and 4G module. We connect an IPTV module to an ordinary computer monitor to transform it into an IPTV. This IPTV will act as a monitoring system for the entire system, whose database is stored on a website.

2.2 Outdoor Applications

Smartcard based Toll booth system will be implemented using Arduino, involving the use of RFID tags & scanner. Alongside this booth, we will have a Air and noise pollution control system as well as RFID vehicle tracking system, which lets emergency vehicles like Ambulances pass by clearing a lane for them at the toll gate.

3 SECTIONS

3.1 Pollution Control System

Air sensors are used to sense the presence of harmful gases/compounds in the air and constantly transmit this data to microcontroller. Also system keeps measuring sound level and reports it to the online server over IOT. This allows authorities to monitor air pollution in different areas and take action against it. Also authorities can keep a watch on the noise pollution near schools, hospitals and no honking areas, and if system detects air quality and noise issues it alerts authorities so they can take measures to control the issue.

3.2 Smart Card based Toll Booth System

The project consists of four keys by which the user can select the mode of toll collection. Once the RFID mode is selected, the LCD displays the message to show the RFID card. The card has to be then swiped on the Card Reader. After the card is swiped, the microcontroller: Arduino will check if the card is valid or not. If the card is valid then the microcontroller will check if the card has sufficient balance. The card balance is displayed on the LCD display. Once the micro-controller detects sufficient balance, the toll gate is opened and the vehicle is allowed to pass through. We have used an IR-sensor i.e. Infrared Sensor to indicate that the vehicle has crossed the toll gate and the gate will be closed.

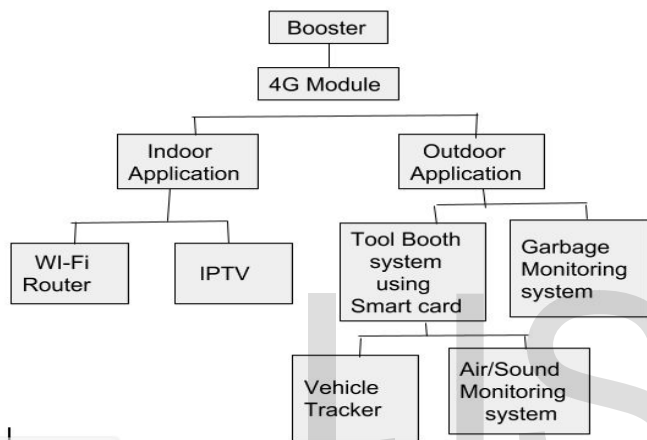
3.3 RFID based Vehicle Tracking

An RFID based tag will be placed on specific vehicles like Ambulances and Police Cars which need immediate clearing from the Toll gate. The Scanner will track over a radius of 1 km from the toll booth to make provisions to clear a lane for such emergency vehicles.

3.4 Garbage Monitoring System

An 'Ultrasonic Sensor' is used for detecting whether the trash can is filled with garbage or not. Here Ultrasonic Sensor is installed at the top of Trash Can and will measure the distance of garbage from the top of Trash can and we can set a threshold value according to the size of trash can. If the distance will be less than this threshold value, means that the Trash can is full of garbage and we will print the message "Basket is Full" on the web page and if the distance will be more than this threshold value, then we will print the message "Basket is Empty".

4 BLOCK DIAGRAM



5 DISCUSSION

5.1 Advantages

- IOT based Toll Booth Manager System can be used at all the Toll Plazas on the Highways. Using this project would help the vehicles to pass the Toll Plaza without stopping which in turn would help people save a lot of their time.
- This project can also be used at Octroi Collection booths
- TV will work irrespective of the weather conditions.
- Noise and Air pollution can be controlled and curtailed wherever necessary
- Accidents can be prevented as vehicles having worn out engines will not be permitted.
- Delivers enhanced real-time video and multimedia for a better overall experience

5.2 Disadvantages

- Setup is difficult
- Big installation cost and operational cost.
- The system is very **power intensive** and requires strong electrical support.

5.3 Applications

- TV will work irrespective of the weather conditions.
- Wearable devices are installed with sensors and software's which collect data and information about the users. This data is later pre-processed to extract essential insights about user.
- A connected car is a vehicle which is able to optimize its own operation, maintenance as well as comfort of passengers using onboard sensors and internet connectivity.
- Industrial Internet: Smart machines are more accurate and consistent than humans in communicating through data. And, this data can help companies pick inefficiencies and problems sooner. It holds great potential for quality control and sustainability.
- Smart City: By installing sensors and using web applications, citizens can find free available parking slots across the city. Also, the sensors can detect meter tampering issues, general malfunctions and any installation issues in the electricity system.
- Smart Retail: Smartphone's will be the way for retailers to remain connected with their consumers even out of store. Interacting through Smartphone and using Beacon technology can help retailers serve their consumers better. They can also track consumer's path through a store and improve store layout and place premium products in high traffic areas.

6 CONCLUSION AND FUTURE SCOPE

Rather than using multiple service providers, the customer can get data, voice calls and TV using a single Service Provider. This is the global scope of this project in the future. Smart grids and smart retail are some other application that can be implemented in the near future as a part of the Smart City Initiative for more technologically versatile businesses and society.

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REFERENCES

- [1] **IPTV Bandwidth Demand: Multicast and Channel Surfing**, D. E. Smith, IEEE INFOCOM 2007 - 26th IEEE International Conference on Computer Communications
- [2] **A test-bed for the convergence services of TV with IP-based STB and mobile services in the IP-based network**, Jung Man Park; Min-Jeong Kim, 2nd International Conference on Testbeds and Research Infrastructures for the Development of Networks and Communities, 2006. TRIDENTCOM 2006.
- [4]. **SMART CARD BASED TOLL GATE AUTOMATED SYSTEM**, International Journal of Advanced Research in Computer Engineering & Technology Volume 1, Issue 5, July 2012
- [5] **IOT BASED GARBAGE MONITORING SYSTEM**, International Journal of Scientific & Engineering Research, Volume 8, Issue 4, April-2017.

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