SMART PARKING SYSTEM using IoT TECHNOLOGY

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MS ESSE (CSE) (Session 2020-2022)

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Acknowledgements

Team would like to thank Prof. Dr. Yodsawalai Chodpathumwan for conduction this learning period and giving us insights about Database, Asst. Prof. Dr. Rachata Ausavarungnirun for the detailed knowledge about IoT systems and architecture (a deep insights), Assoc. Prof. Dr. Soamsiri Chantaraskul for conveying knowledge about Communication Systems, Assoc. Prof. Dr. Chaiyod Pirak for the concepts of Communication Systems, Asst. Prof. Dr.-Ing. Suramate Chalermwisutkul for RF Frontend and Physical layer and in the last, Asst. Prof. Dr.-Ing Chayakorn Netramai for the very nice insights about the Embedded systems. Also, for giving us the opportunity to work on this exciting and engaging project and for sharing their pearls of wisdom with us during the course of this project research.

Abstract

Designing and implementing a smart car parking system for big buildings and multiple stories parking spaces. With the help of IR proximity sensors, the parking spot is observed and based on that the assistive parking features enable and start the timer to calculate the parking fee time. For the real-time monitoring of the whole car parking space, this data is sent to the gateway and then to the cloud. This data can be seen on the dashboard.

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Chapter 01 - Goal and Scope

1.1 Goal

The goal of this project is to find a solution to solve the increased parking problems (Parking spaces and management) in big cities which are now affecting more of our daily life by using the Internet of Things (IoT) that can help us both in abilities to enlarge connected devices in systems and provide more effective facility management on parking areas.

1.2 Scope

The Scope of this project is to develop a prototype of smart parking and management system that is developed by using IoT technology with these features:

- Real- time Data reporting and monitoring
- Buzzer Alarm for parking assistance
- Notifications on Mobile Application

Chapter 02 - Design and Implementation

2.1 System Design

2.1.1 Hardware:

- Sharp IR sensors: for detecting a parking status
- LEDs: for showing a parking status in physically
- Buzzers: for raising alarm when driver parked a car too closely with parking assets
- Level Shifter: to shift the voltage level of Arduino (5V) to the voltage level of ESP8266 (3.3V)

2.1.2 Controller

- Arduino ET-Easy Mega 1280/2560

2.1.3 Gateway

- ESP8266: used as a gateway which provide communication links between edge devices (in this case is “Arduino”) and IoT cloud platform by using WiFi.

2.1.4 IoT Cloud Platform: NETPIE

2.1.5 Mobile Application

- NETPIE Mobile Application

2.2 Features

- **A real-time data reporting** of 3 parking spots status and their billing information via web browser and mobile application.
- **Buzzer alarm** feature when drivers parked too closely with the parking assets.
- **Notification on the mobile application** when there’s no available parking spot

2.3 System Diagram

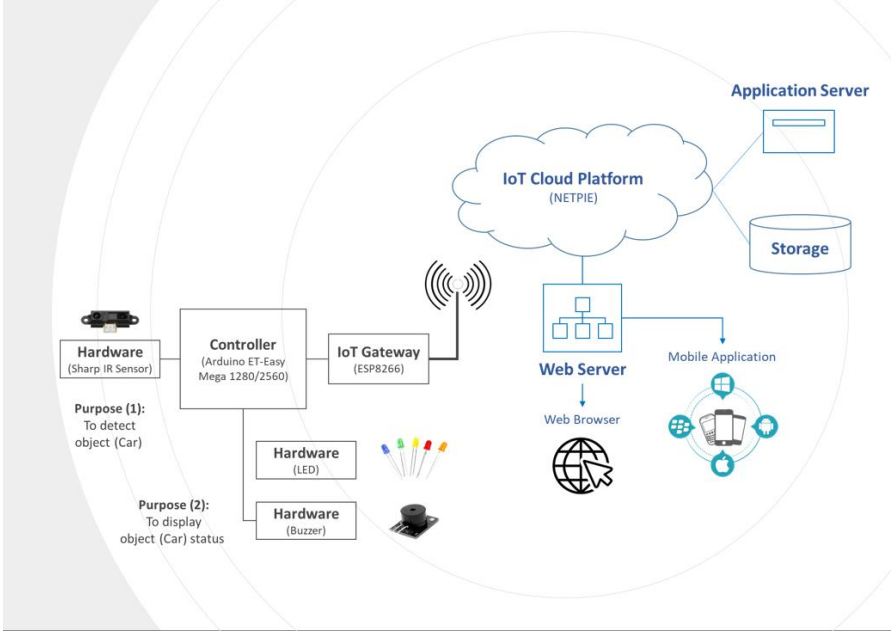

Figure 1 - System Diagram

2.4 Block Diagram

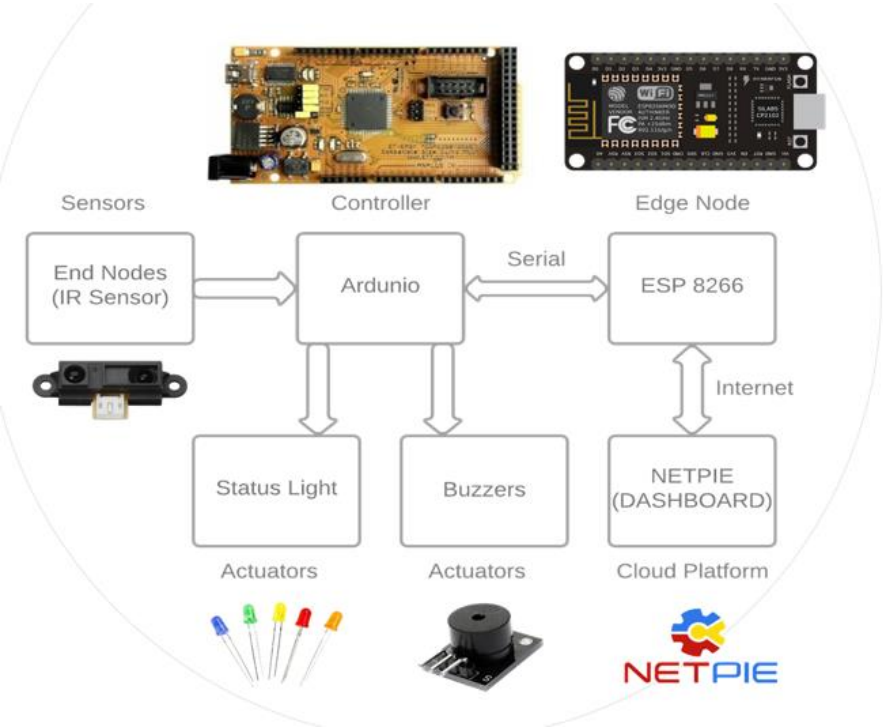

Figure 2 - Block Diagram

2.5 System Implementation

2.5.1 Wiring Diagram

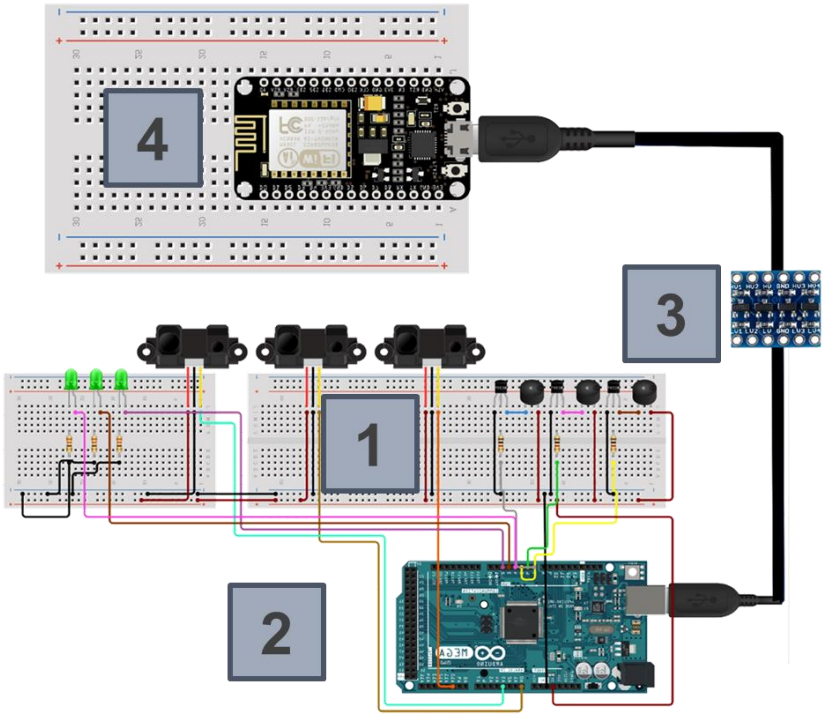

Figure 3 - Wiring Diagram

- (1) Hardware
- (2) Controller
- (3) Level Shifter
- (4) IoT Gateway

Chapter 03 – Demonstration

3.1 Dashboard

Dashboard of Smart Parking System on NETPIE web browser

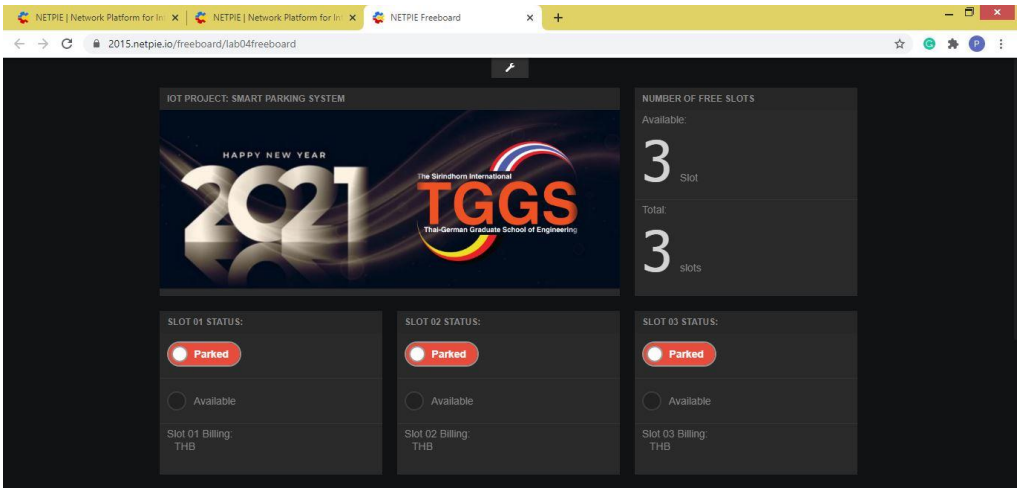

Figure 4 - NETPIE Dashboard

In the dashboard we can see the status of the parking lots and the billing info. also the number of total available spots and total empty spots.

Chapter 04 - Future Work

In the future work we can do multiple things, we can use Raspberry Pi so then we can Amazon Web Services (AWS) cloud and also, we can get global clock stamps. Another thing we can do is to implement Mesh Networking (Zigbee nodes). We can also use an amazing cloud platform (Blynk) for real-time monitoring.

We can implement further features as follows:

- Parking reservation
- e-Payment system
- Database with vehicle registration number captures using camera

References

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