

IOT BASED SMART PARKING SYSTEM

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ABSTRACT

Nowadays, finding a secure parking lot in modern cities deemed as very hard and time-consuming task. Leaving negative implications on traffic congestion, air pollutions, climate changes, etc. are also creating difficult situations to find the secure parking lot on required time. Thus, Smart Parking System (SPS) deemed inevitable option to solve those issues and build a comprehensive smart transportation system. Toward this end, this paper aims to design a secure and smart parking monitoring, controlling and management solutions based on the integration of Sensors, Network (WiFi) and Internet of Things (IoT).

The proposed model provides real-time information about detecting the vacant parking slot in real time. In this project we will use Infrared Sensors to detect the parking lot is empty or not? We will use automatic gate at the entrance to detect the vehicle and any parking slot is empty or available then only the gate will be open. If no slots are available then the gate won't open and the alarm will sound. The data will

be updated to the web portal using WiFi module. From anywhere in the world, if we have internet connection, we can monitor the parking slots availability through internet connectivity.

INTRODUCTION

Now days finding parking in busy areas is very hard and there is no system to get the details of parking availability online. Imagine if you can get the parking slot availability information on your phone and you don't have roaming around to check the availability. This problem can be solved by the IoT based smart parking system. Using the IoT based parking system you can easily access the parking slot availability over the internet. This system can completely automate the car parking system. From your entry to the payment and exit all can be done automatically.

So here we are building an IOT based Smart Parking System using NodeMCU, IR sensors, and servo motor. Two IR sensors are used at entry and exit gate to detect the car and also IR sensors are used to detect the parking slot availability. Servo motor are

used to open and close the gates according to the sensor value. Any parking slot is empty or available then only the gate will be open. If no slots are available then the gate won't open and the alarm will sound. The data will be updated to the web portal using WiFi module. From anywhere in the world, if we have internet connection, we can monitor the parking slots availability through internet connectivity.

Today, the Internet becomes more and more important for everybody in both personal life and professional life. Different devices such as smart phones, sensors, mobile computers, and more other smart objects are examples of things everyday we are dealing with. These and other IoT related technologies significantly affect new ICT and enterprise systems technologies. In the early evolution, it is known as "Internet of Computers"; then changed to "Internet of People"; and recently, with the rapid development in the ICT, it is recognized as the "Internet of Things". In the IoT, different devices and smart objects are included to expand the Internet and become accessible and uniquely identified. The connectivity is enhanced from "any-time, any-place" for "any-one" into "any-time, any-place" for "any-thing". In the ICT innovations and economy developments, a

significant focus has shifted to the IoT related technologies where it is widely considered as one of the most important infrastructures of their promotion and one of the future promise strategies. The main aim is to enable interaction and integration of the physical world and the cyber space.

The IoT refers to networks of heterogeneous devices rather than traditional networks of homogeneous devices. Things, in the IoT, involve a variety of embedded devices and smart objects whose interconnection is expected to enable advanced & intelligent applications and to make the communications and automation, mostly in all areas, easier and achievable. The authors defined three categories which the IoT refers to: (i) the network interconnecting heterogeneous and smart devices which is an expansion of traditional Internet, (ii) the required technologies to support and realize this interconnection (such as RFIDs, sensor/actuators, etc) and (iii) the services and applications exploiting this vision in different areas. An ambient intelligence is early proposed using Wireless Sensor Networks (WSN). A large number of smart sensors are deployed to monitor environmental conditions and send an alert signal, for any change, to a control system which responds with appropriate action.

Such a mechanism can be adopted in different areas with different purposes like surveillance systems, health care, home automation, etc.

In the IoT, billions of devices and smart objects, having different capabilities, require a means for exchanging and transmitting the information collected or generated at the device level. However, the IoT devices are expected to be connected together and able to talk in a way or another. An IoT object must be able to communicate with other devices: identify the proper path to the destination, understand the received messages, and consequently respond with an appropriate manner. Thus, standard protocols become key requirements for the IoT world. This makes it straightforward to achieve the full functionality of such constrained devices while maintaining the desired level of network performance. The mobility in the IoT is one of the major issues.

The middleware software layer also is an essential in such massive networks having different application systems, different functionalities, and variable data types. Middleware enables the interaction between the "Internet" and "things". It acts as an interface enabling the various applications on heterogeneous systems to easily and

seamlessly communicate with each others. Middleware software layer has a major role in hiding the underlying details.

EMBEDDED SYSTEMS

An embedded system is a special-purpose computer system designed to perform one or a few dedicated functions, sometimes with real-time computing constraints. It is usually embedded as part of a complete device including hardware and mechanical parts. In contrast, a general-purpose computer, such as a personal computer, can do many different tasks depending on programming. Embedded systems have become very important today as they control many of the common devices we use.

Since the embedded system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product, or increasing the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale.

Physically embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single microcontroller chip, to very high with

multiple units, peripherals and networks mounted inside a large chassis or enclosure. In general, "embedded system" is not an exactly defined term, as many systems have some element of programmability. For example, Handheld computers share some elements with embedded systems — such as the operating systems and microprocessors which power them — but are not truly embedded systems, because they allow different applications to be load and peripherals to be connected.

What is the difference between a Microprocessor and Microcontroller? By microprocessor is meant the general purpose Microprocessors such as Intel's X86 family (8086, 80286, 80386, 80486, and the Pentium) or Motorola's 680X0 family (68000, 68010, 68020, 68030, 68040, etc). These microprocessors contain no RAM, no ROM, and no I/O ports on the chip itself. For this reason, they are commonly referred to as general-purpose Microprocessors.

A system designer using a general-purpose microprocessor such as the Pentium or the 68040 must add RAM, ROM, I/O ports, and timers externally to make them functional. Although the addition of external RAM, ROM, and I/O ports makes these systems bulkier and much more expensive, they have the advantage of versatility such that the

designer can decide on the amount of RAM, ROM and I/O ports needed to fit the task at hand. This is not the case with Microcontrollers.

SOFTWARES

Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programmed (referred to as a microcontroller) and a ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board.

The key features are:

- By sending a set of instructions to the microcontroller on the board via Arduino IDE (referred to as uploading software).
- Arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.
- You can control your board functions
- Unlike most previous programmable circuit boards, Arduino does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board. You can simply use a USB cable.

- Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program.

- Finally, Arduino provides a standard form factor that breaks the functions of the micro-controller into a more accessible package.

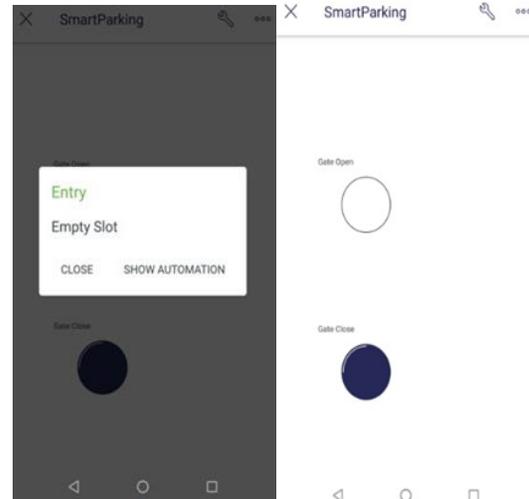
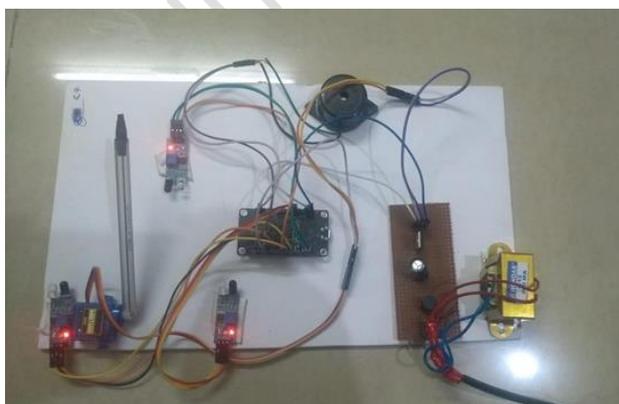
After learning about the main parts of the NODE MCU board, we are ready to learn how to set up the Arduino IDE. Once we learn this, we will be ready to upload our program on the Node MCU board.

Arduino data types:

Data types in C refers to an extensive system used for declaring variables or functions of different types. The type of a variable determines how much space it occupies in the storage and how the bit pattern stored is interpreted.

The following table provides all the data types that you will use during Arduino programming.

RESULTS



CONCLUSION

This project focuses on implementation of car parking place detection using internet of things. The system benefits of smart parking go well beyond avoiding time wasting. Developing a smart parking solutions with in a city solves the pollution problem. The concepts of smart cities have always been a dream. There have been advancements made from the past couple of years to make smart city dream to reality. The advancement of internet of things and cloud technologies has given rise to the new possibilities in terms of smart cities. Smart parking facilities have always been the core of constructing smart cities. The system provides a real time process and information of the parking slots. This paper enhances the performance of saving users time to locate an appropriate parking space. It helps to resolve the growing problem of traffic

congestion. As for the future work the users can book a parking space from a remote location. GPS, reservation facilities and license plate scanner can be included in the future.

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