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IoT Base Smart Car Parking

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Abstract: In recent times the concept of smart cities has gained great popularity. Due to the evolution of the net of things the concept of a sensible city now seems to be achievable. Consistent efforts are being made within the field of IoT so as to maximise the productivity and reliability of urban infrastructure. Problems like hold up, limited car parking facilities, and road safety are being addressed by IoT. During this paper, we present an IoT-based cloud-integrated smart parking system. The proposed Smart Parking system consists of an on-site deployment of an IoT module that's wont to monitor and signalize the state of availability of every single car parking zone. A mobile application is additionally as long as allows an end-user to test the provision of automobile parking space and book a parking slot accordingly. The RFID reader is used for authorize person can take entry for parking. Safety purpose we introduce fire detection smoke detection system. The paper also describes a high-level view of the system architecture. Towards the tip, the paper discusses the working of the system in style of a use case that proves the correctness of the proposed model.

IndexTerms **– Iot platform, Blynk app, Esp8266, sensors, RFID card reader, IR sensor, LED, Servo motor, Flame and smoke sensor .**

I. INTRODUCTION

The project entitled Iot-based smart parking system is to manage all the parking facilities for a user. With the recent growth within the economy and because of the provision of low price cars within the market, an every average middle-class individual can afford a car, which could be a good thing, however the results of heavy traffic jams, pollution, less availability of roads, and spot to drive the motor car. one amongst the important concerns, which is to be taken in accounting, is that the problem of parking those vehicles. Though, if there's space for parking the vehicle but most time is squandered to find that exact parking slot leading to more fuel intake and not also environment-friendly. it'll be a good deal if in a way we discover out that the parking itself can provide the precise vacant position of a parking slot then it'll be helpful not limited to the drivers but also for the environment. Initially, when the user is on the brink of enter the placement the mobile app shows empty and filled spots and when the user is with their vehicle near the parking detect sensor, he/she would be thrown a notification on the mobile app of the parking slot number, where they must park their vehicle. the most important good thing about a sensible parking system is its advanced technology. It follows the newest technologies and ideas to assure profitable outcomes. the planning and implementation of smart parking are very easy to supervise and manage. this technique will be easily handled by the staff members due to its well-organized structure. The concept of the net of Things (IoT) started with things and identity communication devices. The devices might be tracked, controlled, or monitored using remote computers connected through the web. the web of things has different definitions. In Short, it's defined because the things present within the physical world or in an environment that's attached with sensors or with any embedded systems and made connected to a network via wired or wireless connections. These connected devices are called smart devices or smart objects. And it consists of smart machines, which communicate, and interact with other machines, environments, objects, etc. And these are often processing by using some processors like network processors, hybrid processors MCU/MPU, etc. and also the devices are connected by using some technologies called GPS, Wi-Fi, BT/BTLE, RFID, etc. the web of things was first introduced in 1999 at the auto-ID center and first utilized by Kevin Ashton. This latest technology promises to attach all our surrounding things to a network and communicate with one another with less human involvement. Still, the net of things is in its beginning stage and there's no common architecture exists still today.

1.2 Problem Statement

In recent research in metropolitan cities the parking management problem can be viewed from various angles such as high vehicle density on roads. This results in annoying issues for the drivers to park their vehicles as it is very difficult to find a parking slot. The drivers usually waste time and effort in finding parking space and end up parking their vehicles finding a space on the street which further leads to space congestion. In worst case, people fail to find any parking space especially during peak hours and festive season.

1.3 Objective

Smart Parking involves the utilization of low-cost sensors, real-time data, and applications that allow users to observe available and unavailable parking spots. A flame detector could be a sensor designed to detect and reply to the presence of a flame or fire, allowing flame detection so send to the cloud. Smoke sensors sense the encompassing smoke.The goal is to automate and reduce time spent manually looking for the optimal parking floor, spot, and even lot. Some solutions will encompass a whole suite

of services like online payments, parking time notifications, and even car searching functionalities for very large lots. A parking solution can greatly benefit both the user and also the lot owner.

1.4 Scope of the project

At present some countries have portals through which users can gain information about parking areas via the internet. This system can give users information about parking spaces, but it won't be able to give which parking slot is vacant and occupied. Hence, such a system cannot smartly handle the issue. Car lifts along with an automated robotic system, which automatically takes the car to a particular parking spot as soon as the car enters a platform. This system cannot be installed by medium-scale shopping malls, or movie theatres as it can cost them a huge amount. In many public places, the system only shows the availability but it cannot show the exact slot and path to the slot available. Hence, there is a need to smartly find the path to the vacant spot.

II RESEARCH METHODS IN LITERATURE

Parking could be a service that's quite dated within the transport industry and it's thought to own evolved specifically for various generations. The initial parking system, within which there have been not many vehicles, was articulated through the annual space renting model. However, with time, and because the number of vehicles in cities and towns continued to extend, even as the quantity of urban dwellers, the necessity for urban planning became apparent. With this, one area that required special attention, so as to make sure that vehicles entering urban areas don't cause traffic jam still as increase the harmful impacts they need on the environment, was urban parking. For this reason, the concept of controlled parking was borne. First, before the emergence of the smart parking system, cities relied on electronic parking services that involved the utilization of parking meters that weren't wholly automated.[1]

This created loopholes within the collection of fees and also the auditing process. However, with technological advancement, there has been a notable terminal evolution, which has seen the emergence of smart parking systems. the current smart parking system provides the automation of various parking services, allowing consumers to navigate the whole parking experience independently—from the parking occupancy status to ticketing, parking, and fee settlement.[2]

Various mechanisms are suggested by different authors for various styles of data collection within the research to resolve the current urban parking problems. In recent works, the bulk of the studies on smart parking are entirely focused on the technical positions, i.e., system architecture and style [3], operational algorithms and models, and prototype designs [4].

Many of them are focused on the answer instead of the algorithms, software, systems, and also the brief situation of the technology of the sensors. Such studies have examined the merits and demerits, but they let down within the bid to beat the issues, as their inspiration lies within the selected technique of developing a replacement parking system supported the net of Things.[5] Pham et al. [6] enlisted a unique algorithm as how to extend the efficacy of the prevailing cloud-based smart parking system and build a spec supported the web of Things technology. Their proposal on the system assists users to automatically locate a free parking lot at the smallest amount cost supported new performance metrics within the calculation of user parking costs by considering the space and also the holistic number of fees placed in each parking area.[7]

The prices are encapsulated by offering solutions to finding available parking spaces at the request of the user and also the service of suggesting a brand new parking area if the prevailing one is fully occupied. The simulation shows that the algorithm assists in upgrading the probability of successful parking and lowers time wastage. Mainetti et al. [8] presented a classy IoT-aware smart parking system on the idea of the joint use of assorted technologies that include RFID, WSN NFC, and Mobile. it's capable of collecting the environmental parameters and also the information on the occupancy state of parking spaces in real-time. As how of reducing the complete system costs, the chance of using the solar RFID tag as a car detection system was analyzed. The system allowed the drivers to access the closest empty spaces and to form payments for parking via the employment of a customized mobile application.[9]

Additionally, the software app was developed on the premise of the RESTful Java and Google Cloud messaging technologies that were installed on the CS to manage alert events. an indication of concept was produced t as some way of demonstrating the proposed solution's capability in satisfying the important requirements of an innovative smart parking system, while a preliminary exam of the solar tag usage investigated the potential of the proposed detection solution.[10] Ji et al. [11] presented the generic concept of the employment of cloud-based intelligent car parking services in smart cities as an instrumental application that deploys the net of Things (IoT) paradigm. The correspondence of an IoT subsystem included a sensor layer, communication layer, and application layer. A high-level loop within the system architecture was outlined as the simplest way of demonstrating the availability of car parking services with the proposed functions. A cloud-based intelligent parking system that might be used within universities was articulated together with the principles of design and execution.

Wang and He [12] designed and implemented a prototype of a reservation-based smart parking system that might allow drivers to efficiently locate and reserve empty parking spaces. they might learn the parking status from the sensor networks that were deployed within the parking spaces where the reservation process was impacted by the changes within the physical parking status, and therefore the drivers were unable to access the cyber-physical system with their personal communication devices. The researchers also studied and compared the performances of the smart parking policies of the smart parking system. The research results portrayed the proposed parking legislation as a possible tool within the simplification of the operations of parking systems moreover as within the alleviation of holdup made by parking searches. [13]

Block Diagram

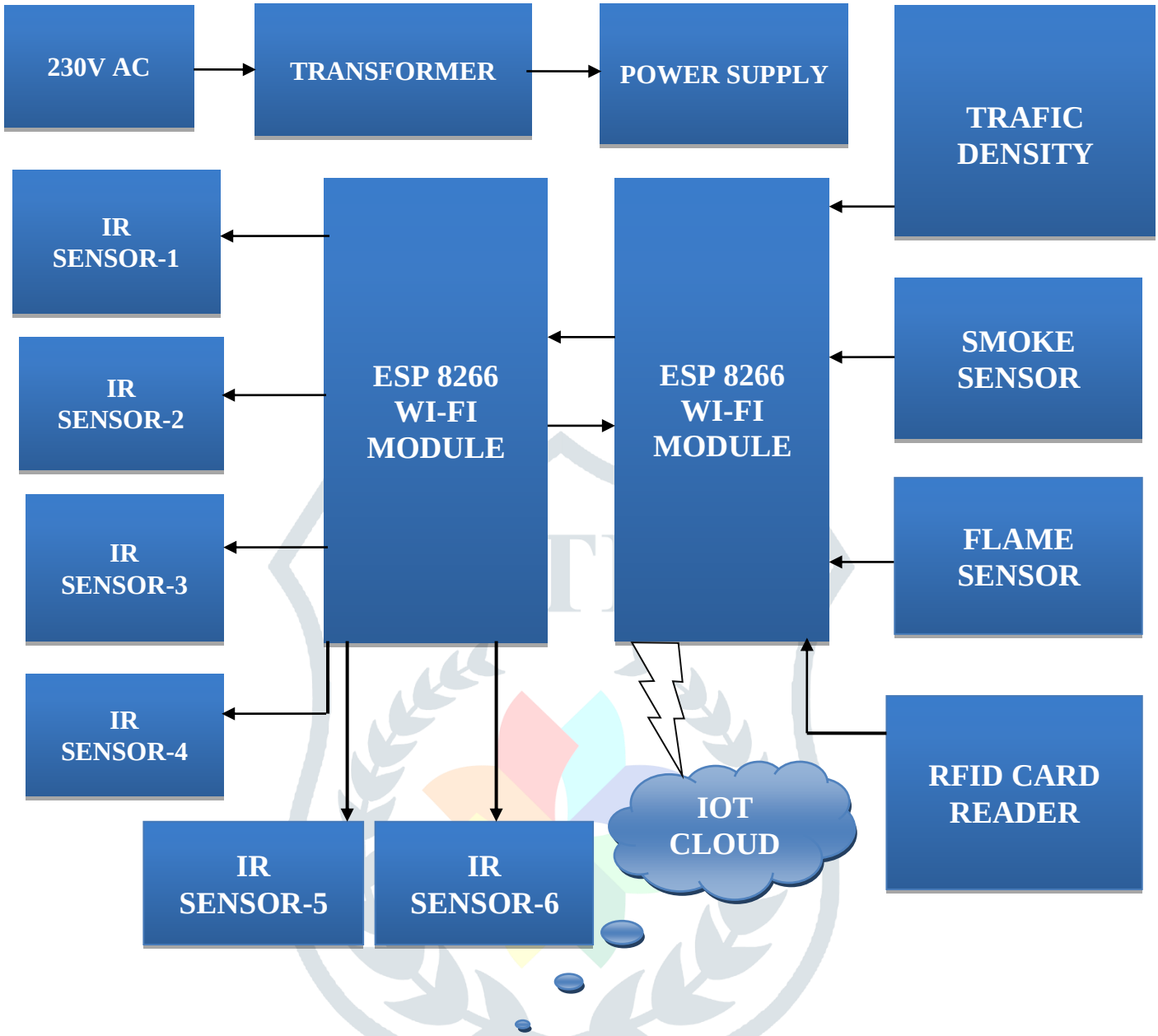

Fig.1: Block Diagram of IOT base Smart car parking system

In the above block diagram, there are nine inputs and eight outputs. Here are we use ir sensors for detecting in parking slos are empty and not. If ir sensor sense the objects and send the pulse to the cloud and parking plate. There are 6 six sensor for 6 parking slots and two for VIP person like Owner, Family, etc. We don't need to wait for parking in this project we are saving time and traffic density. In this project we used smoke sensor using an MQ sensor to detect a gas is very easy. If gas is leakage surrounding it senses the smoke then it to cloud. We can monitor the parking slots are empty or not, it automatically update flame, smoke surrounding. RFID card reader is used for authorize person swipe the card and open the door. A servo motor is used for opening and closing the door of parking gate.

Component Use:

1. **ESP 8266**

Fig.2: Node mcu

The ESP8266 is a system on a chip (SOC) Wi-Fi microchip for Internet of Things (IoT) applications produced by Espressif Systems. Given its low cost, small size and adaptability with embedded devices, the ESP8266 is now used extensively across IoT devices.

IR Sensor

IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensor can detect these radiations. Photodiode is sensitive to IR light of the same wavelength which is emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received.

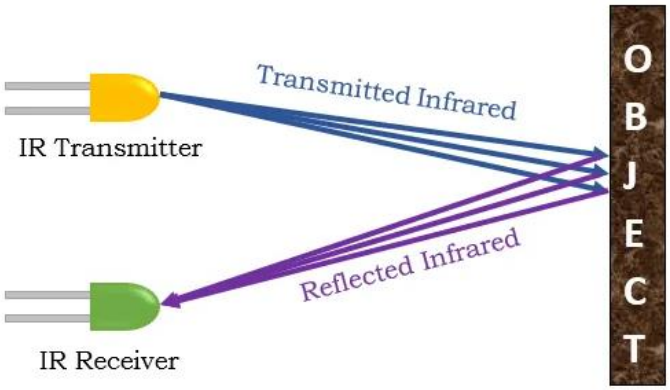

Fig.3: IR TX AND RX

Smoke sensor

The MQ-2 Gas sensor can detect or measure gasses like LPG, Alcohol, Propane, Hydrogen, CO, and even methane. The module version of this sensor comes with a Digital Pin which makes this sensor to control even without a microcontroller which comes in handy once you are only trying to detect one particular gas. When it involves measuring the gas in ppm the analog pin must be used, the analog pin also TTL driven and works on 5V and hence will be used with commonest microcontrollers. MQ2 may be a metal oxide semiconductor type gas sensor. Concentrations of gas within the gas is measured employing a resistor network present within the sensor. This sensor works on 5V DC voltage. It can detect gases within the concentration of range 200 to 10000ppm.

Fig.4: Smoke sensor

Flame Sensor

A flame-sensor is one kind of detector which is mainly designed for detecting as well as responding to the occurrence of a fire or flame. The flame detection response can depend on its fitting. It includes an alarm system, a natural gas line, propane & a fire suppression system. This sensor is used in industrial boilers. The main function of this is to give authentication whether the boiler is properly working or not. The response of these sensors is faster as well as more accurate compare with a heat/smoke detector because of its mechanism while detecting the flame.

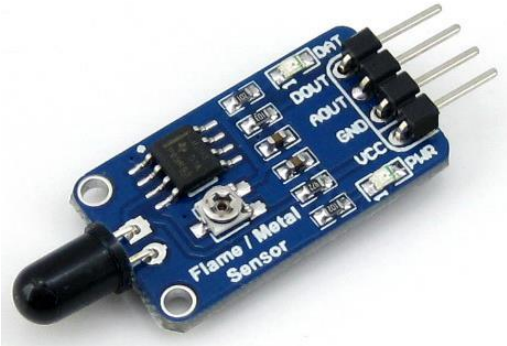

Fig.5: Flame sensor

Servo Motor

A servo motor is a rotary actuator that allows for precise control of angular position. It consists of a motor coupled to a sensor for position feedback. It also requires a servo drive to complete the system. The drive uses the feedback sensor to precisely control the rotary position of the motor. It operates on 5v dc. It can control by PWM pulses.

Fig.6: Servo motor

RFID Card Reader

The module operates 13.56MHz which is an industrial (ISM) band and hence are often used with none license problem. The module operates at 3.3V typically and is hence commonly utilized in 3.3V designs. it's normally utilized in applications where a specific person/object needs to be identified with a novel ID. The keychain has 1kB memory in it which might be accustomed store unique data. The RC522 reader module can both read and write data into these memory elements. The reader can read data only from passive tags that care for 13.56MHz.

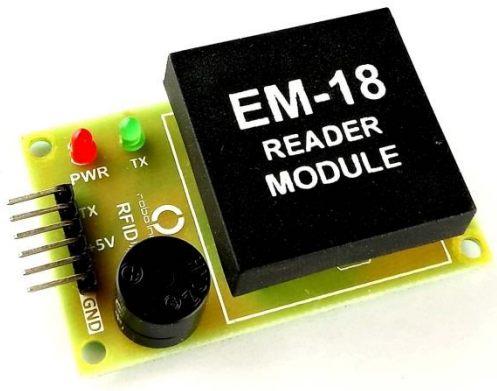

Fig.7: RFID car reader

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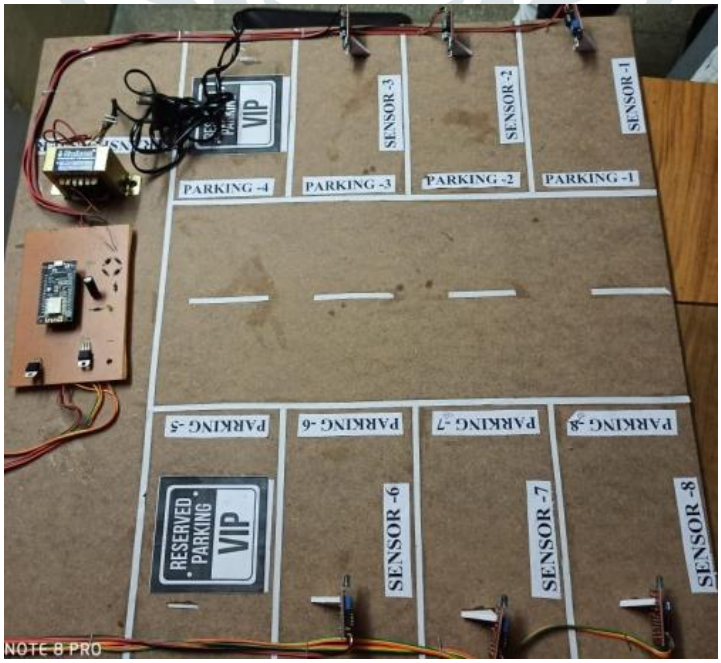

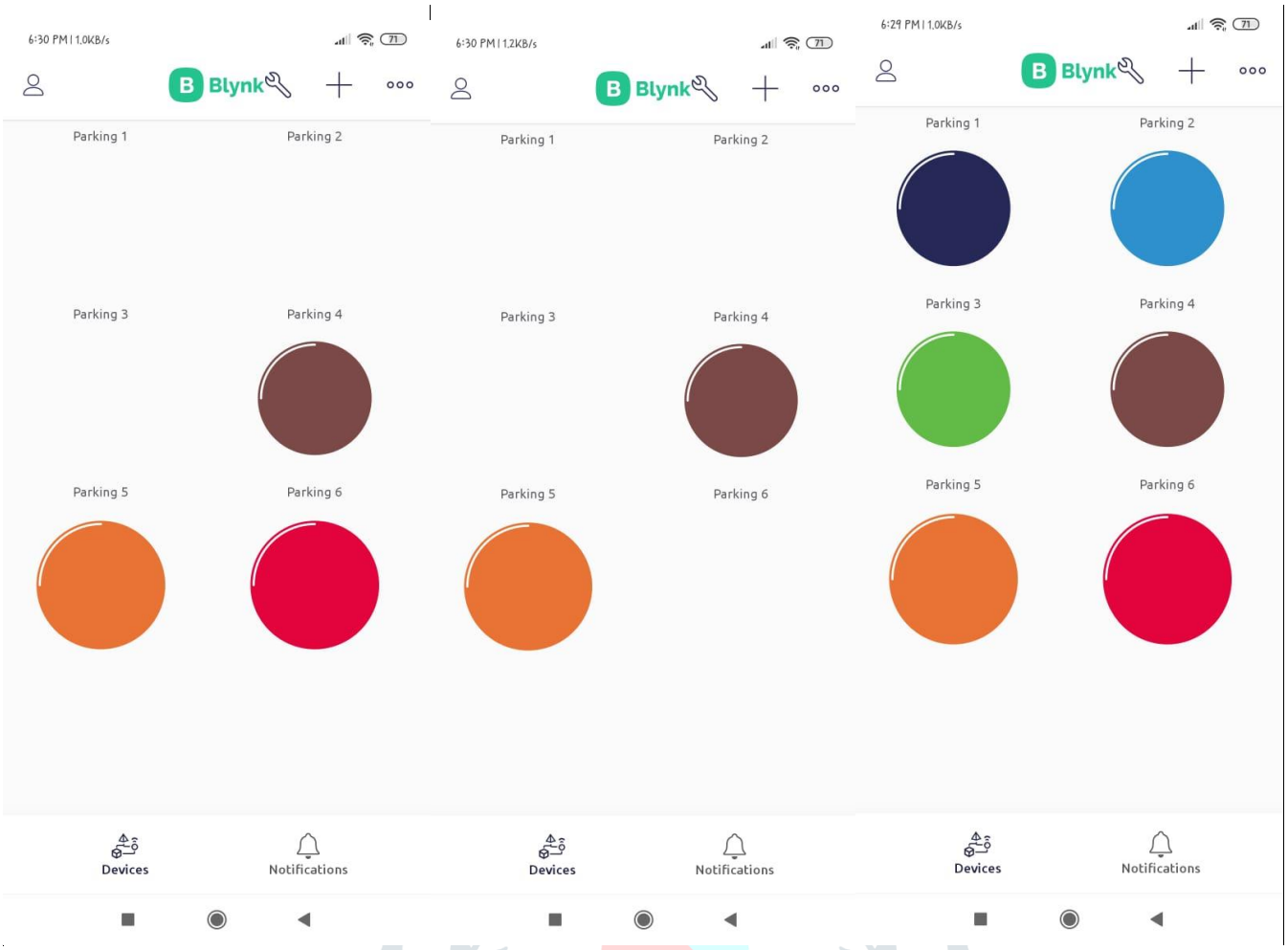

Fig.: Iot cloud

CONCLUSION

IoT has many various applications, but one amongst the foremost exciting is its use in smart parking. IoT-based parking systems are able to better track the slot of parking spots on a given lot, making it easier to see out an available parking spot. It is important to notice that on IoT-based parking systems and parking panel. For instance, some use RFID tags to spot available parking spots, while others use sensors to detect when a car leaves a parking spot. The advantages of an IoT-based smart parking system are that it's more creative, efficient, and convenient for both drivers and owners of the car parking zone.

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