# Project Report

**Internship Title : Slot 9IOT(Basic)-8**

**Project ID        :  SPS_PRO_251**

**Project Title      :  Smart Parking System For Smart Cities**

**Duration          :  9 Days**

**Project Managed by: Sanchi Wakde**

# Smart Parking System for Smart Cities using IOT

## Introduction:

## Overview

The project proposal is initiated due to the current issues that are being faced by some regular people every day, i.e., to find a parking spot. The idea is mainly to create a device with a camera module mounted on it which will help to scan only the cars entering and exiting a parking lot and will display the appropriate space remaining in the lot. As it has been known that 20% of the drivers are getting irritated by driving the whole block to look for vacancy spot to park the car. People are getting dependent upon the app which can help them get proper information about the parking lot occupancy, but inevitable due to the improper implication of GPS and other sensors.If applied through IoT devices all the technological limitations can be portrayed as storage, processing and energy and the cloud will be able to deal with all the computation and real applications .

## Purpose

IoT has a multidisciplinary vision to provide its benefit to several domains such as environmental, industrial, public/private, medical, transportation etc. Different researchers have explained the IoT differently with respect to specific interests and aspects. The potential and power of IoT can be seen in several application domains. Illustrates few of the application domains of IoTs potentials.

# Literature Survey

## Existing Problem

In today's world parking lots have become redundant and needs lot of manpower to handle and maintain it. These parking lots are not user friendly and do not provide data regarding availability of free spaces. Many researchers have contributed to this issue and formalized with various methods to better optimize the parking lot to serve the needs.

## Issued Solution

Internet of Things is the next big thing, as almost everything developed now has an extensive use of data which is then used to get the daily statistics and usage of every individual. The work mainly consists of constructing a screen where the parking space will be shown, and a camera module will be set up, and PIR (Passive Infrared Sensor) will be at the entrance to detect the entrance of a car or any vehicle eligible to park at the lot. The vehicle will be scanned for its registration number in to provide a check whether the vehicle is registered to park or not. This also acts as the security of the parking lot. Moreover, a viable sensor will be placed at each parking slot through which the vacancy of each parking slot will be shown to determine the exact spot available to the user.

# Theorotical Analysis

## Block Diagram
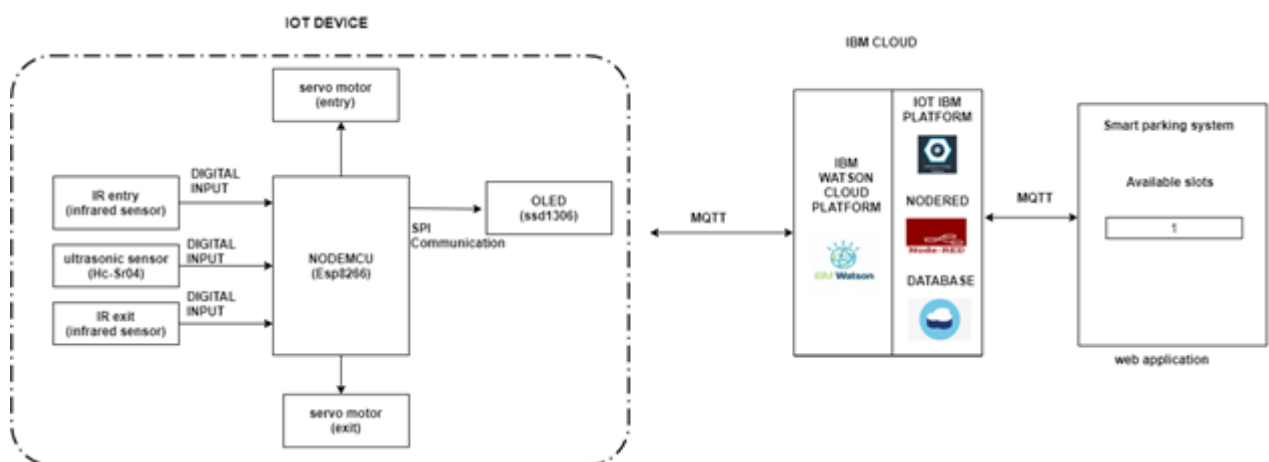
# Software Designing

## IBM Cloud

IBM Cloud offers the most open and secure public cloud for business, a next-generation hybrid multicloud platform, advanced data and AI capabilities, and deep enterprise expertise across 20 industries.IBM offers three hardware platforms for cloud computing. These platforms offer built-in support for virtualization. For virtualization IBM offers IBM Websphere application infrastructure that supports programming models and open standards for virtualization.
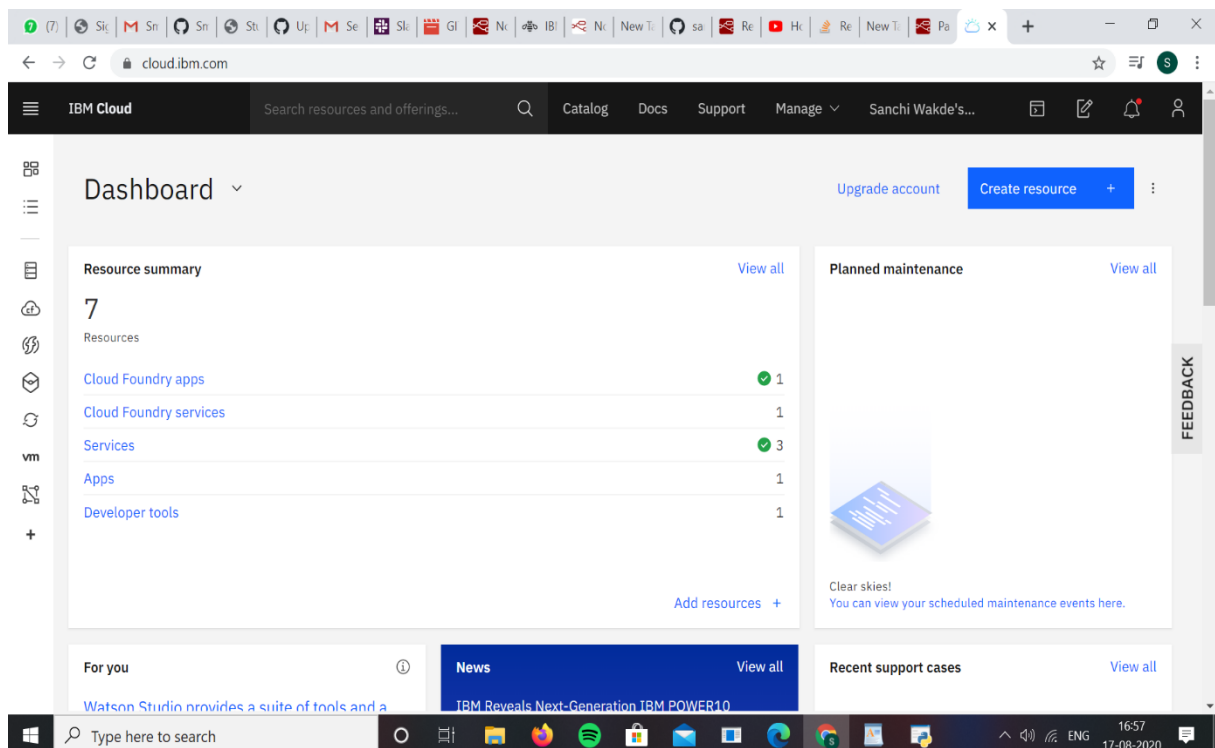
# IBM Watson IOT Platform

**IBM Watson IoT Platform can help you get a quick start on your next Internet of Things project. It is a fully managed, cloud-hosted service designed to make it simple to derive value from your Internet of Things devices. ... This highly scalable service allows payment through the IBM Marketplace or as a term subscription.**
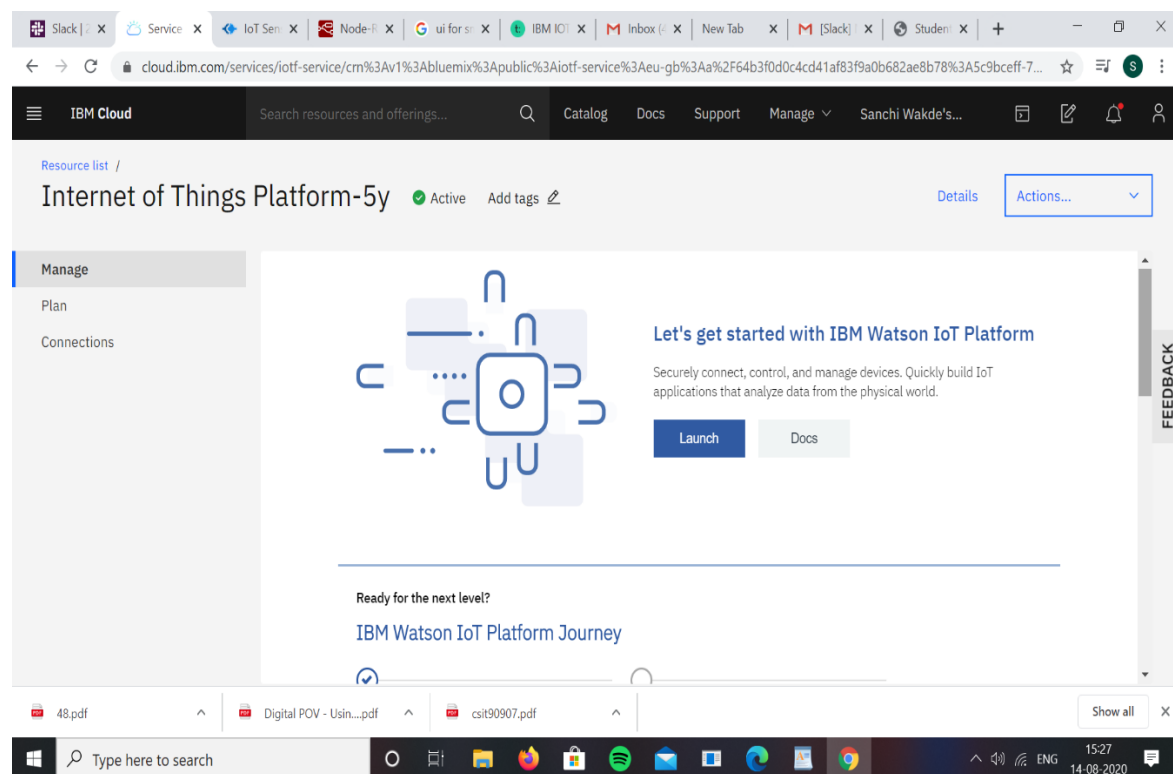


# Experimental Investigations

**A new wave of change has started and is expecting to proliferate with stronger connectivity and interoperability of various devices, named as the Internet of Things (IoT). The internet of things is expected to give strong impacts on different areas of life including healthcare, transportation, smart homes, smart campus, and more. Consequently, there are inherent benefits to the education environment that are not yet well established in literature. The paper studies the potential benefit and impact of the IoT evolution concept in both the physical and the virtual learning environment**

and suggests a paradigm with use case scenarios. The results of an experimental evaluation on the aspects of applying IoT technology in education are presented and discussed in order to verify the set of related hypotheses.

## Hardware Designing Advantages

Design engineers have many choices when it comes to the design of Internet of Things (IoT) solutions. Hardware is evolving to keep pace with the ever-expanding requirements and potential of IoT applications. As with all components, simplicity, cost-effectiveness, form factor, and reduced time to market are desired qualities. Purpose-built hardware offers an easy way to customize and get up and running with a pre-certified single board computer (SBC).

- **High flexibility**

  The flexibility of these SBCs accommodate different designs, giving engineers options they previously didn't have, with limited effort and risk. A valuable head start is pre-certification.

- **Ease-of-use**

  Designers are becoming increasingly specific in terms of their industry and environment, but most of what engineers need is provided. The hardware is production ready and it doesn't require a ground-up development effort.

- **Reliability and longevity**

  SBCs are often used in highly specialized and environmentally challenging embedded applications. Specific industry standards related tests for temperature, shock, and vibration will ensure that the platform is able to operate reliably 24/7 without failure.

- **Connectivity options**
  The IoT is pervasive throughout applications in virtually all vertical markets. Fully integrated and complete connectivity options must be considered and designed into a product right from the beginning — whether that be Wi-Fi connectivity to allow for

product configuration or services, Bluetooth Classic for user device integration, Bluetooth Low Energy for low-power sensors, or Ethernet for use-cases mandating wired network connections.

## Disadvantages

- Problems in ensuring smooth integration of new services
- Difficulty in adapting to new environments
- Frequent changes in hardware and software facilities
- Issues in packaging and integration of small size chip with low weight and lesser power consumption

## Application

Smart parking development implies an IoT-based system that sends data about free and occupied parking places via web/mobile application. The IoT-device, including sensors and microcontrollers, is located in each parking place.

## Conclusion

The IoT has the potential to dramatically increase the availability of information, and is likely to transform companies and organizationsin virtually every industry around the world.
As such, finding ways to leverage the power of the IoT is expected to  factor into the strategic objectives of most technology companies, regardless of their industry focus.

## Future Scope

The future of the smart parking market is expected to be significantly influenced by the arrival of automated vehicles (AVs). ... Using this system, up to 4 times as many cars can be parked in the same amount of space as a traditional garage (since there is no need for extra space in between cars)

# Appendix

# Source Code



```python
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random

#Provide your ibm watson device credentials

organization= "78z40p"
deviceType= "NodeMCU"
deviceId= "mcu123"
authMethod= "token"
authToken= "smartparking123"

# initialize GPIO

def myCommandCallback(cmd):
    print("Command received: %s" % cmd.data)#command received from nodered
    print(type(cmd.data))
    i=cmd.data['command']
    if i== 'lighton':
        print("light is on")
    elif i== 'lightoff':
        print("light is off")
try:
        deviceOptions = {"org": organization, "type":deviceType, "id":deviceId, "auth-method":authMethod, "auth-token":authToken}
        #JSON format
        deviceCli= ibmiotf.device.Client(deviceOptions)
        #connecting the client

except Exception as e:
        print("Caught exception connecting device %s" %str(e))
        sys.exit()

deviceCli.connect()
#connecting to the patform

while True:

    enter=random.randint(1,40)
    exits=random.randint(1,40)
    available=random.randint(1,40)
```



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while True:

    enter=random.randint(1,40)
    exits=random.randint(1,40)
    available=random.randint(1,40)
#Send entry and exit status to ibm watson
    data={'Entry' : enter ,'Exit':exits,'Availableslots':available}
# print (data)
    def myOnPublishCallback():
        print("Publish Entries= %s" %enter,"Exits=%s " %exits,"Availableslots= %s" %available,"to IBM Watson")
#publish the data
    success=deviceCli.publishEvent("Smart Parking","json", data , qos=0, on_publish=myOnPublishCallback)
    if not success:
        print("Not connected to IOT")
        time.sleep(2)

        deviceCli.commandCallback = myCommandCallback
#subscribing

    #Disconnect the device and appication from cloud
deviceCli.disconnect()
```

# UI Output Screenshot