# IOT Based Smart City

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**Abstract: The massive deployment of Internet of Things (IoT) is allowing Smart City projects and initiatives all over the world. The IoT is a modular approach to merge various sensors with all the ICT solutions. With over 50 billion objects will be connected and deployed in smart cities in 2020. The heart of smart cities operations is the IoT communications. IoT is designed to support Smart City concept, which aims at utilizing the most advanced communication technologies to promote services for the administration of the city and the citizens. This paper is presenting a comprehensive review of the concepts of IoT and smart cities and their motivations and applications. Moreover, this paper describes the main challenges and weaknesses of applying the IoT technologies based on smart city paradigms.**

**Keywords: Sensor, IoT, Network, Cloud, ESP32, Online platform.**

## INTRODUCTION

The Internet of Things is an infrastructure that includes physical devices, modern vehicles, buildings, and even essential electrical devices which we use on a consistent basis inter-connected to each other over the internet so that they can accumulate and exchange data amongst themselves. These "Things" have the priority and the ability to self-organize and communicate with other things without human intervention. There are more than six devices connected to the Internet per person.

The concept of IoT aims to present the Internet even more pervasive and even more immersive. Moreover, by enabling easy access and interaction with an extensive variety of devices such as instance for home appliances, monitoring, surveillance cameras, sensors, displays, actuators, and vehicles. The IoT will improve the development of various applications that make use of the massive amount and diversity of data produced by objects to implement further services to companies, citizens, and public administrations. IoT applications are various and brought to several areas and domains for example: home automation, healthcare via mobile, manufacturing automation, elderly assistance, medical aids, automotive, smart grids and intelligent energy control, traffic management, etc.

The IoT structure is subject to smart and self-configuring objects that are combined into a universal network foundation. That will give an addition to new opportunities for the Information and Communication Technologies (ICT) sector, covering the way to different services and applications able to leverage the interconnection of physical and virtual domains. IoT can be defined as 'Objects having virtual personalities and identifications in smart areas employing intelligent interfaces to connect and communicate within medical, social, environmental and users context. The influence of the IoT on the life of users can be considered as its key feature. This challenge has driven to increase of different and seldom, incompatible projects for the possible recognition of IoT systems. Accordingly, from a system prospect, the awareness of an IoT network, commonly with the required backend network services and devices, still needs an established best practice because of its novelty and complexity. Furthermore, to the technical challenges, the IoT model adoption also limited by the lack of widely and clearly admitted business model that can attract expenses to increase the deployment of these technologies.

Smart cities are those that make the use of these smart things to carry out various functions such as lighting, traffic control, connecting multiple cities, energy consumption and pollution control. The main purpose of smart cities can replace the way how we look to the things. Regarding many aspects where IoT is set to rule we can say that from the most reliable day to day actions to the most complex human emotions, IoT will affect it all. Commonly, from the smart city

applications and the underlying environment the citizens will benefit primarily, as illustrated in Figure 1. The IoT based Smart City applications can be a personal assistant for the daily routine of a citizen. E.g., to remind him of his next appointment to optimizing his room temperature according to outside temperature to make his coffee on time. It can recognize his health if he suffers from any problem and notify or alarm his particular doctor in case of emergency. A formal definition exists for smart cities. In the IoT features, devices can be integrated based on the geographic location and determined by using an analyzing system. Sensor services for the collection of individual data can be used within several occurring projects such as concerning the monitoring of cyclists, vehicles, public parking lots. The rest of the paper is organized as follows. We start presenting an overview of IoT in the context of smart cities in Section II. In Section III, we present a general overview of the smart city concept and services. More in detail, section IV describes actual IoT application for smart cities. In section V insights and research challenges are presented. Finally, Section V is concludes the paper and proposes future research directions.

## WORKING

The system architecture consist model like Smart parking, Street Light, & Garbage System.

1)Smart Car Parking

This system consists of a microcontroller as well as an IR sensor. Smart Parking is continually monitoring whether it is book or empty by using IR Sensor, Controller gets sensor data and sends it to the cloud. Then the user can monitor all time. IR sensor used as an obstacle detector. An IR sensor emits the infrared radiation which is bounces from the surface of car then the signal is detects at infrared receiver .Here we use three IR sensors for three parking slots. When the car is available at the first slot then the first slot is “book” shown on the user's mobile screen. It uses same concept for remaining slots. Smart Parking is continually monitoring whether it is book or empty by using IR Sensor, Controller gets sensor data and sends it to the cloud. Then the user can monitor all time.

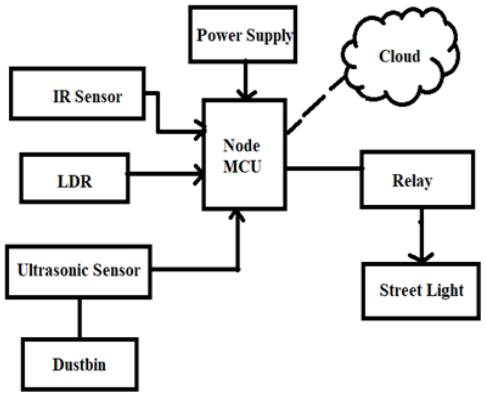
2)Smart Street Light System

The intelligent street light system consists of IR sensors, LDR .The vehicle which passes by the street light is detected by IR sensor. LEDs are on/off the street. We are using here three IR sensors and three LEDs. Here we uses LEDs as a street lights. When the car is passing through first street light then controller get sense data of sensor and controller. Controller turn ON the first street light based on sensor data. When car is passing thought the second street light it will automatically turn ON second street. Light and turn OFF the first street light after some delay. At last it car passing in front of last street light then it will turn ON and turn OFF the second lamp.

3)Smart Garbage monitoring system

Smart Garbage System is continually monitor the dustbin full or empty. By using Ultrasonic sensor. It has 4 pins, VCC, trigger, echo, ground. Echo pin act as a output pin for controller and trigger act as a input pin for ultrasonic. Both pins are connected to the ESP32 controller. The garbage level is shown on the mobile app in percentage. When there no garbage precent in Dustbin then "0%" Show on mobile screen and when garbage bin is full then the "100%" result display on mobile app.

## BLOCK DIAGRAM




## DESCRIPTION

### POWER SUPPLY

A power supply is an electrical device that supplies electric power to an electrical load. The main purpose of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load.

### 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.

LDR

LDR (Light Dependent Resistor) as the name states is a special type of resistor that works on the photoconductivity principle means that resistance changes according to the intensity of light. Its resistance decreases with an increase in the intensity of light.

NODE MCU

Node MCU is an open source IoT platform. It includes both firmware which runs on the ESP8266 Wi-Fi SoC, and hardware which is based on the ESP-12 module. The applications in these samples that are running on Node MCU are written using Lua scripting language which is quite simple and easy to understand.

ULTRASONIC SENSOR

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity.

RELAY

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.

IOT CLOUD

An IoT cloud is a massive network that supports IoT devices and applications. This includes the underlying infrastructure, servers and storage, needed for real-time operations and processing.

STREET LIGHT

A street light or street lamp is a raised source of light often mounted on a lamp column or pole either on the side of the road or within the median, or suspended on a wire above the road to provide illumination.

DUSTBIN

A dustbin is a large container with a lid which people put their rubbish in and which is usually kept outside their house. [British]regional note: in AM, usually use garbage can.

## CONCLUSION

Since the implementation of the IoT infrastructures could enable various and massive opportunities, firstly the highest research motivations are explained and then some useful applications outlined. It characterized how daily activities can be developed, improved and enhanced by employing them. Furthermore, in this work, the challenges which occur when implementing the IoT system were utterly explained. In this regard, the integration of the IoT platform with other autonomous and smart systems for implementing intelligent and widespread applications is one of the most affecting future trends presented. Moreover, explaining a mechanism to overcome some of the critical challenges like management and coordination and smart parking lots presented. The IoT with its implementation and features should, in particular, employ intelligent systems and sensors to preserve the rights of the smart city citizens. As a future work, we plan to survey various solutions and recommendations to address several of the challenges of IoT and smart cities we have discussed in this paper and in particular the security challenges and issues.

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