

A REVIEW ON SMART CITIES BASED ON IOT TECHNOLOGY

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Abstract: - In an IOT based smart city various component like smart water supply management, traffic light control, street lightning system and many more systems are make a city to a smart city. In a smart city all the necessary facilities such as transportation, water, energy and security etc. related issue can be solving in easy way and the community and people provide a healthy and safety environment.

technologies that enable these domains to exist in terms of architectures utilized; networking technologies used as well as the artificial algorithms deployed in IOT based smart city systems.

In contrast to the works of [3], we provide a detailed overview of the different core units and the technologies used in smart city implementations as shown in figure [3].

The world is moving forward at a fast with increasing technology in recent time. Thus, a lot of safety issues in all parts of world. So, in this paper mainly focus to provide a well deserved life of all the persons living in the cities. Generally the smart cities definition depends on geographical, environmental and economical.

I. INTRODUCTION

A smart city is focused on providing the advanced and a developed city. That we will provide an effective water supply system advanced traffic light control system, a well maintained public transportation that overcome the problems face in normal city [1].

The IOT is similar to the world where world is fully interconnected each country that's IOT is a combination of various devices that is computer, sensor and many more equipments. Than the aim of smart city can be obtained through IOT that mean by using IOT technology we can develop smart cities at a low cost and high efficiency. As urban population density, Infrastructures are rapidly growing service need to provide the necessities of life.

Smart city may be recognized by various ways. Use of information and communication technology (ICT) for transformation of human life and working environment in that particular region [9].

II. SMART CITIES: TECHNOLOGIES

The required components that make up the IOT based smart city landscape followed by the

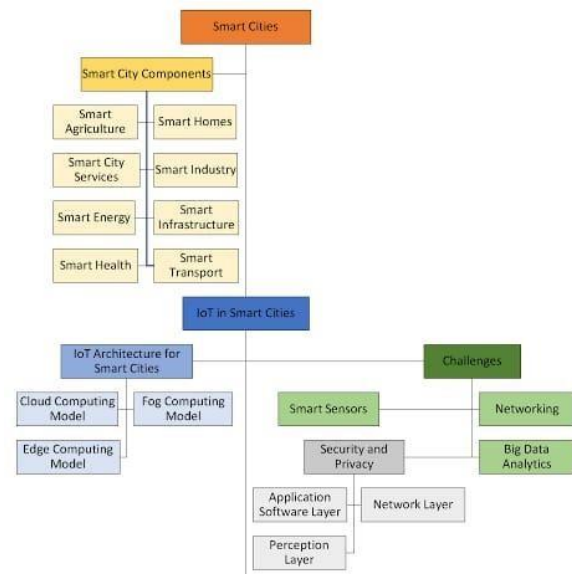


Fig. 1: Block diagram of IOT in smart cities

Table : Comparison of different Smart Cities Applications features based on IoT Technologies

Ref.	Smart City Services	Microcontrollers	Embedded Program Language	Sensors	Communications	Protocols	Algorithm	Efficient Results
[4]	Traffic Signal Preemption (TSP) System	Arduino (ATmega2560)	Arduino (IDE)	Inbuilt GPS of Smartphone	Wi-Fi module IEEE 802.11	HTTP	-	Delay reducing and enhance the response time
[4]	Smart Street Light Management System	Arduino (ATmega328)	Arduino (IDE)	LDR, DHT11	Wi-Fi-ESP8266	HTTP	-	Energy saving and maintenance costs
[4]	Smart Electric Pole System	Pasporty P13	Python	LDR, Current, Accelerometer	Wi-Fi-ESP8266	MQTT	-	City pole controllability and enhance efficiency
[4]	Smart Waste Management System	Arduino Microcontroller	Arduino (IDE)	(HC-SR04)	GSM/GPRS	HTTP	Genetic Algorithm	Reducing the cost and time
[4]	Waste Monitoring and Collection	Renesas RL78	Renesas Flash programmer	(FSR-402), (HC-SR04), PIR, GPS (FM-506)	GSM/GPRS	MQTT	Shortest Path Algorithm	Maintain the city clean and keep the people away from diseases

[4]	Solid Waste Collection System	Arduino (ATmega328P)	Arduino (IDE)	GPS (EM-506)	Wi-Fi-ESP8266	HTTP	Shortest Path Algorithm	Locate empty bin in short path. Cost reduction, and Time management.
[4]	Efficient Parking Slot Availability Detection System	Arduino (ATmega328)	Arduino (IDE)	(HC-SR04)	Wi-Fi-ESP8266	HTTP	Built-in car detection algorithm at parking lot	low cost for implementation. Reduce the human fatigue, and time management.
[4]	Smart Parking System	Raspberry Pi	Python	(HC-SR04)	Wi-Fi-ESP8266	MQTT	-	Online booking and improve parking facilities.
[4]	E-Parking System	Arduino (MEGA 2560)	Arduino (IDE)	(HC-SR04)	Wi-Fi Module IEEE 802.11	HTTP	Image Recognition Algorithm	Online booking, and checking vehicle's from unfiling parking in the parking area.
[4]	Smart Urban Climate Monitoring System	Raspberry Pi 1 Model B+	Python	(DHT22), (BMP180), (BH1750), (MQ7), (MQ135)	Ethernet cable (LAN), USB-Wi-Fi module	MQTT	-	Monitoring pollution levels and warning people.
[4]	Monitoring and Irrigation of an Urban Garden	Arduino Nano	Arduino (IDE)	(DHT22), (MQ135), (BH1750), (SHT10), (YL-69), (GP2Y A21)	Wi-Fi-ESP8266	MQTT	Decision Making Algorithm	Reduces the consumption of water resources as well as improves crop quality.
[4]	Smart People's Safety System	Arduino (ATmega328)	Arduino (IDE)	Heart Beat Sensor, (LM35), GPS (EM-506)	GSM SIM800	HTTP	Learn Machine Algorithm - Logistic Regression	Personal security analyze the severity of crimes against women, reducing the rate of harassment.
[4]	Underground Drainage Monitoring System	ARM7	Keil software	(LM35), (MQ-7)	GSM SIM900	HTTP	-	Time management, Hazards can be avoided, regularly in drainage check.
[4]	Monitoring and Burst Detection in Intermittent Water Distribution Networks	STM32F1	Keil software	Built-in IR/IRLDR Gauge, pressure & External for flow or water quality monitoring	GSM/GPRS	MQTT	Kalman Filter Leakage and Burst Detection Algorithm	Critical events managing that occur in intermittent water distribution networks

Table shows the type of applications micro controllers, software, sensors, communication modules and other field [4].

III. SMART CITY APPLICATIONS

SMART WATER SUPPLY SYSTEM

Smart water supply is essential factor of smart city in which our main aim to provide a clean and drinking water to the living people of this city. Water is important factor to the each person to survival of life.

A water supply system based on pipeline and pump station monitoring with the help of data sciences and IOT.[1]

STREET LIGHTNING CONTROL SYSTEM

IOT based street light allows supervisors to regulate street lights through wireless connections with a fail resist or fail safe nature that means even in a worst condition our solution falls the lights can still work normally without any interrupt. "These lights embedded [1] with sensors which responds according to surroundings light conditions or brightness i.e. in foggy conditions sensors would turn the light on even if it is 12 of noon".

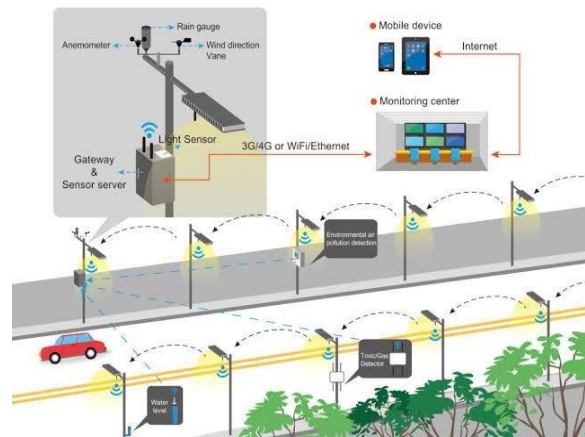


Fig: Smart street lightning control system

TRAFFIC SIGNAL SYSTEM

Now a day's congestion in traffic is a big problem of a smart city so that the traffic signal issue can be resolve by using micro controller. This signal system is used to reduce traffic problems. In this system contains transmitter and either side of road whenever a vehicle passes on road between IR transmitter and receiver than the IR system get activated which is control by micro controller than after this system count the number of vehicles passing on the road. This data is store in memory, and then micro controller should take decision and update the traffic light delay as a result, overcome the traffic congestion. [5]

NOISE MONITORINGS

Noise can be seen as a form of aural pollution as much as carbon oxide (CO) in air so, acity IOT can offer a noise monitoring service to measure the amount of noise produced at any given hour in the places that adopt the service and also be used sound detection algorithms to overcome the noise pollution in the city.

INTELLIGENT PARKING

Smart parking system makes a smart city more effective. Thus, by enabling smart parking you can track located in the departure city and the arrival of a variety of different parking vehicles. So the number of each field of smart vehicles parking should be designed.

SMART HOME

Data generated by the sensors can be used to monitor



the intelligent home. For example, an innovative demand response or the function may be implemented by monitoring pollution, contamination and if it exceeds a critical limit, the client can be warned [6].

IV. IOT BASED SMART CITIES

In the world various countries make IOT based smart cities and give an advance level of smart city vision as shown in fig [7].



Fig: An assumption of IOT model

City	Country	Solutions	Major partners
Busan	South Korea	Safety service for children /elderly, drone based smart marine, smart parking	Busan government, Cisco, ETRI, KETI, SK telecom, KT
Santander	Spain	Smart metering of temperature, traffic intensity, humidity, transportation plans, water needs, etc.	Ericsson, Telefonica, Telefonica I+D
Chicago	USA	Smart grid, smart living, emergency alerting, reduced crimes	Cisco, IBM, Chicago government

Milton Keynes	UK	Smart transportation, reduced alerting,	Milton Keynes council, Samsung, Huawei,
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V. CONCLUSIONS

In this review paper we have generally focus on the IOT for smart cities and its role. In IOT based smart city various component like water supply and management system, street lightning system, public transportation, traffic control system, smart home and many more features make a city smart city. IOT just a technology which is developed a smart city with low cost and maximum efficiency and provide a healthy and safety environment of the citizens.

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