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Internet of Things for Smart City

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Abstract: The Internet of Things (IoT) will able to give the solution to the real life problems and can be able to find the solution on these. The IoT will be communicating with one another and with the users with the help of Internet. Hence it will be used in city to increase the sustainability of the people. It will be confusing to having the how it will be implementing on the whole city. This paper gives the idea about how will able to implement the IoT on whole city. Whole city contains different areas in which we use IoT and can improve the sustainability to the people living in one city and provides the better services to the people.
Keywords: Iot, sensors, smart city, inventions, organization.

I. INTRODUCTION

The Iot will be the one of the greatest inventions in the industry which is really useful in the different applications. Iot means internet of things simply it actually means that different sensors will be used and implement using Internet hence it will be used by the different applications. One of the applications of Iot will have specific interest in the urban living.

The different government organization also tries and arrange different programmes to aware the peoples about different applications of Iot which will give sustainable life for whole city. Iot provides different applications related to security, home used appliances, different monitoring appliances using sensors, vehicles etc. By using different devices used in a whole city and provide different solutions to the city which will be implemented hence it will call as Smart City.

The smart City consist of different sectors such as water management, air quality, parking system, light system, waste management system etc. Many things will be included in the Smart City will be managed easily by using Iot. By implementing Iot in these sectors it will gives lot of applications and it will be very useful.

The smart city will provide different services will using better technologies will be implemented and it will give the different applications for whole city. By using Iot it will be implemented for whole city. For different applications it will be applied.

The main aim of smart city is to provide the services and reduce the cost by using different Iot services. The cost will be reduce and provide the better services. The better the services will give different opportunities for the implementing Iot in various cities.

The smart city includes different sectors which will be focused for enhancing the sustainability.

It will collect the different data from the sensors and it will be used to different purposes. It will be used to the monitoring the different cities their conditions, solutions for it. Hence it will be easily monitored by using the sensor data. It will be easily monitored and used for different purposes.

II. SMART CITY CONCEPT AND SERVICES

The smart city will provide different services. It includes online parking, street light management, air quality, weather monitoring, waste management.

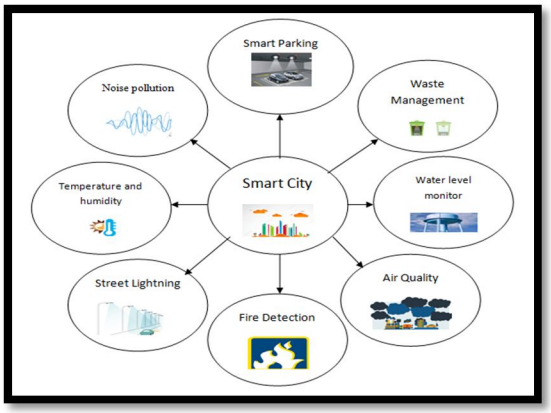


Fig. 1.Smart city services

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1) *Smart Parking System:* The Smart parking system will used for solving the parking problem. This system will help the driver for parking the vehicle. It will show the available slots for parking. The system will help to reduce the parking problem which is huge in city. At the parking place we provide LCD to show available slots for parking and we can also see on our website.
2) *Street Light Management:* The street light management system has a best quality that is energy efficiency. The street light management system will help to save electricity. The street lamp intensity will be measured and according to the time of the day, the weather condition and the presence of people. On the street lamp the light will be dim when there is no humankind or vehicle is passing. Whenever the humankind or vehicle is passing on the street when it comes at some distance to the street lamp the light will be brighter. Street lamp management will prevent the city from unnecessary over lighting. In street light management system we use sensor which generate an output signal indicating the intensity of light by measuring the energy.
3) *Air Quality:* In the urban areas, air pollution is a real-life problem. The main cause of air pollution is increased number of petrol and diesel vehicles and industrial areas.The air quality system which shows quality of air in the city and presence of air pollution in the surrounding. The air quality system will in both indoor and outdoor environment. It will help to bring attention to the environment issues that are beyond the scope of human eye. It will be great help to citizens which have health related issues.
4) *Noise Monitoring:* The noise monitoring system will measure amount of noise produced in the city. We will be using sound sensor to measure the intensity of noise. The sound sensor is a small board that combines a microphone and some processing circuitry. It will help to reduce the noise pollution of the city.
5) *Weather Monitoring:* The weather monitoring system will measure the temperature and humidity. Humidity and temperature are common parameters to measure environmental conditions.It generates calibrated digital output. Humidity and temperature sensor will provide high reliability and long term stability.
6) *Water Level Monitoring:* In real system for managing the tank one management system is requires for managing the tank for filling water, electricity management and for other problems in our smart city water tank management we use IoT for managing the water tank. It will save the water by using the water level sensor which detects the presence of the water. A water detector sensor module is an electronic device that is designed to detect the presence of water and provide an alert in time to allow the prevention of water damage.
7) *Waste Management System:* The waste management system will help to collect the waste from city in organized way. The waste management system in which each dustbin have a sensor which will be detect the level of the waste gathered in the dustbin. There is certain limit is set in the sensor when the limit will cross then the sensor will give status of the bin to the municipality so that they can clean the bin on time and safeguard the environment.
8) *Fire Detection System:* It has been found in a survey that 80% losses caused due to fire would have been avoided if the fire was detected immediately. Fire Detection System is systems that give alert information when fire is occurred. Fire Detection System designed to detect and respond to the presence of a flame or fire.

III. IMPLEMENTATION

A. *Architecture of Smart City*

There are different services will be provided in Smart city. The smart city architecture will consist of three levels as device collection, device processing, device control and alert.

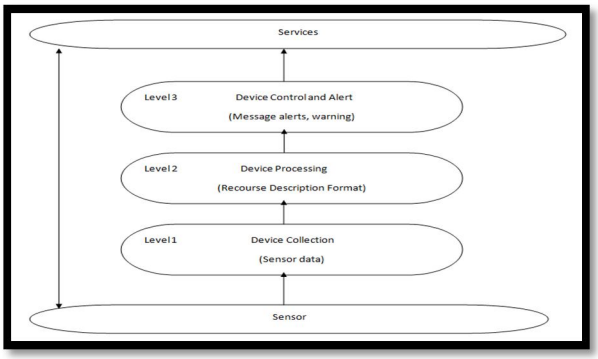


Fig. 2.Smart city architecture

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1) *Device Collection*: It will collect the data from sensors. The collected data will be used for further calculations. It is called as sensor data. The different sensors will be connected throughout the city hence data will be collected from the sensors.
2) *Device Processing*: It will be the second level called as device processing. It will contain Resource Description Format. The second level does the how devices will be proceed.
3) *Device Control and Alert*: The third level is device control and alert. It will consist of controlling the devices and managing different alerts will be got. The alert will be based on the different conditions and sensors.

B. Devices

1) *Arduino:* Arduino is an open-source electronics platform based on easy to use hardware and software. Arduino boards are able to read inputs light on a sensor, a finger on a button, or a Twitter message and turn it into an output activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring) and the Arduino Software (IDE), based on Processing. Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers students, hobbyists, artists, programmers, and professionals has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide.

C. Sensors Implementation

1) *Ultrasonic Sensor*-The ultrasonic sensor is used in the smart parking system. In the parking slot the ultrasonic sensor is set. Whenever the vehicle is at distance 10 cm or less than 10 cm from the ultrasonic sensor then parking slot is allotted to the vehicle and when the vehicle is at distance more than 10 cm from the ultrasonic sensor than parking slot is empty. The ultrasonic sensor is used in the Waste Management System. In Waste Management System the ultrasonic sensor is fixed at upper side of dustbin when the garbage is come at 10 cm or less than 10 cm from then sensor will give status of the bin to the municipality so that they can clean the bin on time.
2) *Flame Sensor*-We are using the Flame sensor in the Fire Detection System. Flame sensor gives the alert information when fire is occurred. Flame sensor detects and responds to the presence of a flame or fire. Fire closer than 1.5 feet away from the sensor then on the website “close fire” message will be generated, when the Fire between 1 to 3 feet away then on the website “Distant fire” message will be generated and when there is no fire is detected then on the website “No fire” message will be generated.
3) *LDR Sensor*-We are using the LDR sensor in Street Light Management. Using the LDR sensor the Street Light will be managed. When there is sunlight or enough light then the street light will be off otherwise the light will be lightning.
4) *DHT11Sensor*-This is used for sensing Temperature and humidity.It gives a calibrated digital output signal. DHT11 gives us very precise value of Temperature and humidity and ensures high reliability and long term stability.
5) *Sound Sensor*-We are using the sound sensor in Noise monitoring system. The sound sensor has a small board. It combines the microphone and some processing circuitry. Sound sensor provides an audio output with binary indication of sound and amplitude with analog representation.
6) *Air Quality Sensor*-Air quality sensor is used to detect and monitor the presence of air pollution in the surrounding area. The Air quality sensor can be used in both indoor and outdoor environments. It brings attention to environmental issues beyond the scope of the human eye.
7) *Water Level Detector Sensor*-The water level sensor will detects the level of water will be measured. The water level sensor will be set to some level. It will save give the alerts when the water level is full or empty. Hence it will save water which is important.

IV. CONCLUSION

We analyzed the solutions currently available for the implementation of urban IoTs. The discussed technologies are close to being standardized, and industry players are already active in the production of devices that take advantage of these technologies to enable the applications of interest. In fact, while the range of design options for Iot systems is rather wide, the set of open and standardized protocols is significantly smaller. The enabling technologies, furthermore, have reached a level of maturity that allows for the

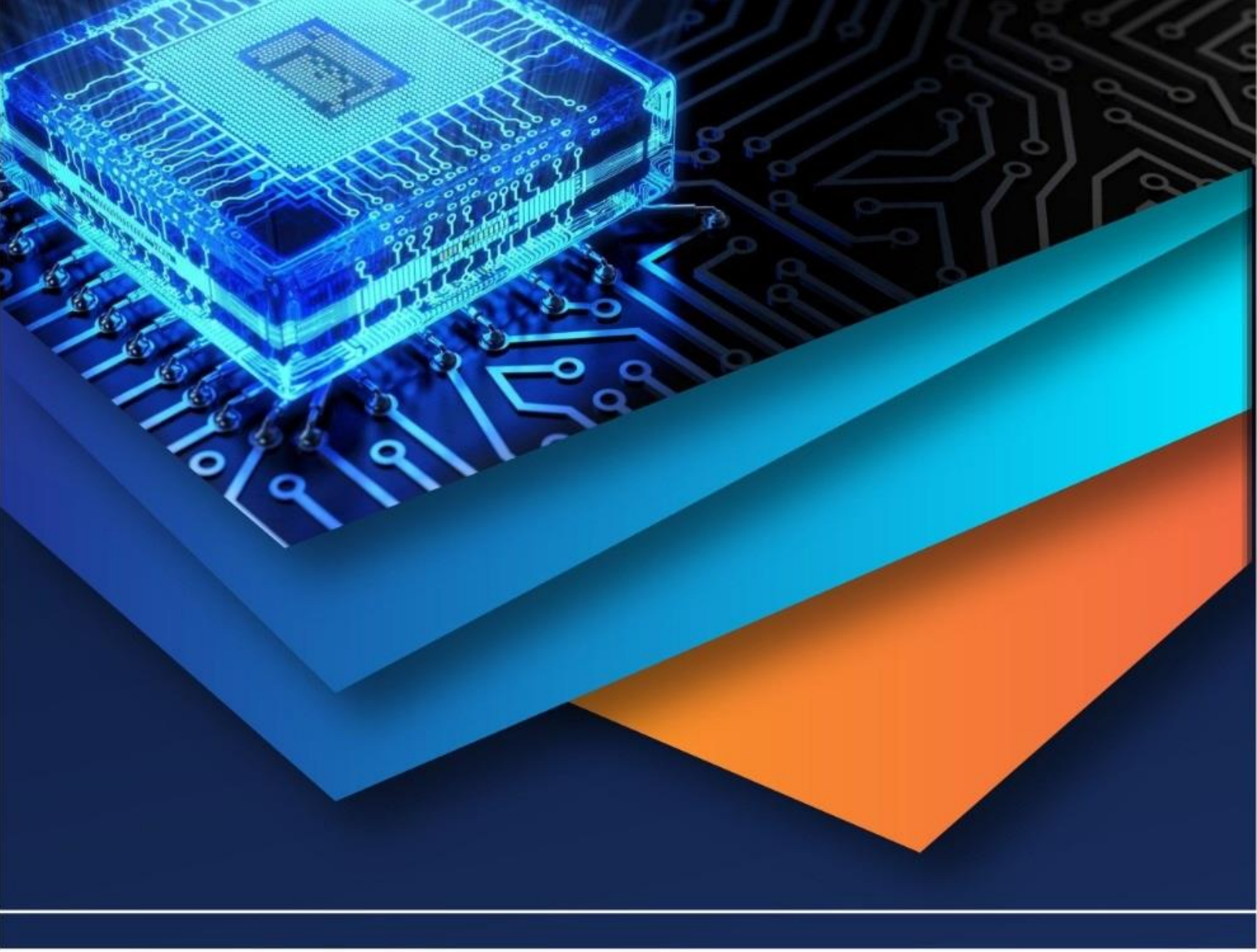
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practical realization of IoT solutions and services, starting from field trials that will hopefully help clear the uncertainty that still prevents a massive adoption of the IoT paradigm.The range of design options for IoT systems is rather wide, the set of open and standardized protocols is significantly smaller. The enabling technologies furthermore have reached a level of maturity that allows for the practical realization of IoT solutions.

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