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A Survey on Smart City using IoT (Internet of Things)

Akshay Kadam¹, Vineet Ovhal², Anita Paradhi³, Kunal Dhage⁴

U.G. Student, Department of Computer Engineering, SKNCOE, Pune, Maharashtra, India¹²³⁴

ABSTRACT: With the growth of population in the cities, it is mandatory that every citizen must get the necessary services as well as infrastructure which is suitable for the citizens. The rapid development in technology gives a solution for the arising problems in the future. Since, the medium of internet provides the components and devices to interact with each other; it enables real time communication between them. This paper presents a list of general ideas which help in realizing the dream of smart cities through Internet of Things (IoT). The framework presented uses sensors and networking with cloud based integration to provide an improvement to the existing cyber physical system. Existing services can be improved with the help of the IoT vision presented in this paper.

KEYWORDS: Android, Cloud Computing, Information Management, Networking, Smart City, Structural monitoring.

I. INTRODUCTION

A smart city is defined as the ability to integrate multiple technological solutions in a secure fashion to manage the city's assets – the city's assets include, but not limited to, local departments information systems, schools, libraries, transportation systems, hospitals, power plants, law enforcement, and other community services. The goal of building a smart city is to improve the quality of life by using technology to improve the efficiency of services and meet residents' needs. Through the use of real-time systems and sensors, data are collected from citizens and objects - then processed in real-time.[1]

The Internet of Things (IoT) is the network of physical objects, devices, vehicles, buildings and other items which are embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more-direct integration between the physical world and computer-based systems, and resulting in improved efficiency, accuracy and economic benefit; when IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. Experts estimate that the IoT will consist of almost 50 billion objects by 2020.[2]

This paper presents a vision that mainly focuses on smart transport, Street light control, Structural monitoring and forecasting etc. The basic aim is to reduce human effort in menial tasks and improve convenience and standard of living. This can be achieved by using an assortment of sensors, microcontrollers, central database and connections of cloud computing and Internet of Things. A hardware box is created that consists of microcontrollers attached to sensors. This is the basic data collecting unit of this project. Multiple hardware units like this will be set up at different points across the city. All these units are connected to the central database using Cloud Computing and IoT.

The hardware units will continuously monitor the data in the surroundings and send them to the central database to keep log. Also in the central database thresholds will be pre-set. These thresholds will be set by the administrator. If the readings received by the central database cross the pre-set thresholds then a notification is generated and action is taken according to it.

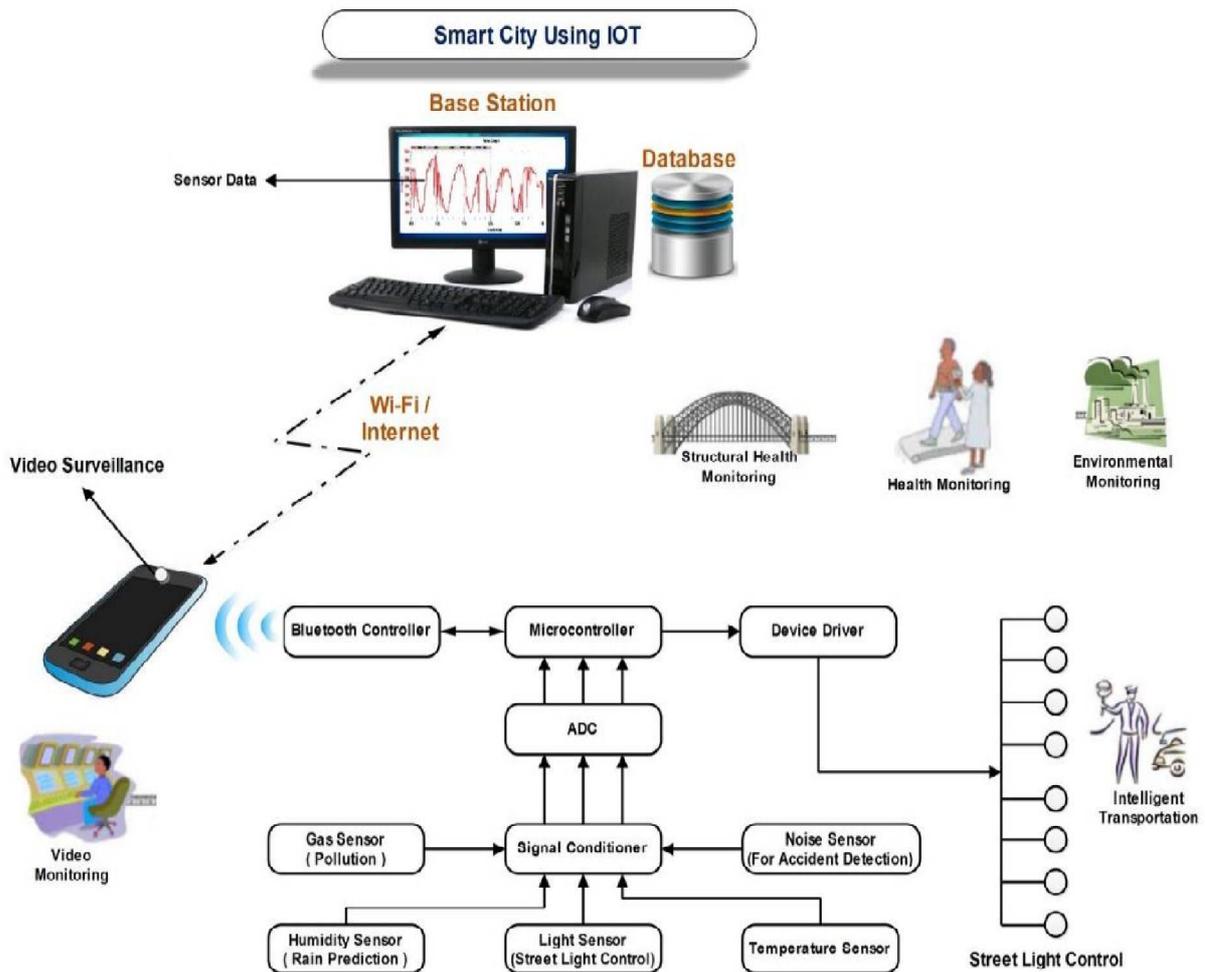
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This is beneficial especially to the common man as he can be continuously be updated via notifications while sitting at home. As a result the citizen can make an informed decision without having to actually face possible inconvenience.

The basic working of the project is shown in the block diagram below.



As seen above the sensors communicate the readings to the central database and if the threshold is crossed the citizen would get a notification on his smartphone

- This project aims towards improving:
- Street light control
 - Weather forecasts
 - Traffic control
 - Structural monitoring

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II. LITERATURE SURVEY

A. Present System

•Street light control –

At present time street light control is done manually that is the street lights are controlled with a switch. The process is very tedious and not always perfect. For example it may occur sometimes during monsoon it gets dark during the day and the street lights are not switched on.

•Weather conditions –

There is no present system which integrates weather information and helps an individual to make an informed decision about the weather conditions outside. For example if it is sunny outside a person could wear a hat or if it is going to rain he may carry an umbrella.

•Accident detection –

There is no particular way of knowing if an accident has occurred which may lead to traffic problems. We do have cctv surveillance to monitor the situation but no measures are taken by the system itself.

•Pollution levels –

At present there are systems that monitor the pollution levels in the air however they are not interactively used. The user may not know about the pollution level until he actually reaches over there and has to bear it anyhow.

•Bridge load capacity –

We know about instances in the past where damage has been caused to the bridges due to excessive load. Now a days it is only mentioned on sign board before the bridge begins. People are unaware if the load bearing capacity of the bridge has been exceeded.

B. Proposed System

•Street light control –

We are planning to install light detecting sensors on every street light which will detect when darkness has fallen. The sensors will automatically register this fact and turn on the street lights without human intervention. Thus, the street lights will be switched on as soon as it becomes dark.

•Weather conditions –

Temperature and humidity detecting sensors will be installed in different parts of the city that will continuously monitor the temperature and rain conditions. Thresholds are already defined in the main server and when the threshold is crossed by the sensor readings the end user will receive notifications like possibility of rainfall in certain area.

•Accident detection –

Sound sensors and cctv cameras play an important role in this application. We know that whenever an accident occurs there is a possibility of traffic. The sound sensors and video feed monitor it continuously and is integrated into the GPS system. Thus, the user will get a notification and can choose an alternative route.

•Pollution levels –

Sensors are put up at various locations which continuously monitor the pollution levels. When the thresholds are crossed, the user is notified and he may take appropriate measures to avoid the pollution.

•Bridge load capacity –

This application is based on weight sensors which are installed on a number of bridges that monitor the load on the bridge. When the load on the bridge reaches to a certain limit, the traffic authorities are notified to divert the traffic away from the bridge until the load on the bridge is back to normal.

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C. Future Scope

- An android application can be designed for a larger group people and more people can make appropriate decisions.
- Predictive algorithms can be interfaced so as to determine weather conditions more accurately.
- Electricity can be saved to an extent due to street light control.
- In general, a smart city can be designed in which the lives of individuals are made simpler and beneficial.

III. EXPECTED RESULTS

- Human effort is reduced.
- Real time information processing is done.
- Very little scope of errors occurring.
- People can make informed decisions with the help of information provided.
- Wastage of resources is avoided.

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V. CONCLUSION

We have presented a vision of developing a smart city with cloud computing and ever growing technology of Internet of Things (IoT). Once this vision is implemented small tasks would be carried out without human interference. Also resources would be spent exactly when needed. The citizens of the smart city would be able to make informed decisions and inconvenience would be avoided. In the end when the citizens of the city are happy then the city would prosper and grow.

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