

## Chapter 4

# Smart IoT for Smart Cities

## Implementation: Applications in Nutshell

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### ABSTRACT

*Internet of things (IoT) is the current area of research that allows heterogeneous devices to have a homogeneous connectivity based on the designed and desired application of the user. With the latest development in connectivity via smart phones, there is an exponential increase in users who access internet. However, various applications have already been designed based on the user's requirement. Therefore, this chapter intends to provide a detailed view on applications on IoT. Industrial applications help in monitoring the machinery so that production increases with minimum chaos if any error occurs. Safety helmet for mining based on IoT is used to measure the gas and temperature levels in the coal mines. Garbage management system is used for monitoring and clearing of dust bins. IoT-based domestic applications help users to have a better access over the equipment they use. As a business application, emotion analysis is performed to obtain the customers mood while shopping. Monitoring of crops from a remote location is another application which provides data on the health of the crop.*

### INTRODUCTION

With the development of technology, devices that connect to internet are increasing in an exponential manner. These devices in particular smart phones are having various built-in sensors that acquire data on a timely basis. Data acquired is processed within the system and results are provided to the user based on the apps that are being designed, developed, deployed based on the users need and intention. But, such data processing may cause overhead to the existing processor wherein the system may hang or may shutdown if all the apps continue to process the data at a time. Hence, there is a requirement for the development of new technique for processing of such data. In this juncture, sensor hub[Benini, L. (2013)] has been introduced in the recent past for the processing of the data acquired from various

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*Figure 1. Architecture of IoT*



sensors. Sensor hub is a unit which combines data from different sensors and processes them such that the overhead on the main unit reduces. Hence, there is a rapid transformation from the devices which are manually controlled to the control using Internet based applications revealing the fact of the newly developed technology IoT. This has found its footprints in the various fields like education, travel, industries, health, business etc[Kishore Kumar Reddy N. G. and Rajeshwari K.(2017)]. To build applications which are designed for testaments have an architecture which creates a framework for the entire process. Figure 1 shows the basic architecture of the IoT.

Users communicate via the sensors which acquire the data required for the user. These sensors are installed in the devices which are designed for a particular purpose. The acquired data may be processed and will be stored on the cloud for further processing. The users further acquire the data that is stored on the cloud which is used for further analysis. As an example, if an automobile is newly designed by a company. The company installs it and will make it drove from one end to the other end of a place which may be of thousands of kilometers distance apart. While the vehicle is on move, the company will be assessing the performance of the designed machine by plotting the data which is acquired on the fly. Every instant the parameters will be acquired by the inbuilt sensors which is also a part of the design. As the vehicle completes a roundtrip the entire design data will be available to the company which makes the engineer to apply some corrections to the design enabling the users who buy the vehicle to have a less problems. The acquired data will show the stochastic nature of the vehicle at various places and under several conditions. Hence, the constraint need to be considered here is that the vehicle must travel in different road, climatic conditions and under different voltage levels of battery as well as fuel. Then, such data will be useful the company to have a worst case assessment, as the user's drive is also unpredictable.

Sensors may be broadly classified as industrial and domestic application sensors. Sensor is basically a device that can detect any change in the measurand whether it may be of electrical quantity viz., voltage, current etc., physical quantity viz., pressure, velocity, distance etc., thus providing an acknowledgment for the change in the measurand in terms of the same or may be of other type if so converted. Practically, industrial applications require to have better precision and accuracy over the domestic application sensors. Generally, domestic application sensors are designed in such a way that they are less reliable

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