



Smart City based on IoT

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ABSTRACT

Due to healthy amount of growth and developments in digital technology, cities are now becoming smart specially in an urban area which are equipped with different types of electronic methods and sensors based on IoT to collect data. This includes data collected from citizens, devices, buildings and assets that is then processed and analysed to monitor and manage traffic and transportation systems, power plants, utilities, water supply networks. The smart city concept integrates various physical devices connected to the IoT network to optimize the efficiency of city operations and services and connect to citizens. In this paper, we describe Smart City based on IoT.

Keywords:- *Internet of Things(IoT), Wifi, Smart City, Home Automation, Smart Irrigation System, Automatic Street Light.*

1.INTRODUCTION:

Due to healthy amount of growth and developments in digital technology, cities are now becoming smart specially in an urban area which are equipped with different types of electronic methods and sensors based on IoT to collect data. This includes data collected from citizens, devices, buildings and assets that is then processed and analysed to monitor and manage traffic and transportation systems, power plants, utilities, water supply networks. The smart city concept integrates various physical devices connected to the IoT network to optimize the efficiency of city operations and services and connect to citizens. Population Density of an urban area is increasing day by day and therefore services and infrastructure are required to provide necessity of city residents. On this basis, there is a significant increase for digital devices, e.g. sensors, actuators, and smartphones that drive to huge business potentials for the IoT, since all devices can interconnect and communicate with each other on the Internet [1]. Smart City includes several applications like Home Automation using IoT, Energy Generation using Speed Breaker, Smart Irrigation System, Automatic Street



Light, Automated Railway Crossing, Automatic Hand Sanitizer, Automatic Sanitization Tunnel, Automatic Solar Tracker, etc.

2.LITERATURE REVIEW:

In recent years, Smart Cities have attracted significant interest by governments in their research and development projects around the world. Although there is no apparent description about what Smart Cities are, they can be briefly explained as those cities that utilise information and communication technologies with the aim to increase the life quality of their inhabitants while providing sustainable development [2].

In the literature, the ‘Smart City’ concept is referred to as the safe, secure, environmental and efficient urban centre of the future with advanced infrastructures such as sensors, electronic devices and networks to stimulate sustainable economic growth and a high quality of life [3, 4]. Currently, most of the cities across Europe and USA have already initiated or are about to initiate the Smart City approach due to its effect on amplified urban growth [5, 6].

Smart City is described as a concept in various ways but a general definition involves implementation and deployment of information and communication technology infrastructures to support social and urban growth through improving the economy, citizens’ involvement and governmental efficiency [7]. A few researchers point out that there can be few negative aspects in the Smart City approaches [8, 9]. But literature lacks in terms of detailed analysis of management of Smart City.

3.SMART CITY APPLICATIONS BASED ON IoT:

For development of an urban city, Smart city will be the future. In order to achieve this target, sensors can be developed at different locations for collecting and analysing data to improve the usage [10].

Smart city can be applied to various aspects and the applications of Smart city based on IoT is as follows:-

3.1.Home Automation using IoT:

Using Home Automation, home appliances will automatically ON and OFF without manpower. Currently, home automation is utilizing the combination of hardware and wireless system for controlling home appliances. In this project we design and develop of controlling of home automation system using Wi-Fi module shown in figure 1. This project is used to control programmed light or other home appliances without compromising in security. IoT or Internet of Things is an upcoming technology that allows us to control several devices with the help of internet.

3.2.Smart Irrigation System:

Smart irrigation system provide irrigation system which is automatic for plants using wireless three level controlled system which help in saving water and money. The main objective of this system is to improve the health of the soil and hence the plant using multiple sensors in figure 2.

3.3. Energy Generation Using Speed Breaker:

We can generate energy using speed breaker when vehicles will pass over it. When we tap the energy generated and produce power by using the speed breaker as power generating unit. The kinetic energy of the moving vehicles can be converted into mechanical energy of the shaft through rack and pinion mechanism shown in figure 3.

There is an equipment to generate power after energy conversion from potential energy to kinetic energy when vehicle pass over speed breaker. When the vehicle moves over the inclined plates, it gains height resulting in increase in potential energy, which is wasted in a conventional rumble strip.

3.4. Automatic Street Light:

In Automatic Street Light, there is no need of manual operation for switching ON and OFF. When there is need of light i.e; night time it will automatically switch ON and during daytime, the street light goes OFF. The sensitivity of street light can also be adjusted. In this project we have used four L.E.D as a symbol of street lamp, but for high power switching we can also connect Relay at the output of pin 3 of I.C 555 to turn ON/OFF any electrical appliances that are connected through relay without inclusion of human as shown in figure 4.

3.5. Automatic Solar Tracker:

Currently, renewable resources is used for producing electricity which is increasing year by year and the reason is non renewable energy resources are decreasing and available in limited amount. Solar panels are becoming more popular day by day because Solar panel converts light energy of sun into electrical energy and stores the energy in a battery which is shown in figure 5.

3.6. Automatic Sanitization Tunnel:

A tunnel is used for the sanitization and decontamination of items and people when combined with appropriately atomised biocides and/or virucide spray.

Sanitary and decontamination Tunnels and Gates are become safe protection and entry for everyone, particularly for those people who work with groups in any area and they are therefore at higher risk. It can be installed at the entrance of public offices, pharmacies, supermarkets, airports, hospitals, ports, stations. It is one of the best option for all private companies who need to sanitize their workforce, goods, vehicles and materials shown in figure 6.

The tunnel creates an obligatory passage and is equipped with, internal arc-shaped atomising nozzles that saturate the environment but preventing dispersions. The nebulisation system is connected to a control system capable of automatically mixing the sanitizing product at percentages indicated by the manufacturer. Access to the tunnel is regulated by a traffic light with motion detection. By placing a barrier floor inside the Sanitary Gate, it is possible to sanitize the surface in contact with the ground.

3.7. Automatic Hand Sanitizer:

Liquid hand sanitizers is mostly alcohol-based gels – which is highly explosive in popularity. When anyone who traveled by airplane have seen hand sanitizers in use.

Do not serve hand sanitizers as a replacement for handwashing. Instead, they are known for providing benefits of handwashing when handwashing is not practical.

Handwashing and hand sanitizers help in reducing of microbial populations in different ways. Handwashing removes microorganisms from the skin whether it's done with "antibacterial" soap or plain soap.

Hand sanitizers reduce levels of microorganisms by killing them chemically, just like disinfectants kill germs on environmental surfaces.

In the covid 19 situation, Automatic Hand Sanitizer is very useful for maintaining distance between Human and sanitizer shown in figure 7.

4. Figures and Table:

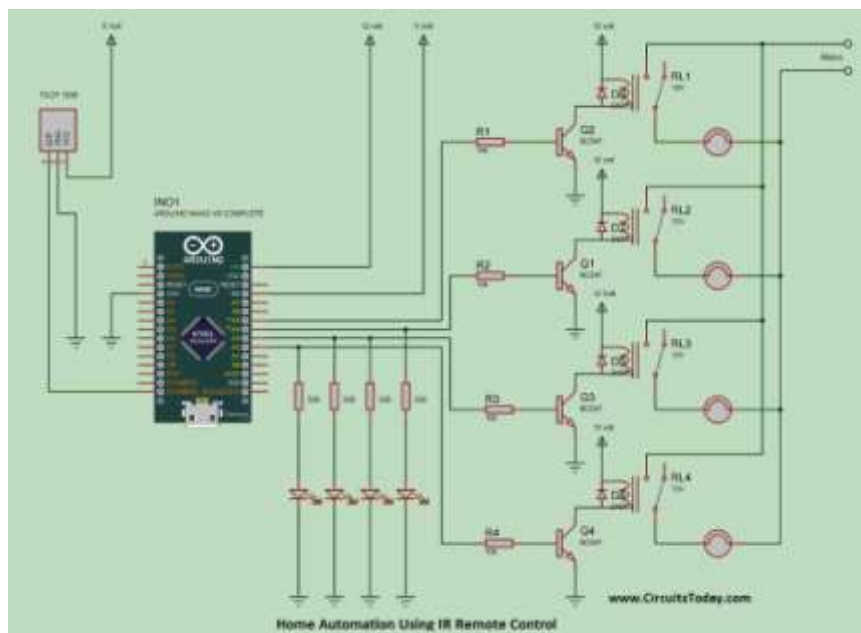


Figure 1. Home Automation using IoT(www.circuitsToday.com)

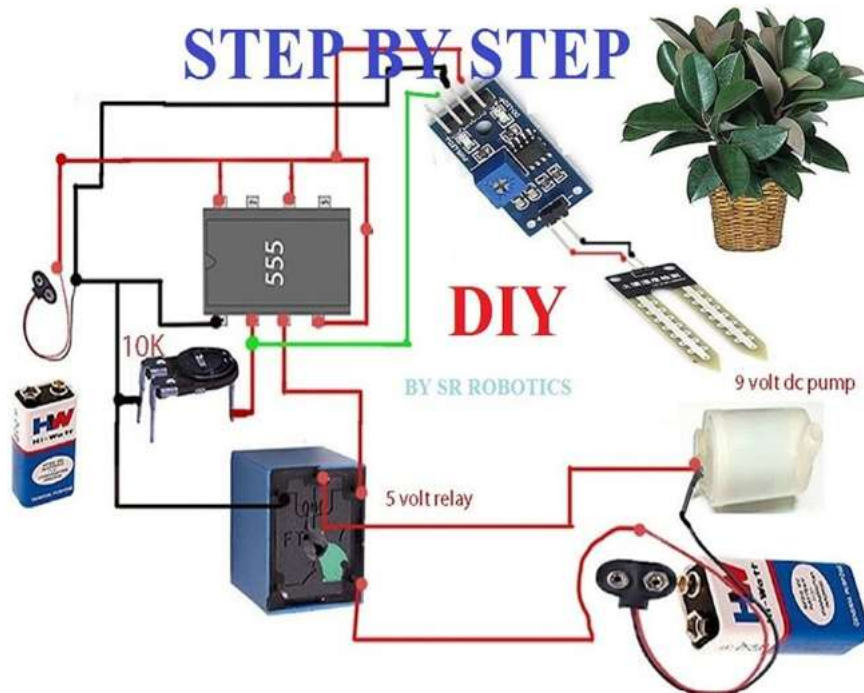


Figure 2. Smart Irrigation System (Source: SR ROBOTICS)

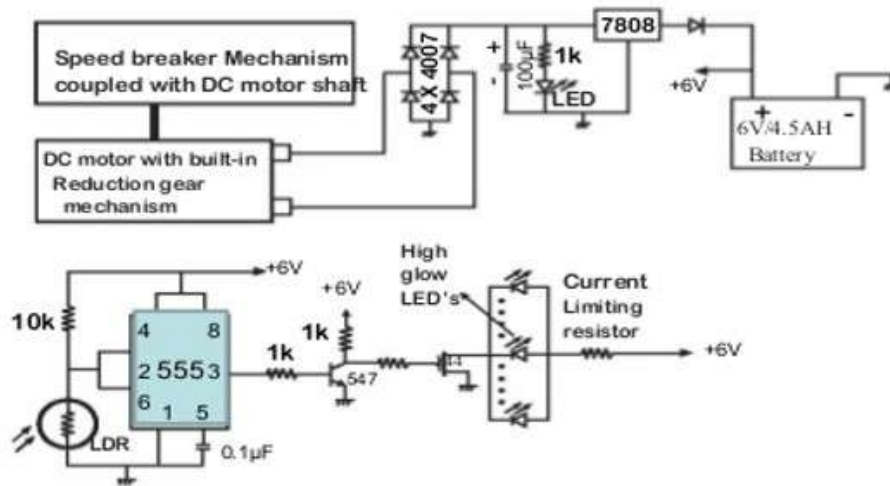


Figure 3. Energy Generation using Speed Breaker

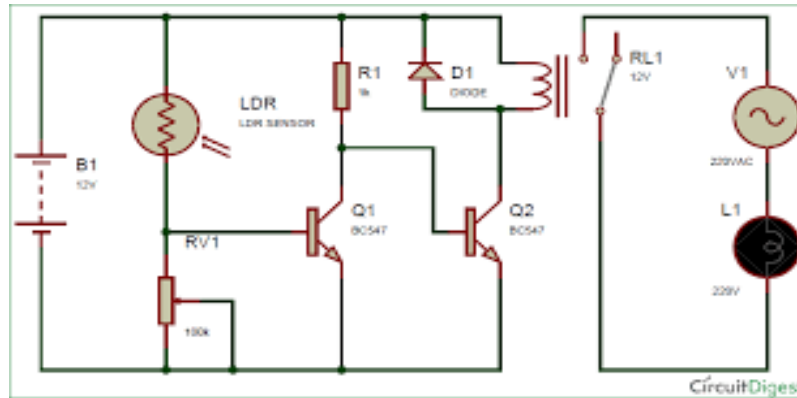


Figure 4. Automatic Street Light (Source: Circuit Digest)

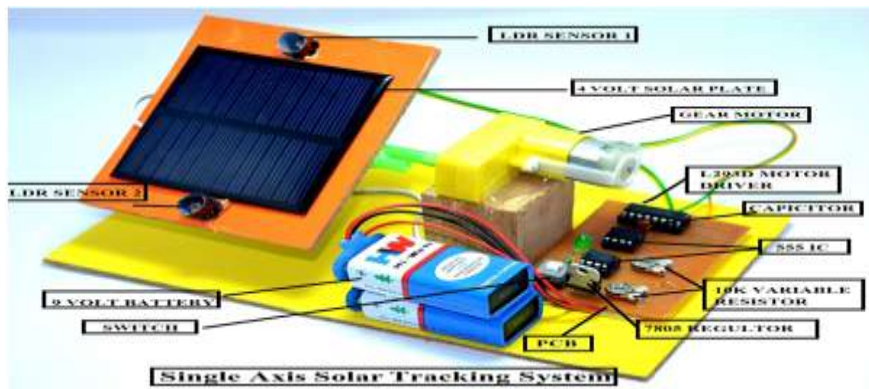


Figure 5. Automatic Solar Tracker (vishalnagarcool.blogspot.com)

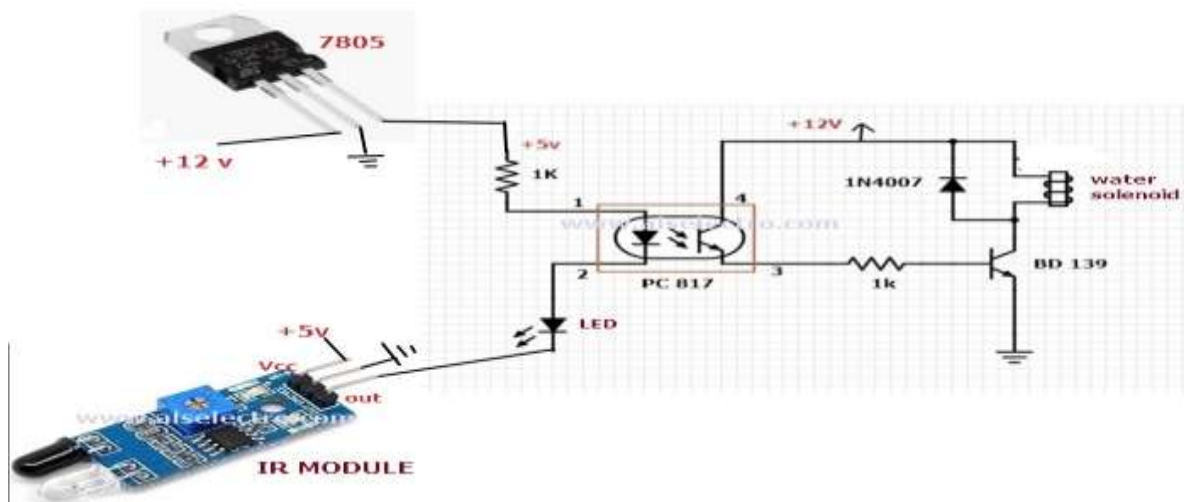


Figure 6. Automatic Sanitization Tunnel (Source: google.com)

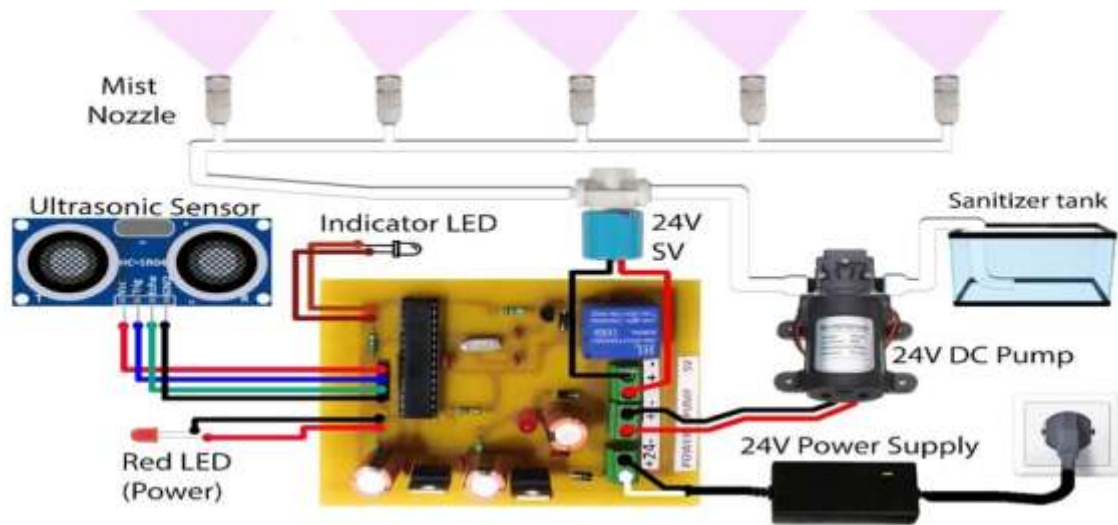


Figure 7. Automatic Hand Sanitizer (www.alselectro.com)

Scotland, New York City and Georgia (USA), and Tehran (Iran) that were acknowledged for their attempts and achievements in establishing broadband networks and eservices supporting advance ecosystems [12-19]. Some of the experimental examples around the practical experiences of smart cities are presented in Table 1.

City	Experience
Amsterdam[12]	Decreasing the traffic, energy saving, and increasing the safety level
Barcelona[13-17]	Implementation of sensor technology, using the data analysis of traffic flows to design a novel bus network and the implementation of smart traffic
Stock Holm[18]	Provide a universal fiber optic network across Stockholm
Santa Cruz[19]	Analyse the data of crimes to forecast the needs of police and maximize the presence of police in the required places

Table 1. Policies and Strategies related to Smart City [11]

5.Conclusion:

The analysis of different cities indicates that cities need to engage and collaborate with public and private organisations as well as with knowledge institutions [20]. The implementation of Smart City is based on

solutions currently available. The Industry leader is already in the production of devices to enable applications of interest.

The enabling technologies, furthermore, have reached a level of maturity that allows for the 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 [21].

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