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Collaboration of Drones and IOT for Improving Smartness of Smart Cities

Arpit Kumar Sharma[1*], Chirag Goyal[2] and Siddharth Jain[3]

[1]Computer and Communication Engineering, Manipal University Jaipur, Jaipur, Rajasthan, India.
Email: er.aks31@gmail.com
[2, 3]Department of Computer Science Engineering, Arya Institute of Engineering Technology and Management, Jaipur, Rajasthan, India.
*Corresponding Author

Abstract: In this paper, we are considering about the network performance of collaboration between the IOT and DRONES. Drones play an important role for the smartness of a smart city. The drone is an aerial vehicle or device which provides multiple applications in various fields. Drones are WCS (wireless communication service) i.e. drone is a wireless aerial vehicle which is used as a data collector, data transporter to the BS (base station) and also used for the recovery of services after a disaster by increasing surge capacity for many purpose like: public safety, exploring areas that are in trouble. IOT devices are important for the drone connectivity, data collecting, energy efficiency and quality of services. The main moto of this paper is to providing a survey which shows how collaboration of drones and IOT are improving smartness of smart city which is based on data gathering, privacy and security of public, disaster monitoring, efficient energy consumption and providing help in troubled areas by detecting them.

Keywords: Conclusion, Introduction, IOT, Data collection, Disaster monitoring, Security and privacy, Smart city, Smart drones, Public safety, Traffic monitoring.

I. Introduction

In this paper we consider the context of smart city like the is role of drones and IOT for the measurement of smartness of a smart city, health care, public safety and security such as emergency response, disaster relief, disaster monitoring, environment protection, traffic control, crime control, investigating accidents, smart events management, firefighting, package delivery and etc. Recently drones have become attractive for research and a variety of application because of their (IOT and Drones) flexibility and simplicity of use in a wide range with help of IOT devices [1]. The IOT devices are enable for the significant advances in smart cities applications such as smart home, streets, parking, powerhouses, and all over city. The main work of IOT is providing internet connectivity and communication with the drones.

The collaboration of IOT and drones are enable for data collecting, internet connection, process of data and information over the node and base station.

We know that the range of IOT is limited. IOT transmitted power can be decreased by 45% and increase the yield to maximum by 28%. Drones and IOT provide a WSN (wireless sensor network).

II. Related Work of Collaboration of IOT and Drones

Due to the occurrence of natural disaster, crime and terrorist attacks, safety and security of public, troubled area, emergency services and health care in a smart city, then there is need of WSN and WCS which terms to collaboration of IOT and drones. We know that smart city means which has smart building, infrastructure, parking services, green environment, good economy and finance, governance. So there is need to keep and make them smart and another need is to enhance these smartness [2]. Drones and IOT are enabled to provide intelligent transportation for a smart city. We reviewed that drones are used such as for privacy and safety, cyber security for a smart city. Drones architectures means delivering IOT's services from it.

We use collaboration because they provide aerial communication and established an IOS communication, links with ground users.

The power consumption and transmission of IOT is low and have a limited communication range. So that IOT is useful for limited range areas.

There are several uses of that collaboration. Refer Table I.

Table I

Sr. No.	Uses
1	Drones and IOT is used to provide a WSN and WCS.
2	They are useful for smart city to keep it smart.

Sr. No.	Uses
3	We also use green IOT devices, for the healthy environment.
4	Collaboration are useful for public safety, security and so on.
5	It is useful as a public safety architecture.
6	With the help of them we can communicate and share data and information with the base station.

III. Overviews

The main use of collaboration is to provide information to the control base station devices. There is a quick need of because of a wireless communication and aerial vehicle.

- *Smart Drones*: A drone is an aerial vehicle which connect with the IOT for data collecting and transferring. It collects the data in the form of image and video with help of its camera and sensor and transmit data with the help of IOT to the required place. Refer Fig. 1.

Fig. 1

In this future it will be main and most preferred way of data collecting and transferring rapidly, because of its so many application which we have concerned.

- *IOT*: The internet of thing make the sharing of information to peoples wireless. That have limitation of range, means the information can be send to human within a limited range. IOT make drones more useful. They make drones only in fly. With the help of IOT we can get the data from to BS very easily and securely [3].
- *Privacy and Security Issue*: The smartness of a city can be seen if there people are living with securely and privately and without any hazardous problem. So the one of the main aim of a city to be smart. That can be realised by drones, AI and IOT which play a vital role.

There are two types of security which related to the privacy of data:

1. *Data Security*: To secure data from cyber attack.
2. *Operation Security*: To secure operation which perform on data from cyberattack. Both are inter related to each other. Data security is fully depend upon operation security. IOT, IOPST device are use for security of operation of data, so that devices are need to keep away from a range of common people.

- *Collaboration of Drones and IOT for Data Collection*: Drones have 4G, 5G, Wi-Fi, LTE connection [4]. They also have control system. There are many of thing are inbuild i.e. camera, sensor and GPS etc. which make the process of data collecting with IOT. With the help of GPS, drones detect the location and send location to the control room with the help of IOT. They also capture the related pictures and videos and send to CBS. Drones are used to get the information of weather using sensor and send them to CBS. Drones collect the data like disaster monitoring, crops monitoring, disease monitoring, identification of water and air quality. Refer Fig. 2.

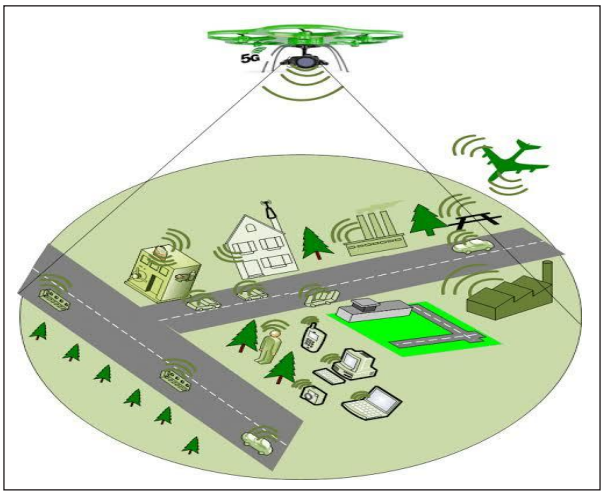

Fig. 2

- *Collaboration of Drones and IOT for the Life Quality*: Inbuild sensor of drones are used to detect the information about the atmosphere. Sensor can estimate the level of gasses which is present in nature. It also measure the level of which gas become high or law [5]. That estimated level of gasses are compare with the standard level of that gasses, which helps to make alternative solution to maintaining of that level of gasses which are creating disease to human life. Drones can be use for getting the pollution level of water. So it can be say that collaboration of IOT an drones are usable for making better life quality.
- *Collaboration of Drones and IOT for Disaster Management*: Drones are also used for disaster monitoring because with the help of drones and IOT we can captured the photos of accidental and disaster affected areas and get the information of that areas influenced by any disaster. We get information like what is temperature level, pollution level, speed of wind, type of soil and so on. So collaboration is helpful for providing estimation for the future to keep the safe that areas from any type of disaster.

- *Traffic Monitoring*: A smart means having a lot of smart facilities. There are so many types of facilities. The one of the best facility is transportation. As per increasing of no of people that causes the increasing of vehicles also [2]. So a large number of vehicles make the traffic on road. So drones are used to find out the main cause of having traffic in a city. Drones has sensor, cameras. With the help of IOT the main cause of that traffic send to the control room of traffic management. The IOT connect the cameras of streets and any other places with the drones. So we can get the information of traffic and transmit it to the control room management for managing it. Like this we can manage the problem of traffic monitoring. Refer Fig. 3.

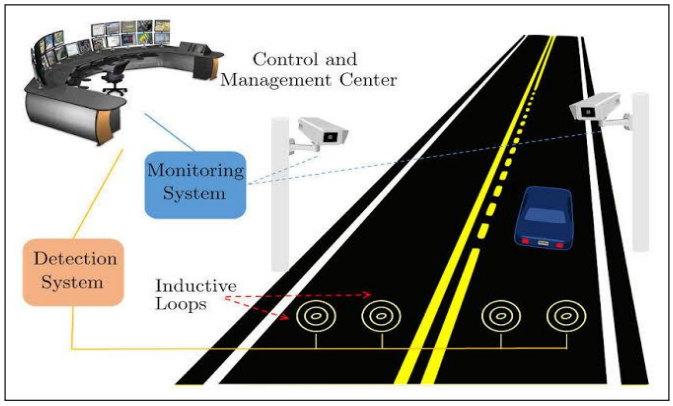

Fig. 3

Appendix: List of Abbreviations

QOS = Quality of Service

IOT = Internet of Thing

CBS = Control Base Station

BS = Base Station

AI = Artificial Intelligence

4G = Fourth Generation

5G = Fifth Generation

IOPST = Internet of Public Safety Things

IV. Conclusion

We know that smart cities have smart facilities like smart home, building, infrastructure, market, parking and so many others [6]. But there is a problem to keep it smart. we can solve this problem by using drones and IOT devices, which enhance a way by which we can not only keep it smart by keeping its people secure, safe, disaster free, controlled traffic and so other but also it provide a way by which we can increase the smartness of a smart city which we have done. Collaboration of IOT devices and drones are able to change the life style of a city and its people, because it has the process of data collecting and transferring. So we can say that for a smart city the collaboration of drones and IOT are needed.

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