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Research Article

Automated Alert Response And Monitoring System Using Smart City Principles

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Abstract

The automated alert response system is mainly designed to automatically respond to any illegal or emergency scenarios where human response can get delayed the main goal of our proposal is to minimize the time taken for reacting to an emergency thus saving valuable data that may get lost due to the delay. In a smart city environment we are being provided with loads of valuable data which are being wasted. our proposal aims to utilize such data from city infrastructures to detect certain emergency situations and understand its nature using data analysis principles to provide alerts further more we aim to facilitate these alerts with automated response using unmanned vehicles (drones, rovers)so that the response time can be minimized along with identifying fake alerts as well as the intensity of the situation can be understood and information can be sent to the officials to help them prepare for the situation at hand.

Keywords: data analysis, smart city principles, automated response, m-cloud,s-cloud, monitoring.

1. Introduction

Our aim is to provide a security solution regarding the response time of an alert issued and monitoring, this can be achieved with the help of some sensors, Arduino board and unmanned vehicle (quad copter). Where at a crime scene or a hazard location the response to the alert can be done at an effectively and at a very fast time span. In case of a fire the strength of the fire can be determined beforehand which helps to decide the amount of force that is required to be used to deal with the situation

Project that we are proposing is a security response system which focuses on IOT and principles with aspect to the Smart Cities. A general Internet of Things based architecture is proposed to be applied to different smart cities applications. We describe some scenarios of data analysis through the help of sensors which helps in various real time applications.With the help of the

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sensors which are located throughout an infrastructure we collect and monitor data every second with the help of a IOT automatically and analysis it.Another major application of this project is a alert response system which will be able to response to any the problem at real time with a minimal response time and effectively capture details about the incident using automated robot and drone systems. This system of a quick alert response and monitoring system can be used in various aspects of security monitoring and can be an effective tool to maintain and contain security related issues. Smart Cities focus on their most pressing needs and on the greatest opportunities to improve lives. They tap a range of approaches - digital and information technologies, urban planning best practices, public-private partnerships, and policy change - to make a difference. They always put people first.

In the approach to the Smart Cities Mission, the objective is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions. The focus is on sustainable and inclusive development and the idea is to look at compact areas, create a replicable model which will act like a light house to other aspiring cities. The Smart Cities Mission is meant to set examples that can be replicated both within and outside the Smart City, catalyzing the creation of similar Smart Cities in various regions and parts of the country.

Security is one of the key factors that is looked upon when someone wants to shift into a city or neighborhood, the efforts taken to make an area safe is enormous and of top priority for the government as well as building landlords to attract more investors. The security of a city or area determines a lot of factors regarding the city. In our project we would like to work on something that provides a better solution to the security concerns in a city.

In a city there is a huge amount of varied data sources. There are numerous sensors which are distributed around the cities; most of them are installed in indoor spaces. This situation has given rise to new analytics mechanisms and tools that provide insight allowing us to have an better understanding of all the data that is in lumps helping us to have ways to operate the machines [1]The concept of smart cites have already started to utilize big data to support the development and sustainability of smart cities around the world. this allowed many cities to develop in the aspects of smart cities, countries like Canada are 85% smart cities and it has helped their economy rapidly.[2]

The Internet of Things is a concept that transforms the connectivity principle with regard to every person, everywhere and always on into the principle of every object to always and everywhere [3].The concept of IOT idea is based on the high impact in several aspects of everyday life, the key applications of IOT is both professional working and domestic fields. In this context, domestics, assisted living, e-health, enhanced learning are some of the applications scenarios in which the new paradigm will play a leading role in the near future. Similarly, in the industrial and business sector, the most obvious consequences will be equally visible in fields such as, automation and industrial manufacturing, and logistics.[4]

When you talk about the security of today the only available tool is surveillance cameras where cameras are placed to watch the events that unfolds which mostly goes unnoticed because of the static or one dementia view of the camera or due to the number of cameras and the human involvement in the aspect with regard to the real-time viewing of all the cameras is very challenging, the man power needs to be increased if the establishment is big, we do have sensors

which sends an alert in to the authorities and the authorities take a minimum of ten min to get ready to respond and then the time taken to react depends on the distance of the event so this are the problems with the existing system that is in place.

What we would like to propose is an alert response system that can respond to an alert with a few minutes of the receiving time, the response time to a distress call will be done at a significantly shorter instant of time. This can be done with the help of an automated quad copter or a drone for a real time viewing of the event that is unfolding. There are a few Sensors transforming stimuli from the physical world into observations and thereby allow to reason about the observed properties of particular features of interest.[5]The cities today are very much being converted into smart city's where the data stored and collected per minutes is enormous so to make use of these data we use the concept of big data analysis to process this data. The visuals from the locations and the flight paths are all analyzed and functions with the help of the big data analysis. The concept of data-mining application benefits a wide cross-application datasets. These cases often follow a paradigm, The source that is in order for this application generates an enormous amount of data, which mainly serves its own needs, but these data's can also be used in other valuable target application, where the data are limited or not easy to obtain.[6]The sensors like thermal sensors and glass break sensors are connected to an Arduino board which is programmed in such a way that makes a communicational platform between the sensors and the drone/quad copter via a wireless network. The moment a sensors is buzzed it sends an alert to the quad/drone which acts upon the alert, i.e., it automatically is programmed to fly or drive to the location of the sensor and monitor the situation and send a live footages[7] of what is the exact situation that has to be dealt with.

2 .Literature Survey

2.1 Related Works

With regard to the concepts of the smart cities the author discussed [8] about fundamental usage of Big Data applied to Smart Cities. A general Internet of Things based architecture is proposed to be applied to different smart cities applications. We describe two scenarios of big data analysis. First one implicates some services implemented in the smart campus of the University of Murcia. The second one is focused on a tram service scenario where thousands of transit-card transactions should be processed by using the two big data applications for smart city services. the major services are of energy efficiency and comfort management in the buildings of a smart campus, and the public transport service of a city. In the first scenario of smart city we have demonstrated that, after applying certain big data techniques to problems like indoor localization, energy consumption modeling and optimization and better understanding of how travelers make use of the transportation system

When we discussed about the smart city concepts the main aspect with regard to the positioning is discussed by this author[1] Determining the Location of a particular sensor region are the essential concepts with which the construction of a smart building is done, the author successfully helps us understand the concepts of location finding and tracking and successful implements these concepts in the smart environment with the help IOT a few algorithms. The author [2] put forth the concepts of collaborative space alignment framework which helps to

reconstruct individual mobility history from a city scale smart card transaction dataset. The author successfully implements the concepts of M-cloud and collaborative space alignment automation. The author [3] throws some light with powerful concepts such as automation and proposed Learning System which will be able to predict the user's requests of energy. With the help of the Bayesian networks the author successfully implements these concepts.
The tracking technology is one of the most influential tech based concepts the author [4] here discusses about the major enabling factor with regard to the integration of several technologies and communications solutions. Identification and tracking technologies and distributed intelligence for smart objects are just the most relevant. The author was successfully able to implement the home automation technology using the concepts of IOT and automation algorithmic frameworks. Four phases namely data acquisition phase (DAP), decision-making phase (DMP), fog to cloud phase (FCP) and execution phase(EP) were adopted for data transfer to cloud through fog layer[9]. For increasing energy utilization and optimizing the usage of network resources, an innovative optimal PM Selection method namely SALDEFT was introduced. For optimization problem choosing a Physical Machine (P_M) is taken into consideration. For problem solving an enhanced evolution procedure is utilized[10]. This article provides a comprehensive overview of recommended solutions for handling data management in IoT applications, and proposes a simple design for the remote health monitoring application using the features of Thingspeak[11]. An ALIVE packet concept that can be used to detect faulty nodes and recover from errors when the server is overburdened by a large number of requests from multiple clients is introduced. To provide greater performance for range queries a Server Replication (Virtual Peer) system is used thereby providing stability between the virtual peers[12].

2.2 Problem Statement

The study of data has been of a major interest since the early 2000s the role of data scientists has increased in companies to understand the data in a better definitive way, the trend in the market today is big data, the study on unstructured data is one of the most important data based studies in today's working environment , Big data generally is a term that describes a very large volume of data – both structured and unstructured – But the amount of data is never important as it cannot be of much use. It's what organizations do with the data that matters. Big data can be analyzed for insights that may lead to better decisions and strategic business moves which in turn increases the profit.

The project that we are proposing is a based on a smart response monitoring system in a smart city using the concept of Big Data - Data analysis, IOT, machine learning, some concepts of AI,M-cloud, S-model and Smart city principles.Mobile cloud (M-cloud) computing n general runs on a cloud-based Web apps rather than native apps. Users subscribe to cloud services and access remotely stored applications and their associated data over the Internet. The mobile devices usually run a mix of Web-based and native apps. However, the trend is increasingly toward the mobile cloud. According to ABI Research.

The Software module(S-model) concepts mainly encapsulates based on the following sequences of works like,

- Talk to database

- Maintain a buffer
- Control a network socket
- Control access to an object or set of objects

When we are dealing with the concepts of software module it is important to be aware and have knowledge of what related the functions in the module together. You should also write the module so it could be used in other projects. Modules have their own private data and multiple functions. The functions that are present can modify only the private data in the modules. The module may be constructed so it is an object such that multiple objects can be instantantiated using the module.

Internet of Things (IOT) is like basic interaction, it's just like a communication that happens between two humans but in this technology we have a communication that is taking place between two computer devices that are connected with a common network. The 'thing' in IOT could that we are going to implement is that we are going to make automated communications networks between the Sensors, Unmanned vehicle (quad copter) and M-cloud. The embedded technology in the objects helps them to interact with internal states or the external environment, which in turn affects the decisions taken.The existing technology that is in place is just a surveillance system that is a static system that does not act or report any abnormal activity

A unmanned vehicle (Quad copter) we will be able to monitor the crime or The system that we are proposing is a response on alert system where using security malfunctions in a immediate and live platform observing and reacting accordingly at the same time, We are using a plethora of sensors and network technologies providing the input attributes using wireless sensor networks, wired sensors, gateways, etc. which can be self-configured and remotely controlled through the Internet. Dealing with our first application that consists on the instantiation of the architecture for Building Management Systems (BMS), in this layer it is gathered information from sensors and actuators deployed in strategic points of the building. But the aforementioned data sources in smart cities are not limited to static devices reporting measurements associated to a particular location, there are also moving ones capable to deliver measurements at different points within a geographical area.

This is mainly due to the rapid development of wireless technology, mobile sensor networks and, above all, the advent of Smart phones. Although approaches based on mobile-phone sensing require a demanding usage of the communication, location and other attributes of the smart phone, which can bother some people due to battery draining, data captured by static, mobile Security is one of the key factors that is looked upon when someone wants to shift into a city or neighbourhood, the efforts taken to make an area safe is enormous and of top priority for the government as well as building landlords to attract more investors. The security of a city or area determines a lot of factors regarding the city. In our project we would like to work on something that provides a better solution to the security concerns in a city. When you talk about the security of today the only available tool is surveillance cameras where cameras are placed to watch the events that unfolds which mostly goes unnoticed because of the static or one dementia view of the camera or due to the number of cameras and the human involvement in the aspect with regard to the real-time viewing of all the cameras is very challenging, the man power needs to be increased if the establishment is big.

we do have sensors which sends an alert in to the authorities and the authorities take a minimum of ten min to get ready to respond and then the time taken to react depends on the distance of the event so this are the problems with the existing system that is in place. What we would like to propose is an alert response system that can respond to an alert with a few minutes of the receiving time, the response time to a distress call will be done at a significantly shorter instant of time. This can be done with the help of an automated quad copter or a drone for a real time viewing of the event that is unfolding. The cities today are very much being converted into smart city's where the data stored and collected per minutes is enormous so to make use of these data we use the concept of big data analysis to process this data. The visuals from the locations and the flight paths are all analysed and functions with the help of the big data analysis.

The sensors like thermal sensors and glass break sensors are connected to an Arduino board which is programmed in such a way that makes a communicational platform between the sensors and the drone/quad copter via a wireless network. The moment a sensors is buzzed it sends an alert to the quad/drone which acts upon the alert, i.e.it automatically is programmed to fly or drive to the location of the sensor and monitor the situation and send a live footages of what is the exact situation that has to be dealt with and smart-phone sensors can be extended or enriched with the data generated by several social-media channels - like Twitter or Face book- giving rise to a new generation of soft sensors from which extract relevant knowledge.

Alternative course of action aims at mining relevant knowledge from users on the basis of non-intrusive ways to obtain data, for example, transit cards in public transport scope. The technology that our project will be implementing is a security based response and lives monitoring system. The time to respond and understand a situation or hazard is a daunting task which might cause some serious losses and problems if not sorted properly. With the help of a quick response system using quads or drones it is possible to view the event in a real time and know the existent or the exact counter measures required to handle the situation, we can save a lot of time and a proper preparation and planning can be done in a professional and quick manner with the help of live data telecasting using the live stream of quad/drones.

To provide a security solution regarding the response time of an alert issued and monitoring, this can be achieved with the help of some sensors, Arduino board and quad copter. Where at a crime scene or a hazardous location the response to the alert can be done at an effectively and at a very fast time span. In case of a fire the strength of the fire can be determined beforehand which helps to decide the amount of force that is required to be used to deal with the situation. This system of a quick alert response and monitoring system can be used in various aspects of security monitoring and can be an effective tool to maintain and contain security related issues.

3 .Architectural Design

Fig 1 shows the overall system architecture which in detailed is divided into two working segments each segment performs some vital functions for the working of the project, the first segment consists of few sensors, arduino board and the zigBee devices ,the first part of the project is a detecting segment which detects the irregularities which may occurs in the city (like glass break, fire or some theft alert) The arduino board acts as a processor for the sensors and the zigBee device, the sensors and the zigBee devices are connected in the arduino board, the

sensor detects the irregularity and then through the zigBee device transmit the alert message to the other zigBee device that is located at the receiver end which is the second segment of the project, with the help of the zigBee technology in the receiver end the message is passed to the server which in response alerts the unmanned vehicle with the help of the Raspberry pi, unmanned vehicle automatically starts moving in the path that is fixed to go and fetch the images with regard to the sensor alert that was issued.

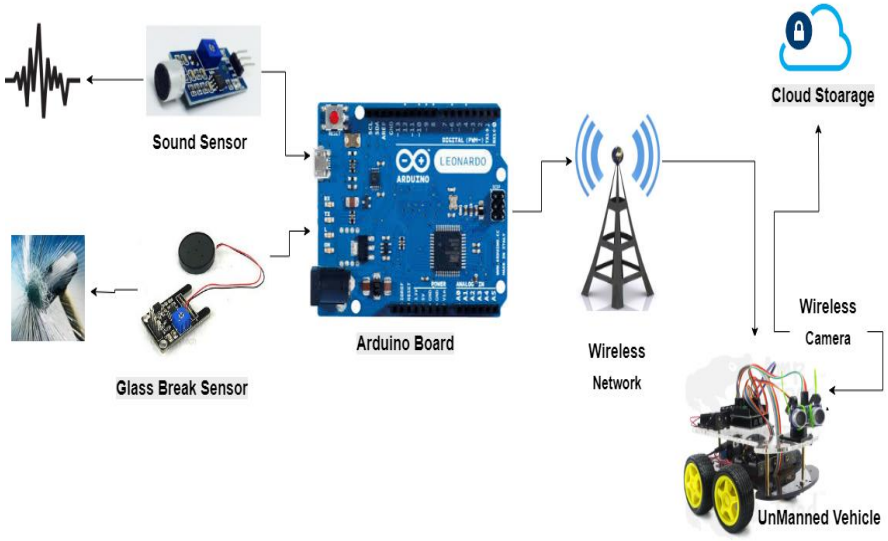

Fig. 1. Architecure of the system

4 .Performance Analysis

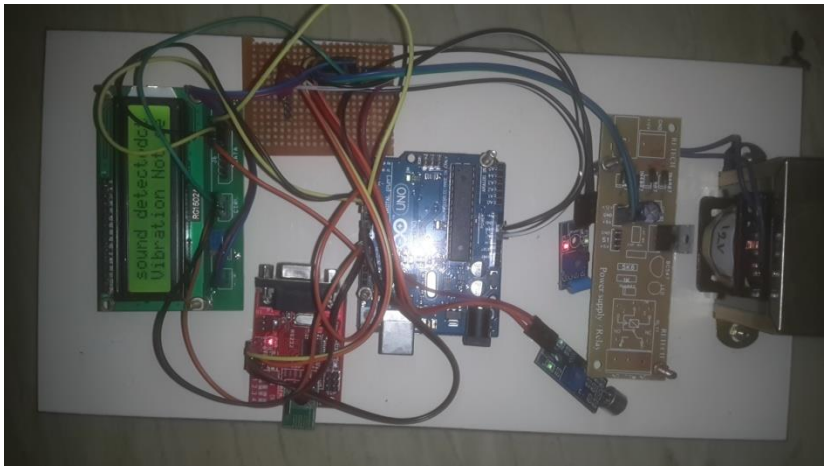

Fig 2: Sensor based segment

The sound detection sensor and vibration detection sensor has been connected to Arduino Board. Arduino Board controls the sensors and receives the input from it. The programming code which is integrated into the Arduino Board helps the sensors detect the irregularity is referred to as the

sound and vibration in the environment, when the criteria is unmatched in response a alert message is sent in Fig 2 . Fig 3 shows the ZigBee device is integrated with the Arduino Board and has been connected through internet. when the sensors detects, then input is given to the Arduino Board and then sent to the ZigBee Device, which is connected with the internet. Then this ZigBee device transmit the signal to the another ZigBee device integrated to Raspberry pie.

Fig 3: The Receiver End Of The Unmanned Vehicle

Here the ZigBee device is integrated with the Raspberry pie Board and has been connected through internet. When the sensors detects, then input is given to the Arduino Board and then sent to the ZigBee Device which is connected with the internet. Then this ZigBee device transmits the signal and another ZigBee device integrated to Raspberry pie which will receive the signal from the sender ZigBee device integrated with the Arduino Board

Fig 4: The Unmanned Vehicle

The Motors which has been connected with the Raspberry pie Board. when the sensors detects, the input is given to the Arduino Board and then sent to the ZigBee Device which is connected with the internet. Then this ZigBee device transmit the signal to another ZigBee device integrated to the Raspberry pie which will receive signal from the sender ZigBee device integrated with the Arduino Board. Then the motor connected with Raspberry pie start to run

accordance to the code programmed into the Raspberry pie. The Wireless camera which has been connected with the Raspberry pie Board. When the sensors detects, then input is given to the Arduino Board and then sent to the ZigBee Device which is connected with the internet. Then the Wireless camera connected with Raspberry pie will take a photo and will be displayed on the Screen. The cloud storage has been used for storing the images. When the sensors detects, then input is given to the Arduino Board and then sent to the ZigBee Device which is connected with the internet. Then this ZigBee device transmit the signal another ZigBee device integrated to Raspberry pie which will receive the signal from the sender ZigBee device integrated with the Arduino Board. Then the Wireless camera connected with Raspberry pie will take a photo and will be displayed on the Screen and stored in the Cloud.

5 .Conclusion

Our proposed s to automate the response system for alerts produced in a smart city environment decreases the delay between the alert generated and the actual response unit to arrive by implementing unmanned vehicles to automatically move to the place where the alert is triggered and capture forensic data that may get lost in time using cameras and sensors .we have improved the help provided to the officials by giving preview of the situation before they actually arrive at the scene giving them ample time to prepare for the task at hand so that they know what exactly is happening .many false alarms can also be avoided saving their precious time and effort.

5.1 Future Work

This proposed unit has huge opportunity in future in improving the systems efficiency by including more than one unmanned vehicles creating a nest where all units can be stationed. We can use advanced data analysis in the data produced and determine the type of alert determined to smartly send the required drone to the spot (i.e.) many different kinds of drones can be stationed in the nest with type of alert triggered found the appropriate drone can be sent to the location. Drone can also be loaded with features that may provide emergency activities as well for example when an fire alarm is triggered an drone loaded with thermal sensors and fire extinguishing foam can be sent instead of an normal one thus providing more help at hand. Another example is that when an vehicle theft has happened a drone with object tracking capabilities can be sent to efficiently track the lost vehicle providing live stream to the police.

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