A Survey on Security of Smart Office by Automation System

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ABSTRACT:The main idea behind the project is to design a smart system to provide security in offices/workplaces. The system performs several functionalities. One of them is providing authorized access to office via biometric so that only valid person can enter the office. The system also acts as an intruder detection system i.e. if any unauthorized person enters in the office, the owner as well as some desired people like watchman are informed about the activity. The system is said to be smart because it automatically turns all the lights and fans off whenever the last person in the office exits the office, thus conserving energy. The system is also designed to sense the presence of natural light in the room and manipulate the intensity of bulb accordingly. It also senses the current room temperature and sets the fan on/off accordingly. Adding on to all the mentioned functionalities the system starts the alarm if there is fire in the office. In conclusion it can be said that the system is designed to provide security as well as comfort at work places.

KEYWORDS: Biometric, Sensors, IOT, Microprocessor

I. INTRODUCTION

As rapid change in technology always aims to serve the mankind, the expectation for living a simple yet advance and safe life keeps on increasing. Now a day's office environment security is a major requirement of every individual when away from home or at the home. Office environment should be leisurely so that the employees can give their best as office environment directly affects the working efficiency of employees/workers. A smart office is a place that makes life easy for employees, which empowers it and increases their ability to stay connected [2]. A smart office aims to create a safe environment for employees so that they can focus more on their work and worry less about the safety. Sometimes employees need to maintain confidentiality about some sensitive documents, because of this one has to always make sure whether he/she locked the door properly or not, his/her laptop is safe or not and many other things. A smart office is a system that does all this work for you with some more additional features that ensures comfort of the employee while working. The systems also contribute in conserving the energy making it efficient to use.

Internet of things (IOT) forms the base of the smart office system. The internet of things is a computing concept that describes the idea of everyday physical objects being connected to the internet and being able to identify themselves to other devices. The Internet of things (IOT) devices not only controls but also monitors the electronic, electrical and various mechanical systems which are used in various types of infrastructures. These devices which are connected to the cloud server are controlled by a single user (also known as admin) which are again transmitted or notified to all the authorized user connected to that network. Various electronics and electrical devices are connected and controlled remotely through different network infrastructures. Web browser present in laptop or mobile phone or any other smart technique through which we can operate switches, simply removes the hassle of manually operating a switch. Now a day's although smart switches are available, they prove to be very costly, also for their working we required additional devices such as hub or switch. As there is rapid change in wireless technology several connectivity devices are available in the market which solves the purpose of communicating medium with the device and the microcontroller.

Starting from Bluetooth to Wi-Fi, from ZigBee to Z-wave and NFC all solve the purpose of communicating medium [1]. In this project we have used Arduino UNO to control various devices.

II. RELATED WORK

Office automation is a challenging one not only to the developer but also to the consumer. Developer has to choose the component as per the customer requirement. Due to all the customer demands are not equal hence they have to compromise with the existing products.

- **Lalit Mohan Satapathy, Samir Kumar Bastia and Nihar Mohanty (2018)**

Proposed a paper in which system is server independent and uses Internet of things to control human desired appliances starting from industrial machine to consumer goods. The user can also use different devices for controlling by the help of web-browser, smart phone or IR remote module. This paper presents a low-cost flexible and reliable home automation system with additional security using Arduino microcontroller, with IP connectivity through local Wifi for accessing and controlling devices by authorized user remotely using Smart phone application [1].

- **Renuka Bhuyar and Saniya Ansari (2016)**

Proposed a paper in which system is based on subsystems like lighting, heating. Security and alarming systems are also present. The sensors are used to extract the real time data from environment. Sensors are connected to the ARM11 Controller. It processes the data and gives the output. Fan, bulb, buzzer are output devices connected to the controller which will work when the system crosses the threshold value. The sensor's data is continuously recorded. Fingerprint Identification module is used for security purpose. Fire alarm and emergency call is given to the service room. This data is stored in PC. This data can be viewed on another PC's through Network switch. The data can be seen on the web page and on GUI [2].

- **Neha Gabal, Neelam Barak and Shipra Aggarwal (2016)**

Proposed a paper in which an advanced approach to motion detection for automatic video analysis has been presented. The proposed method is a pixel dependent and non-parameterized approach that is based on first frame to build the model. The detection of the foreground which represents the object and background which is the surrounding of the environment starts once the subsequent frame is captured. It utilizes unique tracking methodology that identifies and eliminates the ghost object from dissolving into the background of the frame [3].

- **Balakrishna Gokaraju,DonaldYessick, Jonathan Steel, Daniel A. Doss and Anish C. Turlapaty (2015)**

Proposed a paper in which intrusion detection system will be integrated wirelessly to the home WiFi system and could initiate an email to the respective authority. Moreover, these systems have high false alarm rates and unnecessary calls to 911 operator. The novelty of our present implementation design lies in cost and time effective communication of the intrusion event wirelessly to the home owners and law-enforcement with a confirmed image of the scene during the intrusion event [4].

A.**Summary of Related Work**

Sr.no	Paper	Conclusion/Summary
I.	Lalit Mohan Satapathy, Samir Kumar Bastia, Nihar Mohanty, 2018,"Arduino based home automation using Internet of things (IoT)	The experimental setup which we designed has its focal point on controlling different home appliances providing 100% efficiency.
II.	Renuka Bhuyar Saniya Ansari, 2016," Design and Implementation of Smart Office Automation System"	Many security safety techniques are used like smoke detectors fingerprint scanner, illuminating and lighting
III.	Neha Gabal, Neelam Barak and Shipra Aggarwal,2016," Motion Detection, Tracking and Classification for Automated Video Surveillance"	The results of the technique presented in paper have been analysed under qualitative and quantitative point of view. The results proved the efficiency of method on scales of accuracy and low processing requirements.
IV.	Balakrishna Gokaraju, Donald Yessick, Jonathan Steel, Daniel A. Doss and Anish C. Turlapaty,2015" Integration of intrusion detection and web service alarm for home automation system using 'arm' microprocessor	The performance of the total integrated system was analysed and tested over multiple iterations and found to be very robust in reliability of the signal strength and latency of web service alarm.

Table 1 Summary of literature survey

III. PROPOSED WORK

IOT plays an important role in home automation system. The use of IOT in offices to ensure security is the key aspect of smart office automation system. The system includes various sensors that sense the environment and detect any malicious activities. The sensor data is then processed and according to the input, that is the sensed data the system produces output.
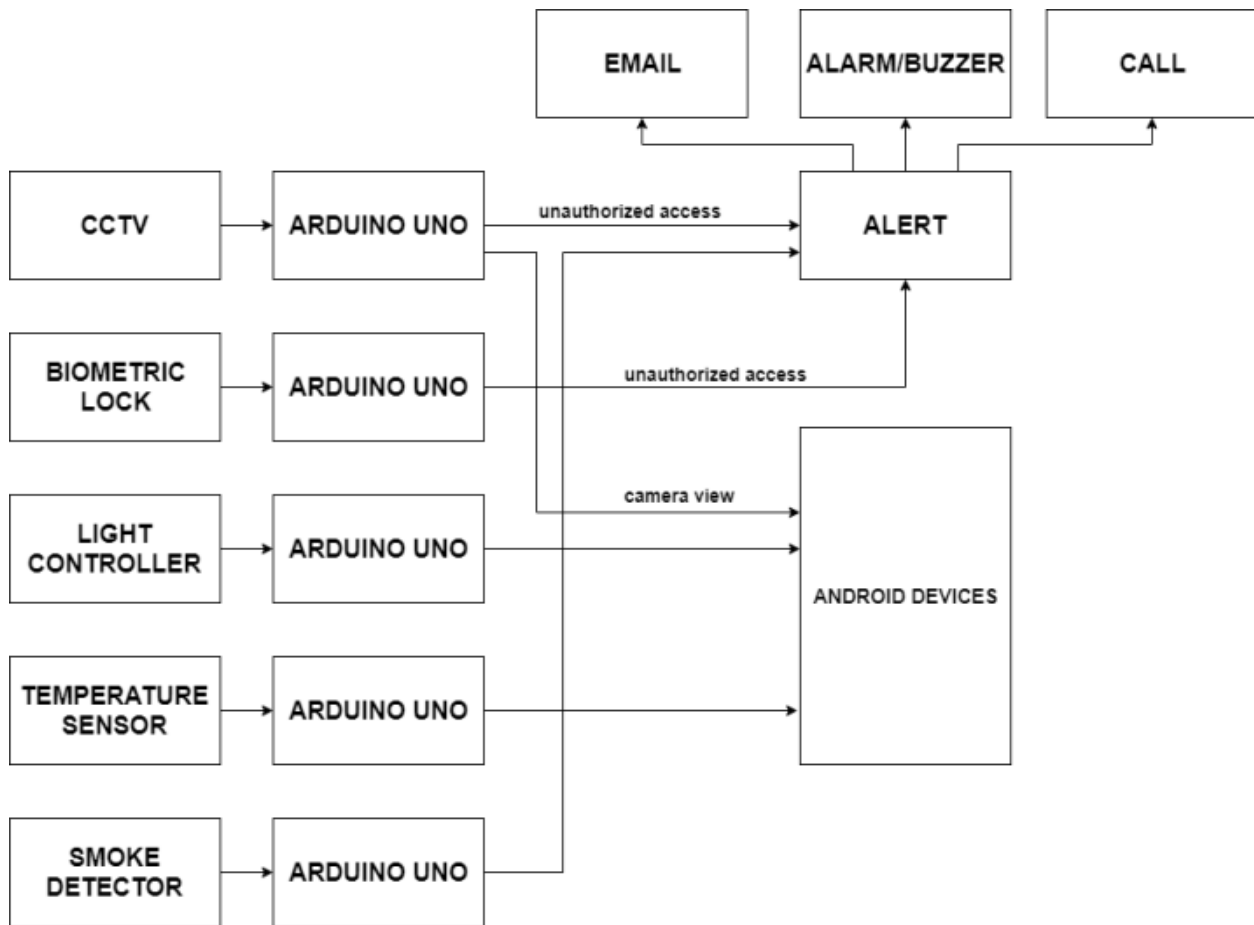
A. *System Architecture:*

Fig. 1 Block diagram of smart secure office automation system.

1. **CCTV:** CCTV will be continuously capturing video footage. This video footage will be further processed using image processing techniques. It is used to capture activities of intruders if any.
2. **Biometric Lock**: Biometric lock will be implemented on the door, so that only authorized people can enter in the office.
3. **Light Controller:** Light controller continuously senses the indoor light intensity and accordingly controls the intensity of bulb present in the room. This helps in conserving energy.
4. **Temperature Sensor:** This sensor senses the room temperature and accordingly sets the fan on/off.
5. **Smoke Detector:** Smoke detectors are used to alert people as soon as possible in case of fire. When smoke is detected in the room the alarm is set.
6. **Arduino UNO:** All the sensors are connected to separate Arduino Uno. The data from the sensors is taken as input and accordingly output is produced. If CCTV detects any intruder activities the same data is sent to Arduino which in turn sets the alarm, sends desired people email/call. The same is done if biometric lock comes across any unauthorized access and also when smoke detector detects smoke in the room.
7. **Email, Call:** Email and/or call will be sent to people who are registered in emergency contacts.

8. **Alarm:** In case of fire, any unauthorized access sensed by fingerprint lock, or any intruder activities are discovered the alarm situated in the office is set on.

IV. REQUIREMENT ANALYSIS

The setup is installed on a computer that includes some hardware and software components.

A. *Software:*
The computer must have a dual core 64-bit processor with Windows operating system. The system must be installed with Android SDK (Software Development Kit) as well as Arduino IDE (Integrated Development Environment).

B. *Hardware:*
As shown in Fig. 1 we set the devices then connect them according to the block diagram. All the sensors are connected to a separate Arduino Uno. A camera will be installed at the all the red alert/sensitive places including the door. The Arduino connected to camera will be in turn connected to android devices and alarm. Fingerprinting sensor is installed right outside the door which is connected to a solenoid lock that will lock/unlock the door. The system includes humidity and temperature sensor - RHT03, a PIR sensor and a smoke detector which will be installed on the ceiling inside the office. A 12-volt battery is used as backup if there is power failure. Arduino Uno kit is required for Arduino setup. An alarm/buzzer to alert if there is any malicious activity happening or even in case of fire to urgently evacuate the office premises.

V. APPLICATIONS

* **Smart Home**
Smart Home clearly stands out, ranking as highest Internet of Things application on all measured channels. More than 60,000 people currently search for the term "Smart Home" each month. This is not a surprise. The IoT Analytics company database for Smart Home includes 256 companies and start-ups. More companies are active in smart home than any other application in the field of IoT. The total amount of funding for Smart Home start-ups currently exceeds $2.5bn. This list includes prominent start-ups names such as Nest or Alert Me as well as a number of multinational corporations like Philips, Haier, or Belkin.

* **Smart City**
Smart city spans a wide variety of use cases, from traffic management to water distribution, to waste management, urban security and environmental monitoring. Its popularity is fuelled by the fact that many Smart City solutions promise to alleviate real pains of people living in cities these days. IoT solutions in the area of Smart City solve traffic congestion problems, reduce noise and pollution and help make cities safer.

* **Military-Smart Bases**
Incorporating IoT devices and sensors into military bases can have several positive effects. Automated security screening, for example, increases safety while decreasing manpower, and a network of security cameras connected to their environment via sensors and to a central network via the Internet will also minimize security risks. Smart management of resources – electricity and water for example – will increase the capacity and output of military bases while ensuring that the wellbeing of all individuals inside the base is protected.

VI. CONCLUSION

Smart Office System has been one of the popular areas of automation and embedded electronics, over past several decades we have used various different techniques for generating alarm, security and automating the office devices. Smart Office System also has several other componentes like safety and security, many safety devices like fire alarm devices is been proposed in the past. Most of the existing alarm systems are based on GSM and GPRS based techniques which are slow in latency as well as quite expensive as the messages and voicemail are not free, in this work we have proposed a novel architecture to offer safety, and automation of the office over IoT architecture. The proposed system can alert the user in case, office catches fire or in case there is an intruder at office, when he is absent. The system as allows the user to operate his office devices purely through his mobile. The entire control and notification system is based on Iotinfrastructure,MQTT as well as Gmail are free sites and it can operate over the WiFi data.

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