Automation of Office System Based on Internet of Things: A Review

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ABSTRACT: ***The Internet of Things (IoT) is the specific integration of different electronic devices. In recent years, the Internet of Things (IoT) has added value to goods and applications. The network connection of IoT devices has decreased power consumption, connectivity, and resilience in accessing information via the network. The suggested Biometric, lighting, and cooling smart office automation systems improve the way the workplace is controlled, the operation of the Biometric, air conditioning, and lighting systems, and their interactions with authorized users. The suggested system monitors current temperatures in various areas of the workplace and also gives the occupancy status, which indicates whether or not an employee is present in the office. As a result, the authorized authority may use the GSM module to monitor all information and manage the office as desired. Furthermore, one of the most significant aspects of current trends is energy conservation. When the office is vacant, the suggested system automatically turns on the light and shuts off the system devices using the number of employees' status. This reduces energy usage while also improving the user experience. Authorized authorities may also monitor or manage the live status of the workplace from anywhere as long as the internet is available using a mobile application loaded on their phone.***

KEYWORDS: ***Automation, Communication, GSM module, Office, Sensor.***

1. INTRODUCTION

The majority of individuals nowadays spend a significant amount of time in workplaces. The workplace atmosphere should be pleasant for workers to perform at their best. The working productivity of office workers is directly influenced by the workplace environment. So, although leisure is essential, it is also needed in the workplace [1]. A smart workplace is a location that makes life easier for employees and empowers and improves their capacity to remain connected. This is accomplished via the use of sophisticated technology and diverse tools, as well as the provision of solutions to improve staff productivity. As the formal boundaries are blurred, a dynamic and competitive society that values creativity and innovation emerges. The development of intelligent growth zones is sweeping the globe. As a result, smart workplaces have quickly become a need.

The Internet of Things (IoT) is a system that utilizes computers or mobile devices to automate the operation of fundamental government activities and parameters using the GSM module. Essentially, smart office automation offers the workplace with comfort, convenience, energy efficiency, and security. The suggested system is further split into three layers: the office work environment, the office gateway, and the office remote environment [2]. Authorized authorities may run the system on their laptop or phone apps over the Internet using the GSM module or 4G mobile network. Hardware interfacing and Home Gateway modules make up the smart office automation environment [3]. The main function of the proposed equipment's Home Gateway is to offer data transfer services between Internets.

Smart office automation, smart office automation, autonomous automation, industrial automation, building automation, and other kinds of office automation may be classified depending on the application. This paper is about IoT-based wireless office automation [4]. The Smart Workplace Automation method uses remote control system techniques to automatically operate different electrical equipment in the office, such as air conditioners, fans, lighting, computers, microwave ovens, and many more, with safety features such as fire sensors.

Different IoT-based methods exist for operating various electrical equipment in smart workplaces [5]. Smart office automation via Web server via GSM module via Android applications from any smart phone, Arduino-based smart office automation, digital control smart office automation, RF-based smart office automation, and touch-screen-based smart office automation are all examples of smart office automation [6]. Smart Office Automation based on Wireless utilizing IoT is a cutting-edge IoT solution that allows users to remotely control smart office equipment through an Android app. The topic of this article is Arduino-based Office Automation.

The workplace of today is the most important and interesting location for information technology applications [7]. In general, an office is a centralized location where sorting paperwork is carried out with the assistance of office workers at their assigned desk. An office may be defined as "a location where appropriate records are

created, managed, and serviced for the purpose of control information and efficient and successful operations [8]." In general, an office is a location where professionals such as engineers, doctors, and attorneys conduct business. Chairs, Almira's, a few tables, electrical equipment such as fans, air conditioning, and other items may be included. Executives, managers, secretaries, and a variety of other workers may be found at the workplace.

Primary and secondary operations are two types of operations that an office may undertake. The office's primary duty is to keep, create, and utilize the institute's records. There are five different types of secondary functions.

1. Preparation
2. ii). Communication
3. Compilation and presentation of statistics
4. Cost-cutting and systematization
5. Management and Creation Data.

The system may conduct application in two ways.

- GSM (Global System for Mobile Communications) (Global System for Mobile Communication)
- Application for Android

The GSM module is used to communicate through SMS. SMS communication is utilized in the workplace for security reasons to provide alarm information. When an employee enters the office, an alert is sent to the authorized authority's mobile phone, which is linked to the system, informing him of the presence of a certain employee in the office while the authorized authority is away from his office.

The Android application is trying to alter the office's modification. An Android application works with a variety of office equipment that are controlled by an Android mobile phone. When an appliance is chosen from the list, just that action is performed on that appliance.

There are primarily two types of communication that may be used.

- Communication of input
- Communication of output

Input communication refers to when a user submits a new configuration to the system through SMS or an Android device. For the secured mode, the input communication is utilized. SMS is delivered to the user in this communication whenever any staff enters the home. There will be two types of output communication:

- Text Messages (via GSM)
- Application for Android

GSM spectrum efficiency benefits Improved, it now enables for low-cost international roaming wireless phones and base stations, as well as high-quality voice that can be adjusted using Digital Network Integrated Services and other wireless telephony business services [9]. It also supports certain new services, such as GSM SMS Services, which enables for the sending and receiving of text messages.

Wireless technology is used in this suggested system, which is also linked to a GSM modem. The system monitors the office environment and employee presence in the office, then updates the information on the office web server, where authorized personnel may view office and employee data [10]. The rationale for updating data on a web server is that authorized personnel may monitor the state of the office from anywhere and at any time. The suggested system includes a number of sensors that gather data from various office factors, such as smoke sensors, temperature sensors, light sensors, and motion sensors [11]. All of these sensors are capable of gathering the required office parameters. The suggested method may be utilized in big buildings and businesses, as well as anywhere else where users need to know a certain characteristic.

The smart workplace is designed for staff relaxation and comfort. This suggested system has two modes of operation: manual and automated. In automated mode, the system's functioning is determined by the on/off state of several sub-systems, such as ventilation and lighting.

Motion sensors will observe the presence of employees in the office. This proposed system also counts the number of employees entered in the office. Whole system will start working only in the presence of an employee, PIR Motion sensor is used. Light sensors will sense the presence of intensity of light [12]. If intensity of light decreases or increases low or high from threshold value, the light emitting device will glow. The proposed system

will then automatically adjust the intensity of light according to the office atmosphere, LDR is the sensor used. The temperature sensor will detect the office surrounding temperature. If the temperature is low or high then the threshold value then the fan or AC will be ON, LM 35 is the sensor used. Smoke sensors will sense the presence of fire or smoke. The Alarm will get activated if in office any fire or smoke is detected, MQ-3 is the sensor used [13]. If in office any smoke or fire is detected, a call is arranged to the authority of the Fire extinguisher and to the emergency rooms which can provide immediate service. All the observed data is sent to the microcontroller. The data is displayed on LCD display as well as sent to the concerned authorized authority.

This data is collected through various sensors then transferred to the microprocessor and is stored in an office database. This data is then transferred to the service room computer from where the information is being observed [14]. The data can be monitor & controlled from service rooms. Different monitors are connected to the main server computer with the help of Network switch. The smart office data can be monitored remotely through any internet enabled device or Android. Call will arranged to the admin office if there are any changes in the office parameters. If there is any emergency, the system informs the ambulance and a notification is sent to the service room.

It is used for the security purpose which can be placed at the office entry gate. The proposed system is also enrolled with fingerprints of all office employees, only a person is allowed inside the office whose fingerprints are enrolled. If any other person whose fingerprint is not enrolled tries to enter the office, the proposed system shows no match on the display.

The suggested system's functioning model is that a GSM module should be linked to it, and that an employee should register his or her fingerprint in the fingerprint door module. The office door will be open, and workers will have authorization to enter, and an alert will be sent to the authorized authority through SMS or mail informing them of the employee's presence. The motion detector detects an employee's presence as soon as he or she enters the workplace, and all the lights and fans turn on immediately. When a security fingerprint is detected, all lights and fans are turned off, indicating that the office is closed. Inside the workplace, if an LDR or MQ2 gas sensor detects gas, a buzzer will sound, alerting security personnel and sending a message to the management. We may also use the GSM module to register mobile to control the lights and fan.

2. DISCUSSION

Arduino is used as a hardware tool in the smart office monitoring system. An Arduino board that has been developed to meet the requirements. This document condenses a number of issues, such as automated employee attendance, and makes it easier for the office's higher authorities to keep track of staff presence in real time. This suggested method also addresses the issue of energy waste. Employees will be detected by motion sensors in the office. This suggested technology also keeps track of how many workers have entered the workplace. Only in the presence of an employee will the whole system begin to function, according to PIR. It makes use of a motion sensor. Light sensors will detect the existence of light intensity. The light emitting gadget will glow if the intensity of light falls below or rises beyond the threshold value. The suggested technology would then automatically change the light intensity to match the workplace environment. The temperature sensor will detect the temperature in the office. If the temperature falls below or above the threshold, the fan or air conditioner will turn on. The presence of fire or smoke will be detected using smoke sensors. If there is a fire or smoke in the office, the alarm will go off. If there is any smoke or fire in the office, a contact is made to the fire extinguisher authorities and to the emergency rooms, which may offer urgent assistance. The microcontroller receives all of the observed data.

2. CONCLUSION

Illumination, lighting, heating, ventilation, door access, and smoke detection systems are all in the works. Biometric fingerprints are utilized for security reasons. Other individuals are not permitted to enter the office. There is a fire alarm system in place. When the threshold is passed, the alarm will go off, and a call will be placed to the service room on a mobile phone. The smart office system in the system is built on the foundation of a standalone smart office and then scaled up to include the whole smart building. Two working modes, automated and manual, are utilized in this smart office system. The manual mode is meant to be used in conjunction with the automated mode.

The suggested system's primary goal is to provide a cost-effective solution for offices and other workplaces. There is a risk of energy waste if an employee forgets to turn off lights and fans in a specific office room. Even when no one is present in the workplace, electrical equipment such as fans and lights are left turned on. When there are just a few workers in the office, all of the lights and fans are turned on. As a result, in this instance, the

suggested system would keep track of visitors in the workplace and efficiently manage electrical resources. The authorized authority or the planned system itself can deal with this issue.

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