# Report on Smart Office Monitoring

## 1. Team Information

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## 2. Introduction

Internet of Things is leading to the development of a plethora of smart objects that can be intended to transform homes and office area into real smart office. In this technique, taking the advantage of the recent innovations in the communication and information technology . Nowadays the Wireless technologies are becoming highly efficient and more popular all around the world and end users show appreciation for using wireless technologies, that gives them relive of the tedious wired cable connections. Recently with the use of embedded Bluetooth, RF, Zigbee technologies and digital devices forms a network where electrical devices can communicate with each other. Currently the office and home automation are one of the prime applications of Bluetooth technology [2].

## 3. Methodology

This document outlines a comprehensive approach to designing a smart office solution that leverages the power of Internet of Things (IoT) sensors. By seamlessly integrating these sensors into the office environment, we can achieve real-time monitoring and control of key parameters such as temperature, humidity, occupancy, tank water level, HVAC systems, and air quality, ultimately optimizing the office space for efficiency, comfort, and sustainability.

**Sensor Selection and Placement**

The success of any IoT-based smart office solution hinges on the careful selection and strategic placement of sensors. Each sensor type should be chosen based on its ability to accurately capture the specific parameter it's designed to monitor.

- Temperature sensors

- Humidity sensors

- Occupancy sensors

- Water level sensors

- HVAC sensors

- Air quality sensors (including CO2, VOCs, and particulate matter)

The placement of these sensors is equally critical. Sensors should be strategically positioned throughout the office to ensure comprehensive coverage and accurate data collection. For example, temperature sensors might be placed near windows, doors, and HVAC vents to capture potential temperature fluctuations. Occupancy sensors should be placed in high-traffic areas like meeting rooms and hallways, while water level sensors should be located near water tanks or reservoirs.

There are various wireless protocols available, such as Wi-Fi, Bluetooth, LoRa, and ZigBee. The choice of protocol will depend on factors like data transmission range, power consumption, and security requirements. For example, Wi-Fi offers a wide range but consumes more power, while LoRa is known for its long range and low power consumption.

# 4. Process Steps

Blocks of Central Control Room:

The system comprises of Raspberry Pi, PIR sensor and Web Camera. The system is monitored using Internet of Things.

1. Camera: A Web camera is attached to the system. The camera takes the snapshot of the accident or undesirable entries by which the user can take the immediate action.

2. Raspberry Pi: It is a credit-card-sized single board computer. A computer with CPU, GPU, RAM, some I/O ports. Additionally it adds wireless LAN & Bluetooth connectivity creating it the ideal solution for powerful connected designs.

3. Android based Mobile Terminal: It is user friendly display through which we can monitor and control the appliances and machine. Android technology use an operating system (OS) based on the Linux kernel.

4. Relay Unit: Relays are used to switch ON-OFF the devices. It is also known as on/off switch. A relay is an electromagnetic switch. It is activated when a current is applied to it. RF Tran receiver: An RF Transmitter and Receiver pair is used for wireless communication. An RF Transmitter and Receiver pair is used for wireless communication to transmit data between central control room and office area unit.

SOFTWARE Components used in this Iot based smart office monitoring area:

1) Arduino microcontroller: The Arduino Uno is a microcontroller board based on the ATmega328. Arduino board is comparatively cheap, plugs straight into a computer's USB port, and it is more simple to setup and use.

2) Blynk Blynk Android Application is used for real time monitoring purpose. It generally intended for the Internet of Belongings. It can control hardware remotely, it can show sensor data, it can accumulation data, envision it and do several further cool things. Blynk app permits you to create incredible interfaces for your projects by means of numerous widgets we offer. Blynk Server accountable for entirely the transport network amongst the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. It's open-source, could effortlessly knob thousands of diplomacies and can even be hurled on a nodeMCU.

3) Alarm: Alarm or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric. It is ON for any unauthorized entry detected.

Hardware Needed :

1. ESP 32
2. Servo Motor
3. R307 fingerprint Sensor
4. 5v 4-channel relay
5. PIR motion sensor
6. MQ2 gas sensor
7. LDR sensor
8. DHT 11 temperature & humidity sensor

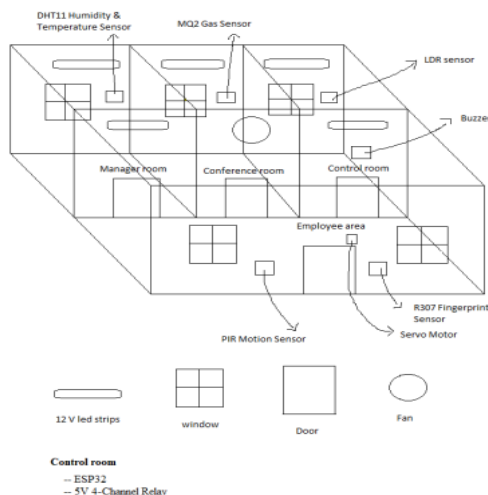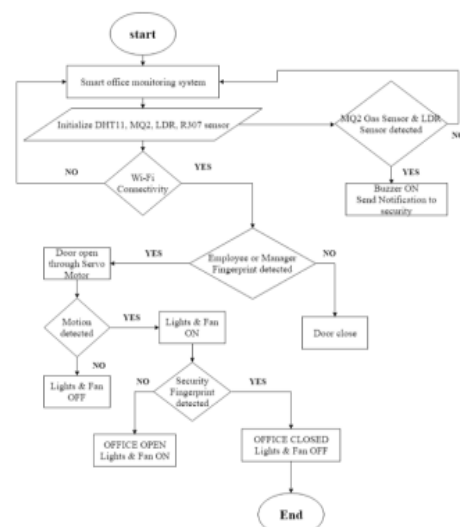System design & Dataflow diagram :



Fig -1: Architectural Design

# 5. Results/Observations

Implementing a smart office solution using IoT sensors offers numerous benefits for both employees and facility managers. It can lead to:

- Improved energy efficiency and reduced energy costs

- Enhanced comfort and productivity for employees

- Optimized building management and maintenance

- Real-time insights into building performance

- Increased safety and security

By leveraging the power of IoT, organizations can create a more sustainable, efficient, and comfortable office environment for their employees, ultimately boosting productivity and fostering a positive work culture.

Nowadays most of the People allocate lot of time in offices. Office environment precisely affects the working efficiency of employees. So, comfort is essential in office. A smart office is a platform that varieties life informal for employees and customers to legitimize and its escalation their capability to stay connected through by accomplishing use of various progressive technology and different tools and solutions to improve the efficiency of users. As the corporal limitations are existence bridged, a complex and viable world focuses on innovation and creativity is being developed. The world is hastily experiencing the evolution of intelligent growth zones. So, smart office has rapid become the need of the hour. A smart office is one that guarantees the finest and active exploitation of physical infrastructure and IT resources. In further disputes, offices in today's cohort of information technology are automated. There is need for technological improvement environment which is very translucent. Thus, the office monitoring allows the systems to become more transparent, it enables information distribution more openly, which creates a convenience for accomplishing an informed decision which has a great impact across the functioning of the business. The effective advanced automation, use of various communication tools in the system shows the positive impact on the business and growth of company or any organization over a period of time. Dominance of smart office is the eradication of internal reporting development, i.e. in/out timings of the employees by an accessible office adjustment. It also surges the efficiency through improved communication among team members which affects in the output. A smart office is to be construct with one thing in mind to discharge adequate possible of workforce.

# 6. Conclusion

Once the smart office solution is deployed, ongoing maintenance and monitoring are crucial for ensuring its functionality and effectiveness. This involves regularly checking sensor readings, calibrating sensors, and updating software and firmware.

Remote monitoring capabilities are valuable for identifying potential issues before they become major problems. Alerts can be triggered when sensor readings exceed predefined thresholds, allowing facility managers to take prompt action and prevent downtime.

In addition to technical maintenance, regular system audits and user feedback are essential to ensure that the system remains relevant and meets the evolving needs of the office environment.

In this system, close attentions are given to user's comfort and satisfaction. The biometric for door access, lighting, heating (temperature & humidity), smoke detection systems are being premeditated. Fingerprint biometric is used for security purpose. Other person cannot arrive the office area. Fire alarm system is used. Whenever the verge is crossed, buzzer will be ON in the control room and mail will be sent to the security peoples. The smart office system in the system is based on a sovereign smart office and then prolonged to the whole smart building. In this smart office system, two working modes automatic mode and manual mode are used. The manual mode is viewed as a complement of the automatic mode.

# 7. References

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