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# Police Attendance and Tracking System

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**ABSTRACT**: The well organized and timely attendance of police personnel is crucial for maintaining law and order. This abstract tells system that combines fingerprint recognition technology and GPS that track the process of police beat attendance. By using fingerprints of the police officers, the system can correctly identify and verify police officers, get rid of the need of manual attendance taking and also police officer live locations will be tracked by GPS tracking system. This increase the efficiency and enabling effective use of resources. It tracks the officers whether or not they were present for a duty or not and also checks his/her movements whether or they present at the allocated location are not during night beat.

**KEYWORDS**: ESP8266 microcontroller, GPS Module, Fingerprint Sensor, Li-ion Battery, Battery Management System, Buck converter, Buzzer.

## I. INTRODUCTION

In recent period, advancements in technology have revolutionized the way law enforcement agencies operate, enabling them to enhance their response capabilities and improve public safety. The two key technology instruments that have played a significant part in this shift are fingerprint identification and position tracking via GPS (Global Positioning System). By incorporating the two techniques mentioned above into officer attendance systems, law enforcement organizations may simplify their operations, improve accountability, and assure optimal resource allocation.

The Internet of Things (IoT) idea has an impact on this attendance system. Using a portable module that can communicate the police officer's identity to the server, where fingerprints are then accurately recognized, it is feasible to identify police officers by their fingerprints. The requirement that each machine be linked to network, which is possible through Wi-Fi, is thebulk crucial aspect to take into account. Therefore, the NodeMCU (ESP8266) is chosen because a computer is needed to have the capability of Wi-Fi networking. When the system is turned on, it initially scans all available Wi-Fi networks. Any additional network can then be quickly linked by entering the password for that Wi-Fi provider network.

When the device is connected, it scans for the police officers fingerprint via biometric module and recognizes them. Whoever is recognized by that device their fingerprint ID is sent to a server (PC). When the server receives the Fingerprint ID, it marks the attendance of the police officers. Server is basically a PC which maintains all the records of the attendance and also keep track on daily attendance.

IoT-based tracking systems enable real-time monitoring of individuals, improving safety, resource management, and emergency response. However, there are some problems with proxy attendance and extra work from higher officials to track attendance using current attendance mechanisms, such as roll calling. The IoT concept offers a more efficient and effective approach for monitoring and ensuring personal safety. So all the above trouble are avoided by implementing this system.

## II. LITERATURE REVIEW

Karthik Vignesh E et al. developed A biometric attendance management system uses the biometric sensor to automatically maintain student attendance records, eliminating manual entry and time-consuming log books[1] Nur Izzati Zainal et al. developed Design and Development of convertable classroom attendance system based on Arduino and fingerprint biometric, A convertable classroom attendance system uses fingerprint biometric technology for security, portability, and independent energy, recording attendance in writing or queuing[2] L.Arunkumar and A.Arun raja have developed Biometric Authentication using Raspberry Pi. It also uses fingerprint scanners, build websites using PHP, create databases and maintain using Postgresql, and execute authentication and recognition using Python. The standardized authentication methodology that may gather a person's fingerprints and store them in a

database is covered by this work. The resulting fingerprint is compared to other fingerprints identified in the database (Postgresql) to display the effectiveness of this method[3] Aniket Shete, Prashant Nangare and Rahul Thakre have developed IoT Based Portable Attendance Device using Bio-metric system. The proposed system IoT and Biometric technology is being employed to try to solving a problem of manual class attendance monitoring in poor nations. This work is developed and implemented using biometric system for IoT-based student attendance monitoring has the potential to reduce time spent on manual attendance tracking and give educational administrators the chance to record data from in-person classroom interactions for distribution of useful attendance scores and for further decisions[4] M A Muchtar et al. developed Attendance thumbprint identification system using one board computer and arduino project, The proposed work utilizes fingerprint technology, which is a unique part of the living things human body, to automatically identify and recognize individuals. However, the present fingerprint sensors can only identify one user at a time[5] Dipak Gadekar et al. have developed Iot based attendance monitoring system using face and fingerprint Authentication is one of the vital concern in this generation of information system. Human Face Recognition (HFR) is a frequently used technique for user verification in many various applications, including videoConferencing, military services, and attendance systems. Utilizing automated technologies and biometrics, HFR streamlines the procedure of keeping attendance, making it simpler to manage[6] Khin San Myint and Chan Mya Mya Nyein [7] has developed Based Attendance system using arduinoattendance system is required many different places such as offices, companies, schools, organizations and institutions, etc. With an Arduino UNO controller, PLX DAQ tool, and an Excel display, this effort focuses on building an attendance system with a biometric module. Lia Kamelia et al. have developed real-time online Attendance System based on tumbprint and a GPS in the Smart phone In this proposed system, For employees with different commitments or schedules, present online Attendance is advantageous. A biometric attendance system helps lessen the problems with data management brought on by manual use[8] The ZFM-20 fingerprint module will be the primary input and security tool for the online presence system that will be developed using a combination of GPS and fingerprint modules in this study.Anagha Jadhav et al. The proposed work presents a common and a portable method to a student attendance in the way of an Internet of Things(IOT) based system that records employing a biometric fingerprint scanner to securely save the attendance information in the cloud. By automating the laborious task of manually recording and maintaining student attendance data, this system hopes to reduce administrative burden[9] Isaac M Mankilik, Chinwe C Isitua and Henry Nnanna Kama The evaluate the services provided by biometric and manual attendance using a single server queueing model. Two major factors are the service rate and the arrival rate. The main sources of data were observations and the attendance system's tracking of both biometric and manual attendance. The findings demonstrate that when queuing is employed as a performance monitoring tool, biometric attendance is superior to manual attendance[10]

## III. METHODOLOGY

Here the Police officers can keep track of their attendance in this location automatically, free from human error and manipulation. Implement a tracking system with real-time location awareness to improve operational effectiveness by improving incident coordination, dispatch, and response. It ensures easy interaction with current systems, such as scheduling systems, crime databases, and dispatch systems. This connection would allow for the real time sharing of information, enhanced situational awareness, and support for data-driven decision-making. And also the officer who are there in the control room can easily track the police officers information

**Alg 1. Algorithm for attendance system**
Step 1: Start.
Step 2: Initialize the Wi-Fi.
Step 3: After initializing the Wi-Fi, Initialize database.
Step 4: Initialize finger print module, If "yes" it will wait for finger print if "no" again it will back to previous step.
Step 5: Detect the finger print and after that analyze the finger print. If match found it will fetch the details like date, time, area from entity server.
Step 6: Upload to firebase.
Step 7: End.
First start the project. Then initialize the Wi-Fi, Next initialize the database then initialize biometric module to the system. If "yes" it will wait for finger print of police officer. if "no" again it will back to previous step and wait for finger print. Next it will detect the finger print and after that analyze the finger print. If match found it will fetch the details like date, time, area from entity server Upload to firebase End and send that data to email address of controller.
**Alg 2. Algorithm for tracking system.**
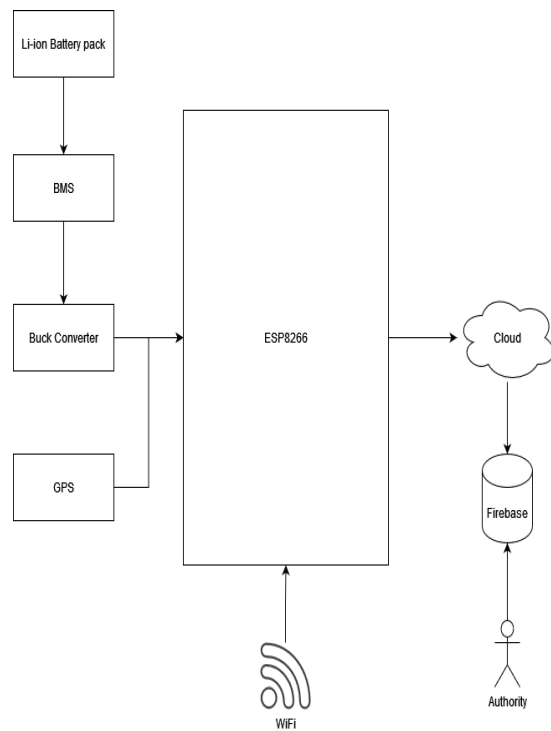Step 1: Start.
Step 2: Initialize the Wi-Fi.

Step 3: Initialize the database.
Step 4: Initialize the GPS module.
Step 5: Fetch the GPS location.
Step 6: Upload to firebase.
Step 7: End.

First start the project. Then initialize the Wi-Fi. Next initialize the database. After initializing database, the GPS module is initialized to track the officer. Next it will fetch the GPS location of the officers. then it upload to firebase. And finally it shares the entire information to the email address.

**DIAGRAM**
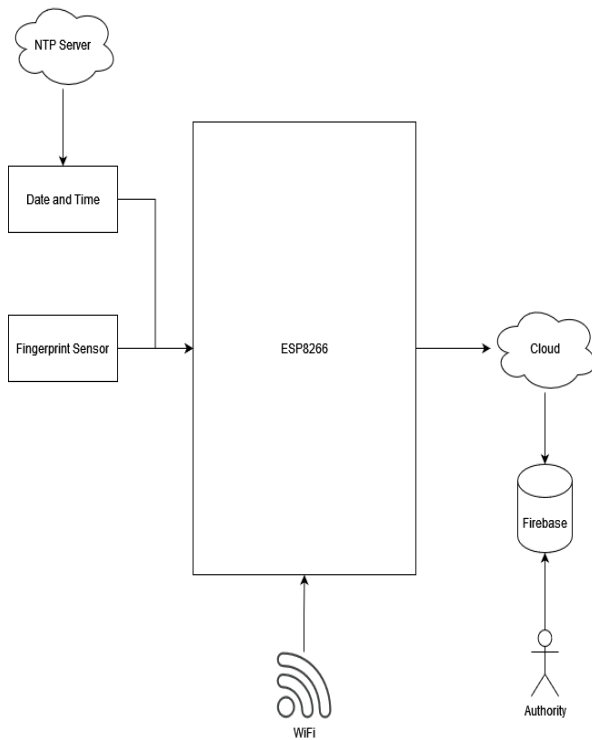


Fig.1 Beat attendance System                         Fig.2 Officer tracking System

In both Fig.1 and Fig.2 shows the ESP8266 module to a microcontroller board (e.g., Arduino) or use a standalone ESP8266 development board. It connects vital components such as the GPS module, fingerprint scanner, and any additional sensors necessary for verification and monitoring. Here Wi-Fi connectivity is available to Set up the ESP8266 module and connect to a WiFi connection with the correct login details. Officer authentication may also be accomplished by employing fingerprint scanners to verify the officer's identification, building code for the ESP8266 chip and NTP server for recording officer presence, and capturing date, time, and location information using the embedded GPS device in order to find out where police officers are in real-time, The GPS module was connected to the ESP8266 and was used to save and update the officer's position information in the the firebase database for following and tracking reasons. Additionally, a buck converter is utilized to convert 8.4 volt to 5 volt current, and a lithium-ion battery pack is employed as a battery.

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Fig.3 Tracking system        Fig.4 Attendance system

Model of police tracking and attendance system.

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## IV. RESULTS ANALYSIS

The iot idea used in this system has an effect on how police officers track their attendance. using a portable module that can communicate the police officer's id to the server, where it is then correctly recognized, it is possible to identify police officers by their fingerprints. in this scenario, having internet access on every machine is crucial, and wi-fi makes this possible. because the system requires wi-fi networking capabilities, the nodemcu (esp8266) was used. when the system is turned on, a preliminary scan of all wi-fi networks is conducted. any more networks may be linked easily by inputting the password for that wi-fi provider network. and also the database will store in firebase and in the firebase the police name, date, time, location are shown and that is send to email address.



<div align="center">
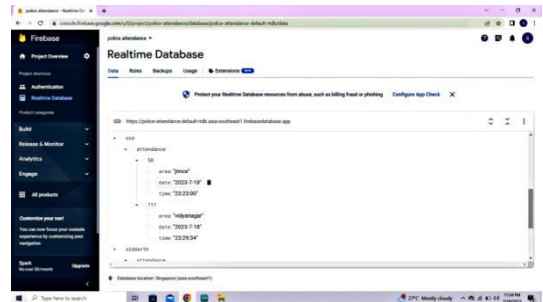
Fig.5 Oled display results            Fig.6 Realtime database
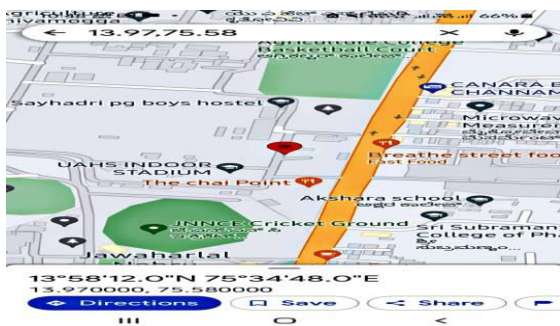
</div>



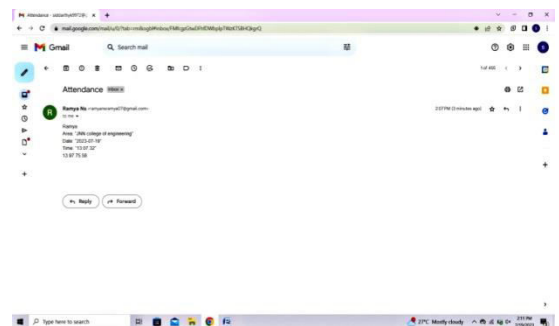<div align="center">

Fig. 3. Google map of officer           Fig 4. details in gmail

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## V. CONCLUSION AND FUTURE WORK

Biometric technology for authentication is trustworthy. There have been reviews of several fingerprint-based attendance systems. The adoption of the systems in poor countries is plausible. The presently existing mechanisms can be improved upon or merge to make system more user-friendly, safe, and speedy. Low-cost embedded systems used in

conjunction with LabVIEW's (Laboratory Virtual Instrument Engineering Workbench) user-friendliness and GSM technology's added capability. In conclusion, IoT-based tracking systems had lots offer in terms of better tracking and monitoring, increased productivity and efficiency, improved safety and security, cost savings, integration and scalability, and data-driven insights. Such systems can be insert in place to give businesses a competitive edge, streamline operations, and open up new growth prospects.

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