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Automatic Attendance System Using Artificial Intelligence and BLE.

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Abstract - Bluetooth Low Energy (BLE) is an emerging technology that enables wireless communication between devices at short distances. This technology has enabled the development of an Automatic Attendance System that can be used to track the attendance of students in educational institutions. The system consists of two components, the bluetooth card in the phone and the BLE receiver. The bluetooth card is attached to the student mobile phone and is used to detect the student's presence in the classroom. The BLE receiver is installed in the classroom and is used to detect and record the presence of the student's bluetooth MAC ID . The BLE receiver is also connected to a local database. When the student enters the classroom, the bluetooth Mac address is detected by the BLE receiver and the attendance of the student is automatically recorded in the database. The system also provides other features such as allowing teachers to view the attendance of their students in real time and generating reports and mailing them to concert faculty for further analysis. The Automatic Attendance System using BLE is an efficient and cost-effective solution for tracking the attendance of students. Using artificial intelligence systems in our cloud database for future integrating work like availing OD and Outpass for students

***Key Words*: BLE,Attendance system , Iot , Artificial Intelligence**

1.INTRODUCTION

The regular monitoring of attendance is another obligatory task of faculties in every university which costs them valuable teaching time in their lectures.The attendance plays an important role when it comes to applying university criteria of 75% attendance for exam eligibility and smooth monitoring of colleges. The Attendance system should consider following things while marking the present students:-

- The student should be present throughout the lecture hours.
- No Proxy or false attendance should be marked.
- Any error or special case should be tractable and corrected easily.

And this all is achieved in hereby methodology by using Bluetooth addressing for unique identification and tracing of students in class. The Students don't have to use any extra chips or tags with their phone or ID card. Simply the Bluetooth of the phone and its unique address will be used for marking the attendance. This system will also use a double check method for tracing the present students to avoid any False Attendance from getting marked. The method mentioned here proves to be better as no use of excess identification tags/cards is required

2. LITERATURE SURVEY:

[1] Automated Attendance Management and Alert System. S.K.N.A.Rahim, N.R.P.Ismail, F.A.Razak, I.Z.Zulkifli, N.H.Jamian, N.F.Razi and N.H.Mohammad.
(**AAMAS**) system was developed to help UiTM lecturers and Academic Affairs Department.AMAS provides various functions, from managing and recording students' attendance record, to sending automatic alerts to students with high absenteeism via short messaging system (SMS) and email. The system is also able to track the number of alerts sent.

[2] Study of Implementing Automated Attendance System Using Face Recognition Technique. Nirmalya Kar, Mrinal Kanti Debbarma, Ashim Saha, and Dwijen Rudra Pal.
This paper describes a method for Student's Attendance System which will integrate with the face recognition technology using Personal Component Analysis (PCA) algorithm. The system will record the attendance of the students in the classroom environment automatically and it will provide the facilities to the faculty to access the information of the students easily by maintaining a log for clock-in and clock-out time.

[3] Automatic Attendance System Using Deep Learning. Sunil Aryal, Rachhpal Singh, Arnav Sood and Gaurav Thapa. In this paper, a novel automatic attendance system is proposed by using machine learning and deep learning algorithms. Real-time face recognition algorithms are used and integrated with existing University management systems which detect and recognize faces of students in real time while attending lectures. This new proposed system for automatic attendance system aims to be less time consuming in comparison to the existing system of marking the attendance.

[4] Automatic Attendance Management System. Suman Dey ,Ankur Guha, Dibyarup Basu, Sudipta Banerjee.
The classroom activities of the students can be monitored and analyzed using machine learning which helps the teachers to evaluate the attentiveness and performance of the students as it is tough for a teacher to do board work and also monitoring each student's activities simultaneously for a large class with a considerable number of students. This monitoring of students with the help of an automated machine learning process actually helps the students themselves to acquire good and quality education from an institution. Identification of students who are disturbing others by the help of this system helps increasing the effectiveness and fruitfulness of the classes.

[5] Automated Attendance System Using Image Processing. Pooja.G.R, Poornim.M, Palakshi.S, M.Bhanu Prakash Varma, and Krishna.A.N.
This system, which is based on face detection and recognition algorithms, automatically detects the student using a webcam when he enters the class room and marks the attendance by recognizing him. The system architecture and algorithms used in each stage are described in this paper. Different real time scenarios are considered to evaluate the performance of various face recognition systems. This paper also proposes the techniques to be used in order to handle the threats like spoofing

[6] Online Attendance System. A. Babu Karuppiah,R. Raja Raja, M. Jeyalakshmi, L. Johnsilin Shiny, and B.Sri Devi.
This paper introduces a new approach in automatic attendance management systems, extended with computer vision algorithms .In our proposed system real time face detection algorithms are used in integration with an existing Learning Management System (LMS), which automatically detects and registers students attending a lecture. The system represents a supplemental tool for instructors, algorithms used in machine learning are combined with adaptive methods used to track facial changes during a longer period of time. Time consumption is lesser than traditional methods

[7] Automated Attendance and Monitoring system using Machine Learning. Sanjana Mekala, Sai Bhavyasree Vootla, Vishnu Vandana Pyatla, Ashwini Ambigalla, and Mareswara Rao Y.
This study describes a face acknowledgment based participation checking framework for instructive foundations. Face detection and identification technology will be used behind the scenes. Understudies whose countenances are perceived are promptly gotten participation, which is refreshed in the EXCEL sheet alongside the time the face is perceived. A wire bunch contains the names of the understudies who are missing from class. Students who are present in class for a specified period of time are rewarded attendance. This is accomplished by monitoring. The entire database is uploaded to the cloud and can be accessed at any time.

[8] A Development of an Online Student Attendance Management Information System. Marcel, Flaubert.
This new system is efficient in speeding up the daily attendance process, as these services are provided efficiently and cost-effectively to reduce the time and resources currently required for such tasks. This is an online application with great user interface designs, more performance enhancements, and many enriched modules.

3. EXISTING METHODS:

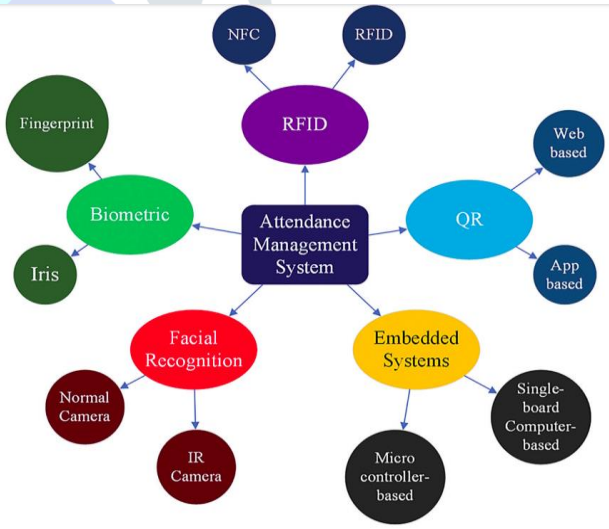

Fig-1

There are several existing methods for the Automatic Attendance system and every method has its own advantages and disadvantages too. Here we have segregated the different workflows of the automatic attendance system.

Biometrics - Using Biometric sensors we can mark our attendance by pressing our bio metric(Thumb impression) on the sensor. Many workplaces have this kind of attendance system. The major disadvantage here while implementing it in educational institutions is , it increases the queuing system.

RFID/ NFC Technologies - In an RFID-based attendance system, each employee would be given an RFID tag, which would be encoded with the employee's unique ID number. This tag would be attached to the employee's clothing or badge. When the employee enters the workplace, their RFID tag would be scanned by an RFID reader, which would then record the employee's attendance.It is one the good methodology for taking attendance but still it will fail when there are dozens of people entering workspace at same time.

Facial Recognition - Facial recognition technology can be used to create an automated attendance system. This system would use facial recognition algorithms to detect and identify faces in an image or video. After the face is identified, the system can compare the face with the database of registered faces to determine if the face belongs to an employee. If a match is found, the system can then log the attendance and update the employee's records. This system can be used to reduce paperwork and save time when tracking attendance.

4. PROPOSED METHOD:

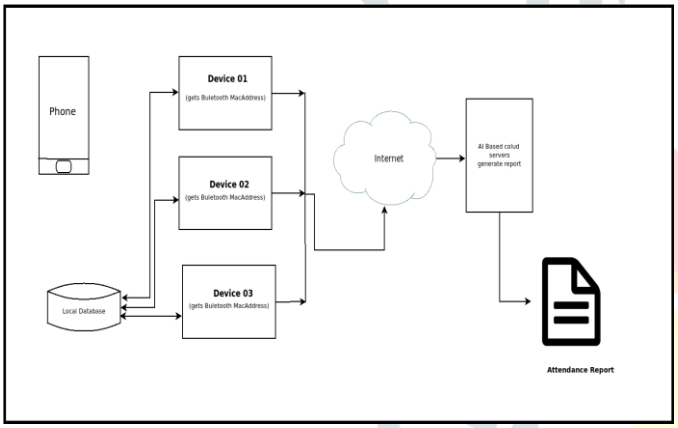

Fig - 2

4 .1 Working:

To start with, our devices mentioned in the diagram are mostly nothing but the BLE receivers which essentially are gonna scan for available bluetooth devices definitely nearby. Each Class room literally has one device exclusively, This device basically has a touch screen with actual Material UI design in a subtle way.

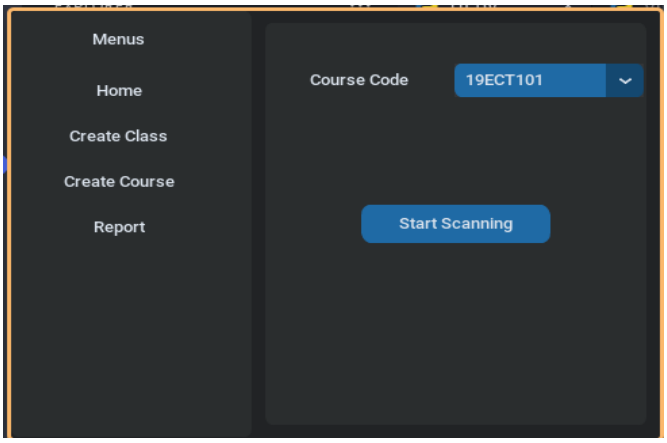

Fig – 3

These devices are connected to the local database where it can
collect the mapped data like register number and bluetooth MAC address.Once the class advisor clicks on **start scanning** button it automatically starts scanning the bluetooth devices nearby and mark the attendance to the respective register number of the mac address detected.The over all scanning for 60 student take around 3 minutes - 5 minutes depends on the processors.
You also have other options like create class and create course option to create a class database and course database by clicking on create class / create course. We can also send the report of the concerned faculty by using Report Option.

5. HARDWARE

5.1 TFT Display:

This small 3.5 inch touch screen Raspberry Pi Display module is meant especially for Raspberry Pi, using the most recent Linux Core system. This is frequently ideal for DIY anywhere, anytime and doesn't bear any separate power source or case to carry it. The module sits right on top of Pi and a perfect volition result for HDMI observers. The screen also comes with a stylus to interact with the bitsy screen.

5.2 Raspberry Pi:

The Raspberry Pi may be a very cheap computer that runs Linux, but it also provides a set of general purpose input/output (GPIO) pins that allow you to regulate electronic components for physical computing and exploring the web of things (IoT).Raspberry Pi can open up opportunities for you to create your own home automation projects, which is popular among people in the open source community because it puts you on top instead of using a proprietary closed system.

5.3 Battery Pack for Raspberry Pi

Any portable battery designed to charge a smartphone over USB can be used with the Raspberry Pi. This 4000mAh battery outputs 5V 2.4A and comes with a nano adhesive pad that sticks to most surfaces. Compatible with Raspberry Pi 4, the built-in USB-C cable powers your Pi, and the battery can be recharged with a USB-C or micro USB cable). There is also a micro USB version for older Pi models.

As you might expect, this battery pack can also double as a smartphone or tablet recharger. It can also be charged while providing power to your device. This makes it the perfect all-round portable battery for your favorite tech, ideal for the Raspberry Pi.

6. SOFTWARE

6.1 Raspbian OS:

Raspberry Pi OS is a Unix-like running system based on the Debian Linux distribution for the Raspberry Pi family of compact unmarried-board computer systems. First advanced independently in 2012, it's been produced as the primary running system for those forums considering the fact that 2013, disbursed with the aid of the Raspberry Pi foundation.

6.2 Visible Studio Code

visual Studio Code is a source-code editor which includes a selection of programming languages, along with Java, JavaScript, move, Node.js, Python and C++. This platform is used to create artificial wise initiatives.

6.3 Fast API:

FastAPI is a web body for growing non violent APIs in Python. FastAPI is grounded on Pydantic and sort hints to validate, contribute, and deserialize information, and automatically bus- result in OpenAPI files.

It completely supports asynchronous programming and can run with Gunicorn and ASGI waiters for product comparable as Uvicorn and Hypercorn. To ameliorate inventor- benevolence, editor support become considered considering the fact that the most days of the design.

6.4 Pandas:

Pandas is a software program library written for the Python programming language for records manipulation and evaluation. mainly, it gives records structures and operations for manipulating numerical tables and time collection. it is loose software program released under the 3-clause BSD license.

6.5 custom Tkinter

CustomTkinter is a python UI-library primarily based on Tkinter, which presents new, cutting-edge and fully customizable widgets. they are created and used like normal Tkinter widgets and also can be utilized in aggregate with ordinary Tkinter elements. The widgets and the window hues both adapt to the device appearance or the manually set mode ('mild', 'dark'), and all CustomTkinter widgets and windows assist HighDPI scaling (windows, macOS). With CustomTkinter you'll get a constant and contemporary look across all desktop structures (windows, macOS, Linux).

6.6 Google Gmail Mail:

The Gmail API is a RESTful API that can be used to get admission to Gmail mailboxes and send mail. For maximum net applications the Gmail API is the fine choice for legal get right of entry to to a consumer's Gmail records and is appropriate for various packages, together with:

- study-best mail extraction, indexing, and backup
- automated or programmatic message sending
- electronic mail account migration
- electronic mail agency consisting of filtering and sorting of messages.

7. RESULT

column 1	column 2	column 3	column 4	column 5	colu
Date	Time	19EC064	19EC066	19EC067	19EC0
11.12.2022	13:01:06	1	0	0	0
11.12.2022	18:33:36	1	0	0	0
12.12.2022	10:23:13	1	0	0	0
12.12.2022	10:23:52	1	0	0	0
12.12.2022	16:00:41	1	0	0	0

Fig - 4

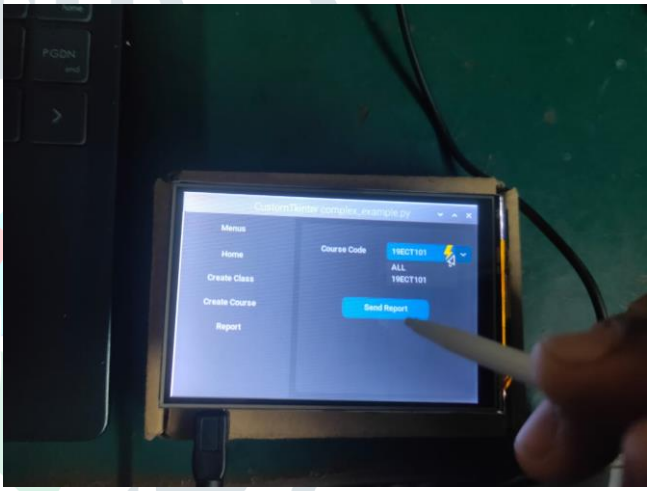

Fig -5

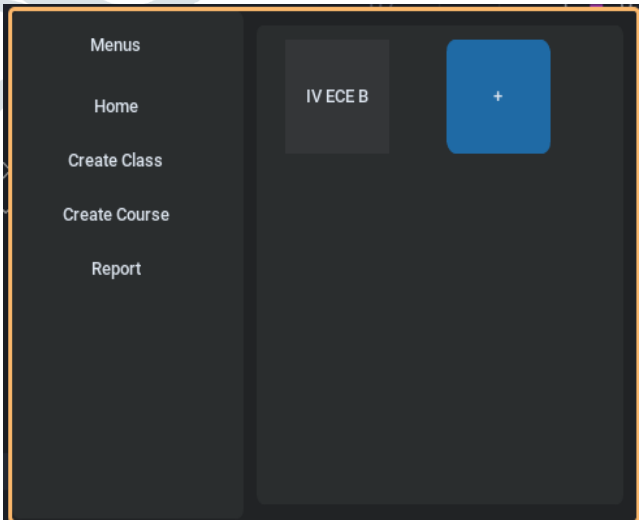

Fig - 6

8. CONCLUSION AND FUTURE WORK:

The use of BLE technology for automatic attendance system is a promising solution for educational institutions. It has several advantages, including cost-effectiveness, convenience, and accuracy. It also provides a secure platform as it uses encrypted data transmission. Moreover, it eliminates the need for manual attendance, which is a tedious task. Overall, BLE technology can be effectively utilized to create an effective and efficient attendance tracking system.

Some of future work we would like to add are:

- Creating the Attendance Portal which as both User and Admin Interface
- Adding a feature call availing for On Duty and outpass form with that portal
- Deploying a synced local and cloud database for security and data reliability.

9. REFERENCE:

[1] Automated Attendance Management and Alert System. S.K.N.A.Rahim, N.R.P.Ismail, F.A.Razak, I.Z.Zulkifli, N.H.Jamian, N.F.Razi and N.H.Mohammad.

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