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Smart Attendance Monitoring System Using IoT

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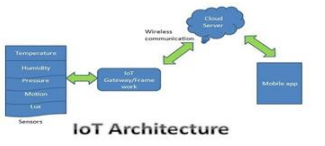
***Abstract*: The pace at which Digitalization is advancing is astonishing. Due to Covid, the process is amplified. College education needs to be smarter and should be automated from attendance management to smart classes. We as human are susceptible to errors and automation is our friend. This paper will present a small project which will automate Attendance management with the existing Cameras.**

***Keywords*: Automation, Image Processing, Image Recognition, IOT.**

1. Introduction

Since the Pandemic, lot of schools and colleges have taken to Online Education and have adapted it towards examinations and a lot of platforms have been developed for the implementation of Education online. Attendance Systems have been outdated since the start of education system. However, Digitalization and the revolution of the internet have been major factors for development of technologies like IOT, Automation and development of hardware Devices compatible for Communication through the internet. Development of IOT Systems have become popular due to fast pace of the internet. Now when it comes to the Architecture of IOT systems. The following figure will explain the same

The figure explains:



IoT Architecture

- Data is first extracted from Devices with the help of sensors (e.g., Temperature Sensor)
- They are communicated through the help of Gateways and Frameworks
- The data is stored in a Cloud server which will be used for further computations and other calculations
- The Computation and useful results are then sent to a mobile application which will be designed for the particular solution. This Paper will be presenting a project which will be concerned about the attendance management and will lay emphasis on IOT Systems.

2. Objective

An automated attendance management system with face recognition capabilities is a big improvement. The biometric authentication is being used for attendance marking is a clever way of implementing an attendance management scheme. Face recognition, among other methods, is more reliable and quicker, and it decreases the risk of proxy attendance. Face recognition allows for passive identification, which means that the person being recognized does not have to take any action to be identified. The enrollment of the employees in the system is a one-time process and their photograph would be placed in a resources storage. Using a digital real image, the automated grading system can detect a person's face. The presence of each employee is updated in the database daily and the results are more accurate in a user interactive manner. There are two stages of biometrics The first stage includes Face detection and the second step is made up of distinguishing those face images that were detected with the database that already exists. There is a variety of recognition and detection of faces systems available. Facial recognition algorithms can expose features such as the locations of the forehead, chin, eyes, nose, jaw, and mouth from a face picture.

- A fully automated attendance system using Iot.
- Using IoT, the student's data will be well organized, so that the teachers can know who came in late or who came in early.
- Each student's attendance is calculated and reports are generated which saves time. The status can be monitored on the mobile app easily anytime.

As a result we want to make sure that each student's data is accurate with minimal human intervention.

3. Methodology

- The Image is acquired via cameras and is stored on the microcontroller
- The Image is then processed and is sent for Image recognition or face detection
- After Face detection, the Images are compared with

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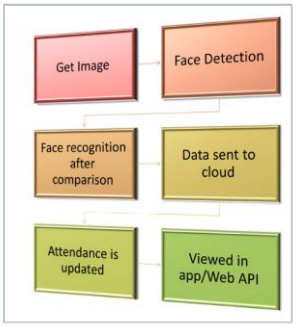
the existing databases and an output is computed. If the image matches, the result would be yes or else no.

- The Data is sent to a cloud server which stores all the info of the students and will be linked with the Web API
- The Web API contains all the Information of the classes, students undertaking the class, subject teacher and some info about the student attendance status. The Web API is updated after every class and the teacher and student can access it.



4. Working

1) Software

We use the OpenCV to build a simple Face Recognition Model.OpenCV is an open source computer vision and machine learning software library.

The libraries used are:

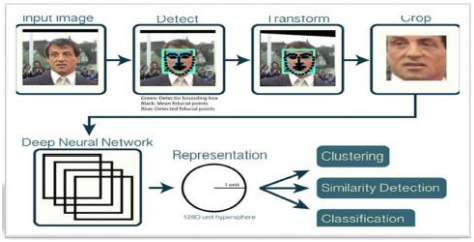
- Cmake
- Dlib
- Pillow
- Face-Recognition
- Numpy
- Opencv-Python

Import all the required libraries.

- Define some functions which are used for face detection.
- The first function detects the face in the image and returns agray scale image with a box around the face by using Haar classifier.
- The second function takes the directory as the input and returns the faces along with its labels.
- The remaining functions are used for training Haar classifier, drawing bounding boxes around the faces and to input the text on the boxes.
- Once all the functions are defined, we pass a test image to recognize the faces in the test image.
- The next step is to train our model.
- In the final step, our model detects the face in the test image and draws a bounding box around the face and tries to predict the person in the image.

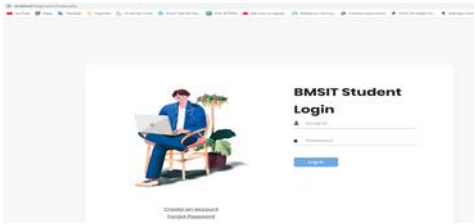
2) Hardware

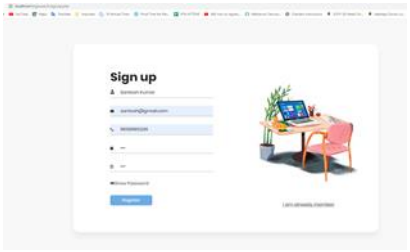
- We are using an IP Camera to get the images from Live Footage.
- We are also looking at the option of using a Pi-Camera and integrate it with a Suitable microcontroller for computation and data communication.
- Hardware Implementation can be also avoided when we can pull data from the existing camera systems.

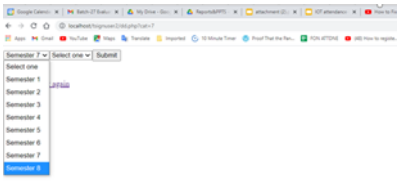


3) WebAPI

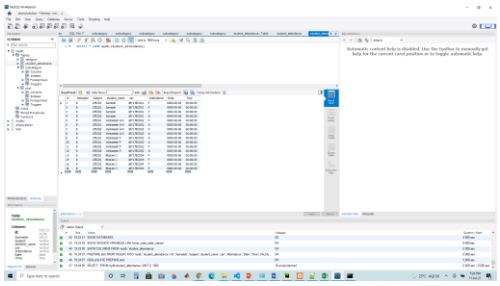
This is the User Registration page of the Portal. It has a Create an account section where you will be assigned your photo and ID. We also have the recover password option for security purposes.



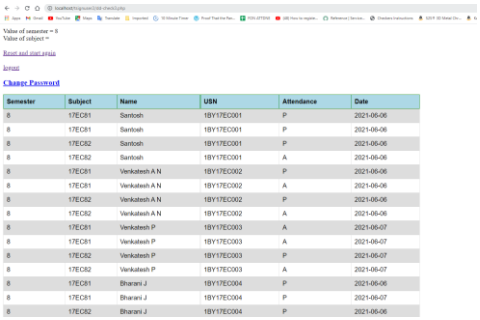




This is the First Page Post Login. It contains info required for your data collection which will be acquired in the backend using MySQL.



This is the Data stored in the Database. We have Name of the student, Unique ID, Classes taken. This is the page which shows which person has attended classes and absent for any class. Specific student records can also be taken.



Value of semester = 8
Value of subject =

Reset and start again

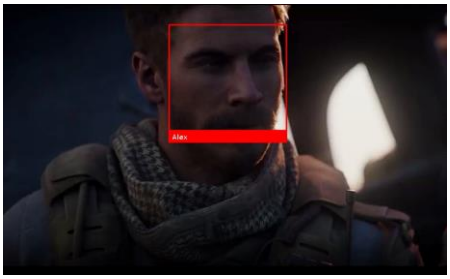
logout

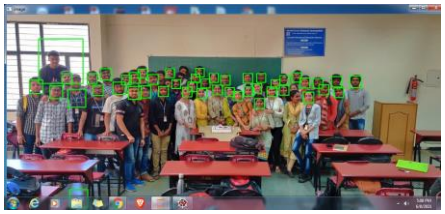
Change Password

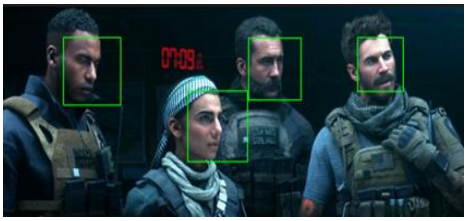
Semester	Subject	Name	USN	Attendance	Date
8	17EC81	Santosh	1BY17EC001	P	2021-06-06
8	17EC81	Santosh	1BY17EC001	P	2021-06-06
8	17EC82	Santosh	1BY17EC001	P	2021-06-06
8	17EC82	Santosh	1BY17EC001	A	2021-06-06
8	17EC81	Venkatesh A N	1BY17EC002	P	2021-06-06
8	17EC81	Venkatesh A N	1BY17EC002	A	2021-06-06
8	17EC82	Venkatesh A N	1BY17EC002	P	2021-06-06
8	17EC82	Venkatesh A N	1BY17EC002	A	2021-06-06
8	17EC81	Venkatesh P	1BY17EC003	A	2021-06-07
8	17EC81	Venkatesh P	1BY17EC003	A	2021-06-07
8	17EC82	Venkatesh P	1BY17EC003	P	2021-06-07
8	17EC82	Venkatesh P	1BY17EC003	A	2021-06-07
8	17EC81	Bharani J	1BY17EC004	P	2021-06-06
8	17EC81	Bharani J	1BY17EC004	P	2021-06-07
8	17EC82	Bharani J	1BY17EC004	P	2021-06-06

5. Results

This is the Result of the image recognition and the attendance is updated automatically with the help of Background scripts running. The attendance is updated automatically and the teacher is given a confirmation that the attendance is updated for the class.







We have taken in mind that the computation of different device used in this project are limited to their specs and have different types of applications and function running in the background.

6. Conclusion

This paper presented an overview of Smart attendance monitoring system using IOT.

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