Automated Visitor Authentication System

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ABSTRACT –

This Technical paper presents the Automated Visitor Authentication System (AVAS) to its readers. AVAS is intended to ease the workload of the staff premises (mainly associated with visitor paperwork) at Airports Authority of India (AAI), Nagpur. The System mentioned here tracks the Entry and Exit details of the Visitor at the AAI premises, stores that data on the cloud database and provides the stored data by retrieving it from the cloud whenever required. The System can reduce staff workload significantly since now they need to maintain lesser paperwork and also the storage and retrieving of this data would be much faster. The System also features a module for an admin panel which could help to retrieve the information from the cloud database and display it in a proper and simply understandable format. It will also store the login credentials of the Officers employed at AAI, so that they will login easily to their own account present in this system. Another benefit of the Admin module is that it will be easy for the System Administrator to include new Officer details, in case someone new joins, or delete any Officer details in case someone leaves the Organization. The System also gives an option of Live video communication between the Officer and the Visitor waiting at the entrance gate of the premises, it includes sending the video feed and voice to each other. The live video communication can only be initiated from the Officer side, the Visitor has not been given this privilege in this System.

Keywords – Automated Visitor Authentication, Live Video Feed, Admin panel for AVAS, image processing, cloud database.

I. INTRODUCTION

The Automated Visitor Authentication System (AVAS) reduces paperwork and moves towards digitization at the Airport Authority of India (AAI). It is a system to track visitors' activities and authenticate visitors' arrival at the entrance of AAI premises. AVAS registers the Visitor approaching the staff premises by adding their important credentials (Name, Mobile no., Aadhar card no., Purpose of meeting and also the Officer that they intend to visit) onto the system and captures the Visitor's live photograph. The system then sends this data to the respective Officer for verification, saving the information onto the cloud database. Then, the Officer decides whether to accept or decline the request after verification. This method saves the Security guard's time and efforts to bring a paper pass, verify it through the concerned authorities and then allow the Visitor inside the premises. It would contribute to the efficiency of the Organization, keeping in mind the safety as well, and even when the number of visitors goes beyond a certain limit, the system would be ready to cope up by getting scaled up.

II. ANALYSIS OF PROBLEM STATEMENT

The Organization needs to manage the Visitor data, i.e., their basic details, authenticate the Visitor, notify the arrival and purpose of the Visitor to the respective AAI Officer, maintain the Entry and Exit time of the Visitors and lastly store all this information somewhere for future reference. The manual hard paper handling of this data needs to be reduced since this method leads to time consumption and makes it more challenging to handle larger amount of data. Also, if any previous record is to be fetched out then it will not be a much easy task. So, the automation of this manual paperwork can be of much help to the Organization.

Additionally, security measures also need to be taken care of when the number of Visitors coming for the arrival at the premises increases.

An Automated Visitor Authentication System (AVAS) provides the answer to above scenarios by keeping the daily track of every Visitor arriving at Airports Authority of India (AAI). The System, AVAS, introduces managing records of Visitor details on the cloud database, capturing a Visitors' live photograph, and obtaining an approval from some Officer for the Visitor entry. In the system a live Video Communication Module (VCM), can also be advantageous, in which the Officer can initiate a video call with the Visitor directly and communicate with him, so that whatever further information may be required from him can be gathered.

III. LITERATURE REVIEW

A similar system has been built by several others but their way of Visitor authentication is a little different than the one proposed within this paper.

A System was developed by Santosha Rao and Casbona Jonathan which was an automation system comprising of

Raspberry Pi equipped with camera and an android mobile phone. The Raspberry Pi equipped with camera would be kept in the Visitor's waiting area and the consulting Person would possess an android mobile phone inside which the Visitor Management Software would be installed. The Visitor would take an appointment using the client application installed in his android mobile phone by selecting an available slot and then receiving a QR code. The consulting person has the access to information regarding each appointment through the mobile application installed in his android phone. Whenever the visitor would show the QR code to the camera, which is attached with Raspberry Pi, the professional application would get notified and the person would be in a position to access a list of all the Visitors that would be there in real time. An intelligent token system was used by them to determine the order of passage when several visitors are there at the office (1).

Another notable System for Visitor Management was developed by Ms. Sampada Khot, Ms. Tejaswini Patil, Ms. Mali Rupali and Ms. Mahind Rupali. Their system named, "Visitor Management System Using GSM", uses the unique feature of GSM which is the Short Message Service (SMS), SMS is a bi-directional service for sending short alphanumeric message in a store-and-forward type of process. SMS can be used for both "point-to-point" as well as in cell-broadcast mode. GSM technology, in terms of hardware and the fees paid to providers, was predicted to get cheaper as it grew more popular and because the technology was maturing (2).

Another system which is somewhat similar to our system, the AVAS, is one developed by Harish Rapartiwar, Pushpanjali Shivratri, Omkar Sonakul and Prof. Ashwini Bhugul of Computer Engineering Department, of Marathwada Mitra Mandal's College of Engineering, located in Pune, India (3). Their system also has some modules and handling of backend similar to ours but the main differing point is that theirs is a web application whereas AVAS is a desktop based application which is built specifically according to the requirements of the authorities at AAI, Nagpur, India.

IV. THE PROPOSED SYSTEM

The Automated Visitor Authentication System (AVAS) monitors the Visitors entering the AAI staff premises. It is an automated and digitized solution to overcome traditional Visitor management using manual pen-and-paper based approach, along with adding some guaranteed security.

The unique feature of the system developed by us is that it also gives the Organization an Admin panel which makes it easier for data retrieval and its display from the database. Adding to the previous advantage, an optional Live video communication will increase the safety and the overall functionality of the system.

The system remains active at the entrance of AAI staff premises. AVAS provides a user-friendly Graphical User Interface (GUI) at the entrance, where the visitor needs to enter basic details and capture his/her photograph. The Visitor needs to select the respective AAI Officer whom the Visitor wants to visit. AVAS uses OpenCV, a python library, for processing the captured image and MySQL for storing it in the cloud database.
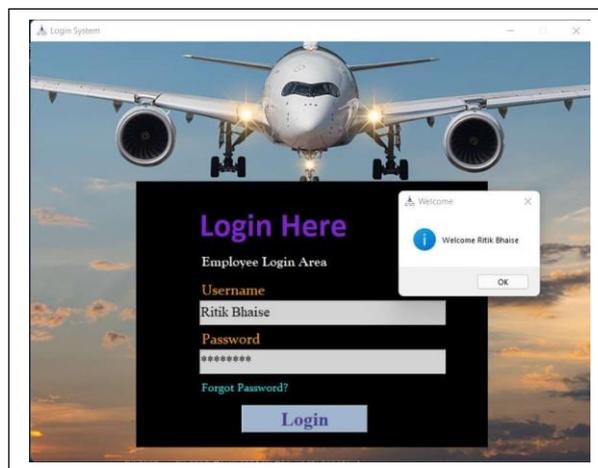

Figure 1. A screenshot of the login page for Officer

At the Officer's end, the Officer logs in to the system by entering a valid username and password. When the Visitor submits the request from the Visitor's end, the system notifies the Officer about the Visitor's arrival. AVAS displays all the details of the Visitor to the Officer along with a captured photograph in a separate GUI. The GUI includes buttons for accepting or declining the requests. On successful verification, the Officer accepts or rejects the Visitor's request which gets reflected at the request status on Visitor's end. The Visitor is then permitted or denied entry in the AAI premises based on the Officer's response.
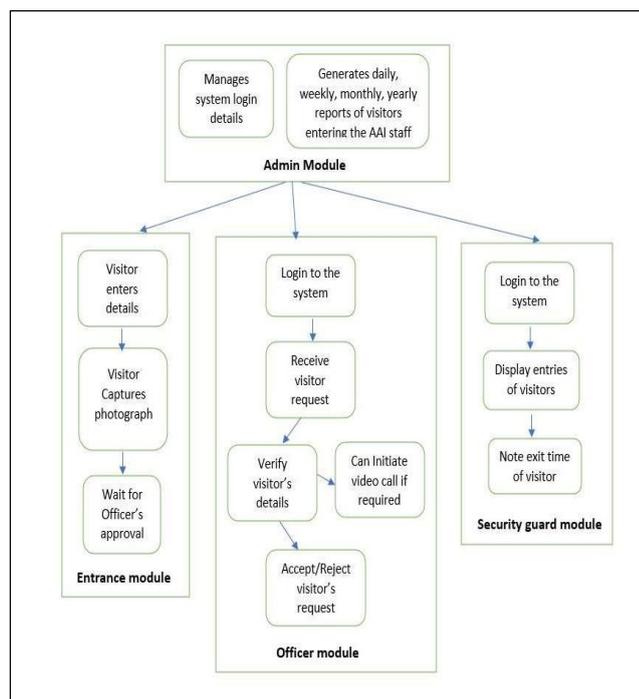

Figure 2. Functionalities of different modules

AVAS stores the complete details of the Visitor and the entry and exit time as well in the cloud database. AVAS uses MySQL and Amazon RDS to manage the contents of the database at the backend.

Entrance module –

The GUI as shown in fig. 3 will be running at the entrance gate of the premises at AAI. These details will be filled and sent by the Visitor to the respective Officer of AAI whose names are going to be present in either a drop-down list or will be taken through a text entry. And the GUI will wait for the response from the side of that respective Officer whom the request is sent.

Figure 3. Sample screen showing the details the Visitor will have to fill for sending the request

Officer module –

At the Officer side, the Officer will first have to login to the module using the login GUI, a sample is given in fig. 1. When the Officer is logged in, he/she will get the notification that a Visitor has arrived and requested for a meeting. It will also show the details of the Visitor and the purpose of the meeting as given by the Visitor.
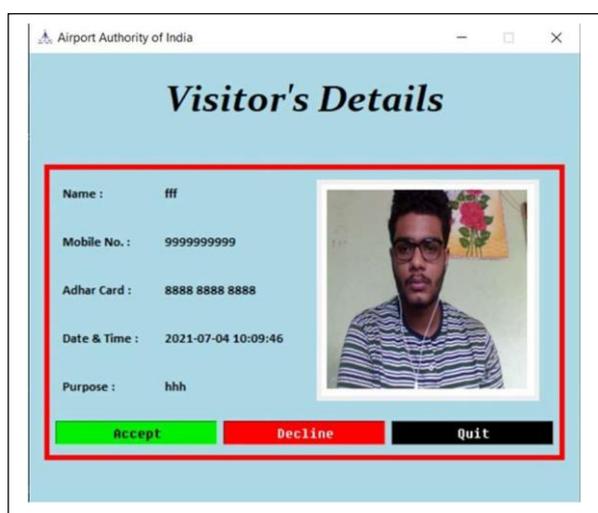

Figure 4. Sample screen of Officer showing arrived Visitor's details

The Officer will receive a request as shown in fig. 4 and after verifying the details the Officer at AAI can accept or decline it.

Video Communication Module –

If the AAI Officer wants to connect with the visitor through video call, the Officer can initiate a video call through AVAS. But this feature can only be activated by the Officer side, not from the Visitor side.
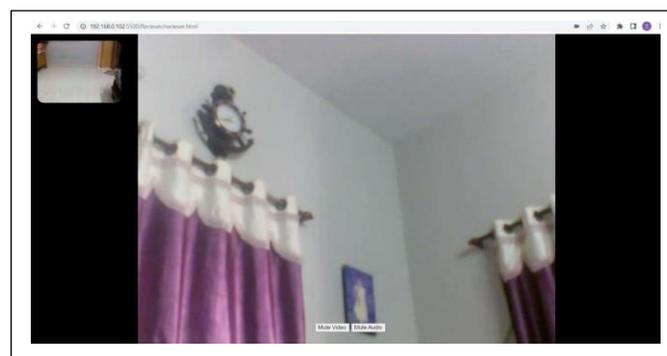
Visitor Screen
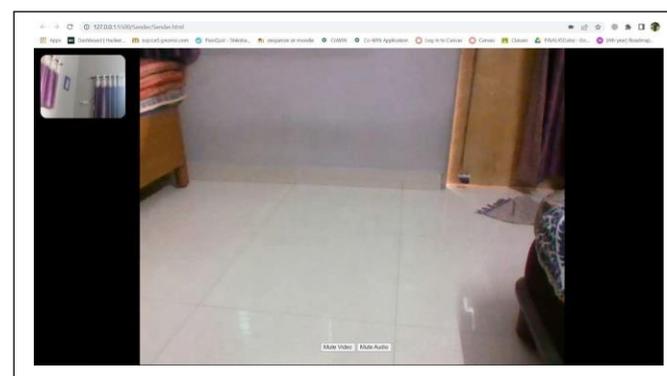
Officer Screen

Figure 5. Sample images of Live video communication between Officer and Visitor

The sample images in fig. 5. shows how the Live Video Communication Module (VCM) would look like. The VCM would work on any browser, here for the sample we have used the Google Chrome browser, but it can be switched as well depending on the Organizations software usage or requirement. The main code of the Live Video Communication Module (VCM) has been written in JavaScript.

Technical Terminologies:

Graphical User Interface (GUI): It provides an interface for the user to interact with the system.

OpenCV: OpenCV (Open-source Computer Vision) is a python library used for image processing.

MySQL: MySQL is an open-source relational database management system which is used for managing the contents of a relational database.

Amazon RDS: Amazon Relational Database Service is a fully managed, open-source database service provided by Amazon Web Services.

JavaScript: It is a programming language that is one of the core technologies of the World Wide Web, alongside HTML and CSS. Over 97% of websites use JavaScript on the client side for webpage behaviour, often incorporating third-party libraries.

Admin Panel –
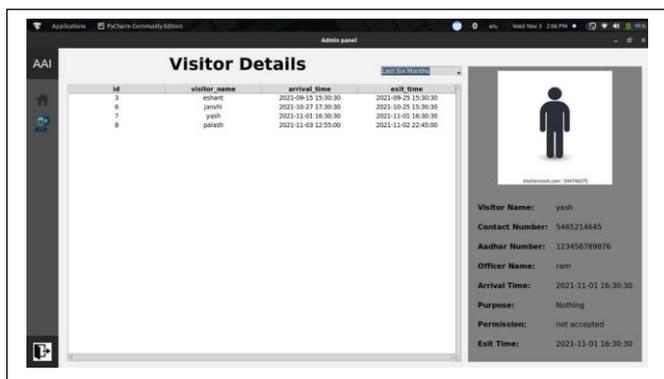
Figure 6. Admin Panel showing sample Visitor details

AVAS includes an admin module that manages login details. The admin module generates daily, weekly, monthly and annual reports of visitors entering the AAI staff premises. The system also includes security guard module that displays the entries of all visitors entering the premises in a tabular format and note the exit time of visitors.
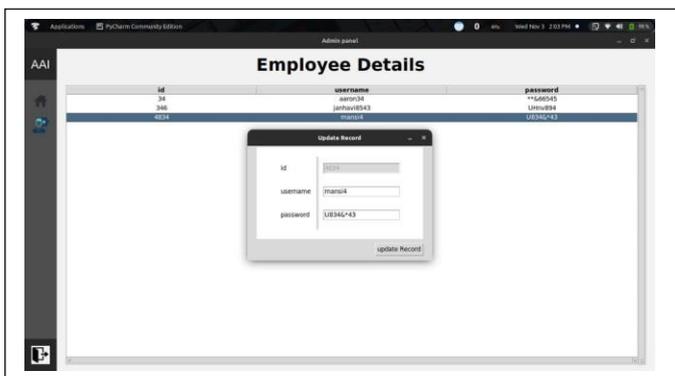
Figure 7. Admin Panel showing sample Employee details

V. REQUIREMENTS

Software Requirements – The basic software requirements for the successful use of this system are as follows –

1. An Operating System which has I/O facility.
2. A MySQL connection.

Hardware Requirements –

The minimum hardware requirements for this System to work are as follows –

1. A Network connection for the cloud services, or else a common local area network.

2. A Monitor and keyboard at the Visitor's end for viewing and entering the details which needs to be sent to the Officer for confirmation.
3. A video camera to capture the image of the Visitor.
4. A video camera, microphone and speaker facility at both the Visitor and Officer ends so that the live video communication module can work.

VI. ACKNOWLEDGEMENT

VII. CONCLUSION

AVAS is implemented to reduce the Organization's workload of paperwork at the entrance of the premises and advance the Organization towards a step of digitization and automation. The system uses Amazon Web Services Relational Database System (AWS-RDS) for the database to securely organize the data. In addition, AVAS provides a user-friendly interface with efficient and effective time-saving services to the AAI Officers and their Visitors. AVAS advances the safety and security of the Organization by systematically authenticating the Visitors.

Thus, AVAS proves to be a practical solution for growing Organizations (in terms of workplace and Visitors) like Airport Authority of India (AAI), Nagpur.

VIII. REFERENCES

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