Gate Pass Management System with Mobile App

Ramya D[1] Abhinav G[2] Roshan Dennis L[3] Jai Prakash M S[4]
[1,2,3,4]Department of Mechanical Engineering
[1,2,3,4]SNS College of Technology, Coimbatore, India

Abstract — This project is aimed at developing a Main Gate Pass Management System with Android Mobile Application. which can be used to monitor the persons who are entering into our college and what time they will leave from college, through this application. This is typically useful when a group of students, staff, office employee login with the help of QR code or Barcode. This application has guest login also, but they will provide additional information like Name, Mobile Number and Purpose of Visit. Admin Login has separate dashboard screen to manage users, view entry logs and change app settings, This system provides a complete centralized control for Entry logs, electronic circuit will connect via local Wi-Fi to send and receive data from the mobile app. Servo motor will connect with Main gate to make door automatically open and close with given interval of time by administrator. This is the most efficient mobile application and Gate Automation system for our college and other Large-Scale Concerns.

Keywords: Gate Pass Management System, Mobile App

I. INTRODUCTION

A. *The Problem Domain*

In all organizations, irrespective of their capacity, many movements take place every day at the gate level. It may be employees moving in or out, visitors entering the premises, movement of materials etc. All these movements occur at the organization’s premises, factories and companies needs to be monitored and controlled. This is where the concept of a gate pass comes into play. Gate pass can be used to authorize the movements of humans, materials and machines to or from the premises of the organization. It will help to monitor and track all the movements happening in an organization.

B. *The Problem*

Enhancing security at the gate level is essential in every organization, as the poor security of material existing and its movement, transit of employee during the working hours and visitors entering the premises could ruin the reputation of the whole organization. Keeping records of above processes should be standardized. The Gate Pass is an important document for this purpose.

Currently Sns Group operates and monitors this process manually. So, it will be great to implement an automated process for Gate Pass Management that aims to replace the manual process currently using. Because the manual system resulting a lot of inefficiency and unaccountability due to cumbersome and inaccurate record keeping with inconsistent maintenance of security about the movement of company material, employees and visitors in and out of the organization. Also, when there is a non-conformity related to material or the people who are moving through the gate, then there is no process to back track the details related to the respective incident.

Reviewed online software which are relevant to gate pass management. But no integrated software which covers material, employee and visitors available online. All the software covers these areas individually. But the customer requirement is a one solution which address all 3 areas, as the personnel available at the security desk is not well experienced on computer-based systems. When compared to other available systems, new system specifically addresses the process flow of customer and align with their manual process. So, it’ll be easy for the employees to get use to the system. The significant difference between the implementing system and other available systems is, once log into the system personnel available at security desk can manage all the procedures related to Gate Pass Management. This is very useful for them as they are busy with all general security processes.

C. *Motivation*

The security of the business depends on lot of factors and if it is less attentive, then might risk the security of the entire organization. To make sure that everything is under control, must implement right measures and this drives the organization towards a solution that takes care of the security at the gate. Gate Pass Management System enables the right security, where could keep a vigilant eye on the material movement, transit of employee during working hours and the visitors who are gain the access to the premises.

Can gain numerous advantages when gate pass system is implemented in an organization. The first and foremost being the restriction of unauthorized movement in organizations’ premises, and apart from this, the gate pass allows the organization to get a record of the time of movement and to track the person responsible for the movement. In the case of materials, gate pass prevents the unauthorized transactions.

The system improves the accuracy of data and eases the process of fetching data out of the system. The system cares the overall security of the organization while improving the discipline inside the organization. It also enhances the company image by incorporating with systems that are technologically sound. This gives a positive view for people who visit the organization. Once they experienced the methods that have been used by the company will increase their positive attitudes towards the organization.

“Digital is way better than the paperwork”, the main concept of the system is to enhance security process while reducing the involvement of human resources.

D. *Aims and Objectives*

Aim is to implement an integrated and user-friendly system which tracks all transactions of material, employee and visitors, which occurs through the gate.

Objectives which will increase the effectiveness of Gate Pass Management System is as follows:

- The main objective is to implement an automated system that will be used to manage Gate Pass for material, employees and visitors more accurately, with the aim of minimizing human intervention by replacing the current manual process.

- To improve the efficiency and accountability of security process by using an automated system.
- To improve the data management by making the link with respective departments and security desk.
- To establish a system which will align with other automated systems to increase the traceability and compliance of records, to the requirements of the organization.

E. Scope

This study focuses as stated, on the security of the organization. Here the material, employees and visitors considered, and this automated system follows a unique procedure to help maximize the security of above resources.

Material Gate Pass Management System will track material which are moving in or out of the organization. The loss of material can be reduced to the barest minimum through the usage of the system because it has a provision for supporting all steps involved in the transit of material, and the system will quickly tackle any issue.

For the material movement between the factory locations or from a factory location to a different location, as the first step it is required to make a request. The requests will be confirmed by an authorized person. The next step is the creation of Gate Pass by Finance Division based on the request. Then the Gate Pass will send to the approval stage, and this needs the consent of the employee, so the Gate Pass can be processed. The dispatch stage comes next and there the material is sent outside the organization along with the printed gate pass, by Security personnel. Final stage of the procedure is the return acceptance, returns could also include dispatched material which are returnable.

Employee Gate Pass Management System will track employees who are moving in and out of the organization during working hours. This is ideally laid out to give the best safety feature, solving all the security issues. Even though in and out time is tracked by the employee ID card there is no documented process to verify the acceptance of movement of the employee. This act as an Employee Self Service (ESS) facility.

Employees, who have ESS facility, can make a request to go outside during the working hours or to departure early through Employee Gate Pass Request. Employees, who don't have the ESS facility, must request through Human Resource (HR) department. HR department will generate an EGPR on behalf of the employee. The request will be reviewed and approved by an authorized person. The next step is the creation of Gate Pass by HR division based on the approved request. The departure stage comes next with the involvement of security desk. Departure is marked and the Gate Pass will be printed and issued by the security desk. Final stage of the procedure is the return acceptance; returns could also include people who did departure with a returnable gate pass.

Visitor Gate Pass Management System has always been the best security feature that has been utilized to track visitors who visit to the organization premises for the official purpose. This system allows keeping track of all the individuals who entered and exit the premises and can trace all the details according to the date, time and purpose.

First the employee from respective division would beforehand put a request for the attendance of visitor(s) who comes with prior notice. The requests will be confirmed by an authorized person, and it will convert to a Visitor Gate Pass. When visitor arrives at the gate, the security desk will acquire the information from the visitor and will cross check with the details entered in the system. After conforming, the security desk will issue a printed Gate Pass for the visitor. After visiting the respective employee, visitor will take the belongings from the security desk; will report at the gate for exit. Security desk will update the system accordingly after the visitor signed off the gate pass.

Visitors, who come without prior notice, will inform security desk about the person he/she needs to meet. Security desk informs the responsible employee and verify the details of visitor through telecommunication. Once the visitor is verified, security desk informs employee to meet the visitor at the visitors' room. The required records will be maintained in the Visitors' Room Log form. If the visitor needs to visit the organization premises, then security desk asks relevant employee to generate Gate Pass as per above procedure.

The Project 'Gate-pass Management System' is to record the details and various activities of the user. It simplifies the task and reduces the paperwork. In this project, we are reducing the paperwork which is done by giving the paper gate pass. We are providing the electronic version of the paper gate pass. We provide appropriate training to the user which suit their specific support has been provided at key points within the academic calendar. Admin is monitoring all the user and system. In this project, the only faculty is approving the user gate application if they want to allow student then gate pass system is a pop-up on the guard system database. Training has been provided timely basis and they got trained as the Gate pass System is new and rolled out to their area of responsibility. Now we are in the very early stages, so it is difficult to put a specific time on the training, but we will keep people informed as plans are developed. The system is very user-friendly, and it is anticipated that functions of the system are easily accessed by Administrators, Faculties, Students, and Guest.

GMS provides an easy method for the front desk officer to search the ongoing visitor of the day. They will be timely notified of the current visitor visiting their department. Searching method is also faster and the system will give output that user needs. Currently, most organization is using the named method in keeping track all the incoming and outgoing visitor records in each of the department. Problem raised when at curtain point of time the number of visitors visiting the department increasing and unable to manage and messed up. On top of that, a security issue also is the main issues in generating visitor pass in that organization. GMS also helps user access information inquiry faster. Compared to the manually system, user need to go page by page to search information. Imagine there was hundreds of visitors coming in and out. However, with the new system, user only need to search via card number and as a result, the system will display related output that been entered by the user earlier. Problem such as waiting for a long-time queue will be no more an problem and will give an impression of well-organized system.

II. METHODOLOGY

A. MVC Architectural Pattern

The fundamental methodology of the function is to construct an MVC Architectural knee-jerk reaction that separates a review into three main coherent components: the model, the view, and the controller. Each of these components is built to manage specific knowledge aspects of an application. MVC is much of the closely frequently secondhand industry standard web lifestyle framework to entwine scalable and extensible projects. Model The Model principle corresponds to en masse the data related signification that the user all of it with. This can describe either the message that is for transfer during the View and Controller components or whole other trade logic related data. For concrete illustration, a customer challenges the status quo will protect the customer reference from the database, prompt it and show the lay of the land it data strengthen to the database or manage it to perfect data. View The View coal and ice is second hand, for the most part, the UI heart of the application.

For lesson, the Customer regard will include bodily the UI components a well-known as matter in hand boxes, dropdowns, etc. that the indisputable user interacts with. Controller Controllers clear as an interface during Model and View components to process en masse the engagement in activity application logic and incoming requests, bias data by the Model element and interact by all of the Views to confirm the ironclad output. For concrete illustration, the Customer controller will manage all the interactions and inputs from the Customer View and prepare the database for the Customer Model. The cognate controller will hand me down to regard the Customer data.

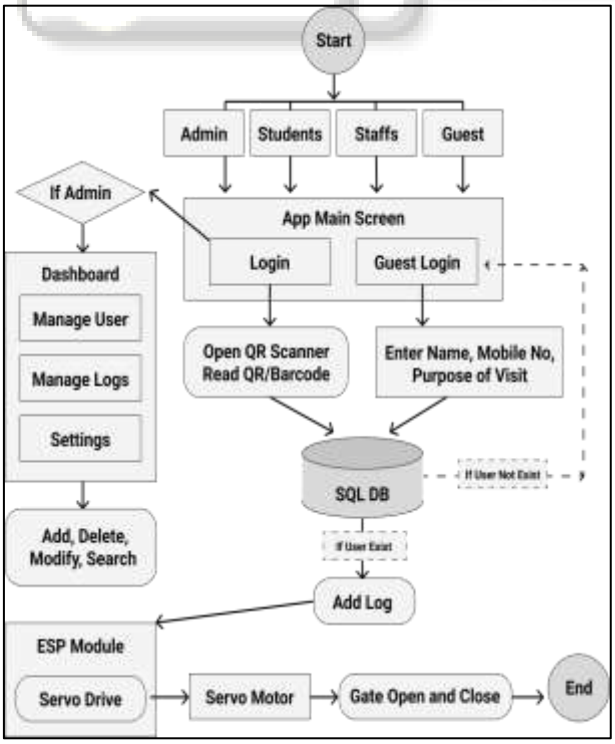

Fig. 1: Methodology

B. Main Features

1) User Login without any Reason
2) Guest Login Available with Reason
3) IN and OUT Time log for each user login
4) QR and Bar code Scanner Option
5) Scanner Auto Close When idle for 3 sec (to save battery power)
6) Electronic Circuit Locally Connected via Wi-Fi
7) Main gate model open when user get access.
8) Admin login has more option in same app.
   – Add Users Screen
   – User List Screen
   – Search User
   – Delete User
   – Enable / Disable Guest Login
   – Change Time Interval For Gate Open and Close Duration
   – View logs
   – Clear Log list
   – Search Option for Log

III. HARDWARE REQUIREMENTS:

A. ESP 32

The ESP32 is a very versatile System on a Chip (SoC) that can be used as a general-purpose microcontroller with quite an extensive set of peripherals including Wi-Fi and Bluetooth wireless capabilities.

It is manufactured by Shanghai-based Espress if Systems, and costs less than $5. Although the ESP32 is a SoC, most users will not start by using just the ESP32 chip itself.

Fig. 2: Actual ESP32 SoC

While it is possible to design a product using the ESP32 SoC, this is not a common approach. Instead, most ESP32-based designs use pre-made modules that consist of an actual ESP-32 SoC, external flash memory, and a crystal and pre-tuned PCB antenna or an IPEX antenna connector.

One big advantage to using this module instead of designing from scratch is that Espressif has already pre-loaded the low-level device drivers, the wireless protocol stacks for Wi-Fi b, g, n, Bluetooth and BLE, and FreeRTOS as the base OS.

In addition, a bootloader has also been loaded to allow for relatively easy downloading of user applications.

Fig. 3: ESP32 Wroom-32 Module

Another module commonly referred to as an ESP32 is what is more appropriately called an ESP32 Development Module. This is basically an ESP32 module mounted on a board with additional support circuitry such as a voltage regulator and a serial to USB IC.

It allows direct connection to a desktop PC that can then be used to compile, download, and run programs directly on this module. Figure 3 shows two such development modules from different manufacturers.

Note that one has more of the pins of the ESP module available than the other one and is slightly more expensive. Otherwise, they are very similar. They each allow a direct connection to a desktop development system through a USB cable.

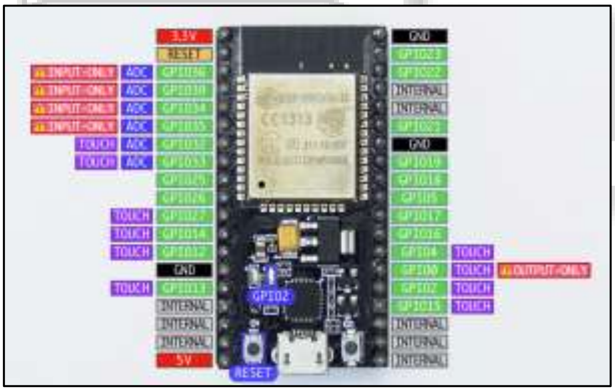

Fig. 4: ESP32 Pin Diagram

B. Servo Motor

A servomotor is a linear actuator or rotary actuator that allows for precise control of linear or angular position, acceleration, and velocity. It consists of a motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.

Fig. 5: Servo Motor

C. Servo Motor Theory

There are some special types of applications of an electric motor where the rotation of the motor is required for just a certain angle. For these applications, we require some special types of motor with some special arrangement which makes the motor rotate a certain angle for a given electrical input (signal). For this purpose, servo motor comes into the picture.

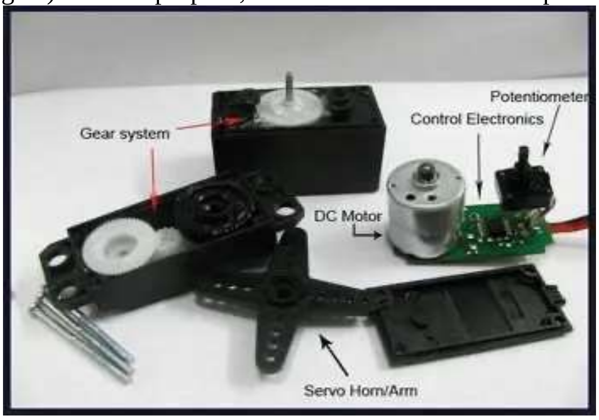

Fig. 6: Servo Motor Components

The servo motor is usually a simple DC motor controlled for specific angular rotation with the help of additional servomechanism (a typical closed-loop feedback control system). Nowadays, servo systems are used widely in industrial applications.

Servo motor applications are also commonly seen in remote-controlled toy cars for controlling the direction of motion, and it is also very widely used as the motor which moves the tray of a CD or DVD player. Besides these, there are hundreds of servo motor applications we see in our daily life.

The main reason behind using a servo is that it provides angular precision, i.e. it will only rotate as much we want and then stop and wait for the next signal to take further action. The servo motor is unlike a standard electric motor which starts turning as when we apply power to it, and the rotation continues until we switch off the power. We cannot control the rotational progress of electrical motor, but we can only control the speed of rotation and can turn it ON and OFF. Small servo motors are included many beginner Arduino starter kits, as they are easy to operate as part of a small electronics projects.

IV. SOFTWARE REQUIREMENTS:

A. Arduino IDE

The Arduino IDE is an open-source software, which is used to write and upload code to the Arduino boards. The IDE application is suitable for different operating systems such as Windows, Mac OS X, and Linux. It supports the programming languages C and C++. Here, IDE stands for Integrated Development Environment.

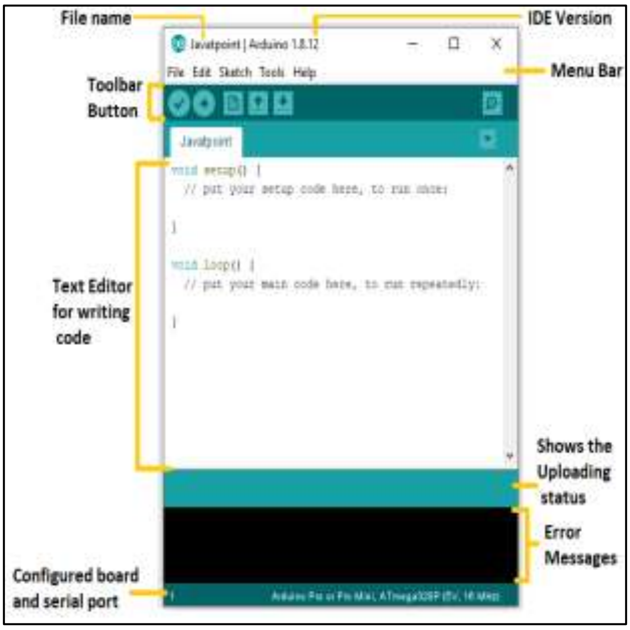

Fig. 7: Arduino IDE

The program or code written in the Arduino IDE is often called as sketching. We need to connect the Genuino and Arduino board with the IDE to upload the sketch written in the Arduino IDE software. The sketch is saved with the extension '.ino.'

B. *Android IDE*

Android Studio is the official integrated development environment (IDE) for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development. It is available for download on Windows, macOS and Linux based operating systems. It is a replacement for the Eclipse Android Development Tools (E-ADT) as the primary IDE for native Android application development.

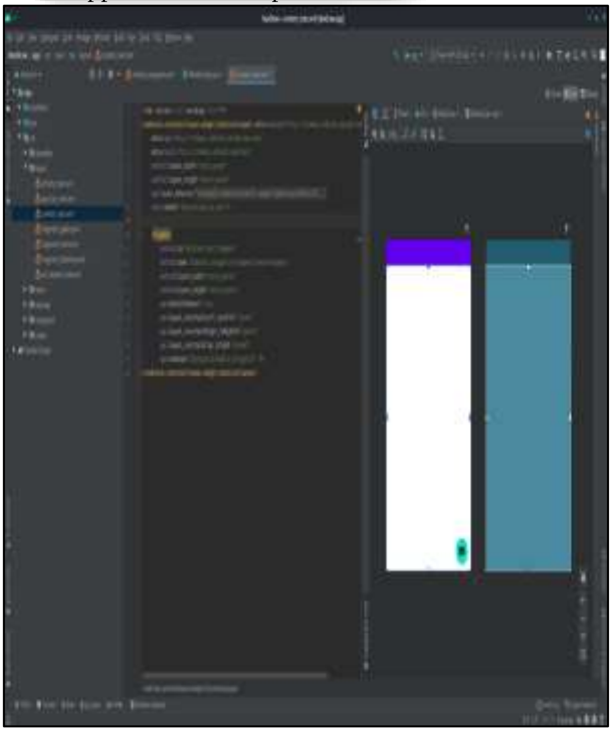

Fig. 8: Android Studio

Android Studio was announced on May 16, 2013, at the Google I/O conference. It was in early access preview stage starting from version 0.1 in May 2013, then entered beta stage starting from version 0.8 which was released in June 2014. The first stable build was released in December 2014, starting from version 1.0. At the end of 2015, Google dropped support for Eclipse ADT, making Android Studio the only officially supported IDE for Android development. [On May 7, 2019, Kotlin replaced Java as Google's preferred language for Android app development. Java is still supported, as is C++.

C. *Database- SQLlite*

SQL Server is a client/server database system. The server runs the SQL Server database software, which processes requests submitted separately database shopper software and sends the results to uphold to the client. The SQL Executive and the SQL Server Database Engine business are examples of database services performed by SQL Server. The SQL Server software is arranged in infinite layers. The NetLibrary protect, which accepts connections from clients, hides the combine connectivity schedule when a shopper communicates by all of a server one after the other SQL Server. Net-Libraries evaluate inter practice communication (IPC) mechanisms one as referred to pipes, quiet procedure calls (RPCs) and Windows Sockets. Several Net-Libraries are included mutually SQL Server for both the server and the client. Net-Libraries on server beware of client banding together attempts.

V. EXISTING SYSTEM

Currently, in many organizations and companies Gate entry is controlled by two main gates. Guest access by car requires a gate pass form signed and faxed to the Organization Security office by the inviting person. This is not an efficient way, and the reasons are pretty simple. In some organizations, even in this modern era Gateman/ Guard using registers to the entry about person or vehicle.

This means, no authentication is done by Guard, and which results in many misses happening.

A. *The problem with the current system:*

Any fax owner worldwide can issue a gate pass. Which results in undesired people or vehicle entry in companies' premises.

There is no control over the guest's arrival. Anyone willing to enter can enter the company. It may be possible some criminals may enter and park their vehicle in the company parking area and police start asking a question to guard and they are helpless.

There is no way of knowing who and when and by who was invited. Regarding in register does not mean that information is true. There is no authentication process.

The project in the topic will replace the current tax policy and register entry with a sophisticated Intranet system to overcome the above problems. Noting data in the register is very laborious works as well as time-consuming.

But New Gate Pass System replaces the existing system and makes the process faster.

VI. LITERATURE SURVEY

1) The Gate-Pass Management system by applying the model of UTAUT was discussed by Norizan Anwar, Mohamad Noorman Masrek, Yanty Rahayu Rambli in year 2012. They proposed the system by adopting technology model (UTAUT) to determine the user acceptance of visitor application system. The main motto of this system was Handling your visitor at your fingertips.
2) Another system for Visitor Pass was discussed in the paper by Prof. Abhay Gaidhani, Suraj Sahijwani, Parag Jain, Shantanu Jadhav, Ankush Jain in year 2015. This paper aims to develop a system for Gate pass using Raspberry Pi. The main aim was to save paper with the help of Internet Connectivity to send SMS and Email for verification of user.
3) Digital Visitor Information Management System (VIMS) Application and Design. This application enables capturing new visiting record by auto-clock in/out, and assignment of visitor pass. Visitor information are recorded in a centralized database server, which provides data management and manipulation through searching and report generating. E-VIMS able to record visitor information during visitor registration by using visitors Malaysia Government Multipurpose Card (MyKad)
4) On the other hand, the decision to develop a visitor system may depend on the needs of an organization so in this review paper we have discussed a Visitor Gate Pass Management System to enhance level of security and manage visitor in any Organization`

VII. PROBLEM STATEMENT

The smart phone becomes important equipment to the organization to store the data and to process the data for any purpose. It also can be used to access and process any data and information needed easily and less in time. Therefore, it is hope that GMS application system able to solve the problem.

VIII. APPLICATION OF GMS

All interdepartmental interfaces will have proper authentication and authorization to act upon the data made available to them. The login will be through secure sessions and over secure HTTPS protocol.

A. Major Modules:

1) Administration Module:

This module is normally used by the administrators at different departments who deal with the administrative work of guests on behalf of the host. This web application helps the department representatives to register the expected visitor, process the visit, and pass on the information to security. Security and debt. can view the reports of the visitors for the date range.

The dept. the administrator can fill in secondary data for the visitor and generate reports and initiate other interdepartmental communication for coordinating/facilitating arrangements.

2) Security Gate Module:

The Security Gate module facilitates the admin staff at the security gate to register the visitor's arrival with a time log. The system can take in secondary real-time data about the visitor, his co-visitors, and belongings. Check-in and This interface Module process check-out.

3) Advantages:

There are many advantages of the Gate Pass Management System. This online system helps the service-providing company to manage their Gate Pass remotely. Guards are finding everything about Gate Pass with few clicks. The new system is a totally computerized system.

4) User Satisfaction Level:

This offline system gives each and every service to visitors Gate Pass just by giving some information.

5) Time efficiency:

A new system provides features like time efficiency to show Gate Pass, Guards details etc.

6) Various type of Service:

This system provides view Gate Pass, Person details, vehicle details just after few click.

7) Easy Inquiry:

An inquiry is easily done by the user in the system. The inquiry is basically an automated and computerized task which really makes the inquiry process faster than previous. About Gate Pass-related query.

8) Real Time Tracking

Every action in the gate pass workflow takes place in real-time. Track the live movements of each material in the gate pass process at multiple branches & locations.

9) Future Enhancement of GMS

In near future, we are planning to use more sensors to automate the process of gate pass. Which will help to make the process less time-consuming.

We are planning to add a new feature i.e. to get a gate pass instantly.

We are working to increase automation in the system to increase user experience greatly.

IX. CONCLUSION

By using GMS, the organizations have an option in increasing the level of security enforced in their premises. GMS enables free, secured, fast and easy visitor registration.

1) _ Computerized records give better management and manipulation of data, through searching and report generation.
2) _ Its installation is easy and hence does not require professionals for the same.
3) _ The GMS system is easy to maintain and use.
4) _ It gives reliable and efficient security protection on which one can rely.
5) _ Unauthenticated and unwanted users cannot enter the commercial space.
6) _ QR Scan functions can be coupled with the existing system to gain extra security.

Hence, we can conclude that this system would prove to be an efficient system to obtain a Gate Pass in any organization. Using this system the usage of paper decreases drastically, and gate pass can be obtained through NFC card that proves to be more secure and easy process which also saves time in obtaining gate pass and thus makes procedure easy.

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