

Bluetooth based Authentication System

Kishor T. Mane

Asst. Professor, Dept. of Info. Tech.
D. Y. Patil college of Engg. & Tech.
Kolhapur, Maharashtra, India

Vandana G. Pujari

ME (E&TC) Student,
D. Y. Patil College of Engg. & Tech,
Kolhapur, Maharashtra, India

ABSTRACT

In this information technology era, enterprise needs the automation of every system get the competitive advantage and multidimensional growth of the business. For this every enterprise need to observe the incoming and outgoing time of every employee and to stop the entry of unauthorized persons. For this many automated and manual systems are available like smart card, RFID, manual ID card, thumb impression techniques, etc. Every technique has its advantages and disadvantages. But the biggest problems with these system is that employees have to carry a number of electronic devices (PDA, Mobile Phone, Smart card, Library card, ATM Card, Credit Card etc) with them for different purposes. Carrying many e-devices/e-cards is not comfortable for a person. To reduce the number of e-devices one has to carry, many IT companies are working towards integration.

The purpose of this paper is to integrate the authentication process at the time of entry and exit of employee using mobile phones with the support of Bluetooth Ad-Hoc network.

Keywords

Bluetooth, Ad-Hoc network, RFID, Authentication System.

1. INTRODUCTION

In all the IT industry's information security is concerned with the assurance of confidentiality, integrity and availability of information in all forms. There are many tools and techniques that can support the management of information security to get the competitive advantage and multidimensional growth of the business [1]. For this reason every enterprise needs many automated and manual systems like smart card, RFID, manual ID card, thumb impression techniques, etc. to observe the incoming and outgoing time of every employee and to stop the entry of unauthorized persons, search for employee. But these techniques are very time consuming. So there is a need for some advanced techniques. Instead of maintaining many devices for authentication purpose it is possible to integrate the authentication process at the time of entry and exit of employee with mobile phones with the support of Bluetooth Ad-Hoc network. Ad hoc networks are a new wireless networking paradigm for mobile hosts [6]. Unlike traditional mobile wireless networks, ad hoc networks do not rely on any fixed infrastructure. Instead, hosts rely on each other to keep the network connected. Bluetooth is a proprietary open wireless technology standard for exchanging data over short distances.

Today the cost of Bluetooth enabled mobile is very cheap. It means mobile phone can be used as an ID card for the purpose of authentication.

The main purpose of this system is to reduce the money spent on check in check out by organizations and provide them better, secure multi-purpose system. It also helps organization to get current and past location of person in the organizations premises, which help organization to keep watch on his employees and guests.

2. LITERATURE REVIEW

In the IT industry many systems are exists for authentication like ID card, Smart Card, Bar code, Bio-metric system with Thumb Impression, Face recognition and so on. In ID card based system user have an ID card with name and other information about the candidate with the authorized signature. At the time of authentication the security man at the entry of the organization verifies information of the ID card manually. There are also many systems based on the technology like bar code [11] and biometric technology [12]. In biometric security system some techniques like face recognition, thumb impression are used. But all the technologies have its own advantage and disadvantages. The purchase cost and operating cost of all these technologies are very high. It requires lot of time to check the authenticity of person.

Due to these disadvantages there is a need of new system which done the registration automatically with the mobile Bluetooth service whenever person enters inside the organization premise. It also needs to take logs of the person location and movement for security purpose with the help of wireless Ad-hoc network based on Bluetooth.

3. SYSTEM ARCHITECTURE

The present work is focus on design and implementing new system which used to authenticate the person at entry and exit and also track the movement of that user inside the organization by setting Bluetooth based wireless Ad-hoc network and with the use of mobile phone. The architecture of this system is shown in fig. 1.

The design and development of these system is divided into three modules as –

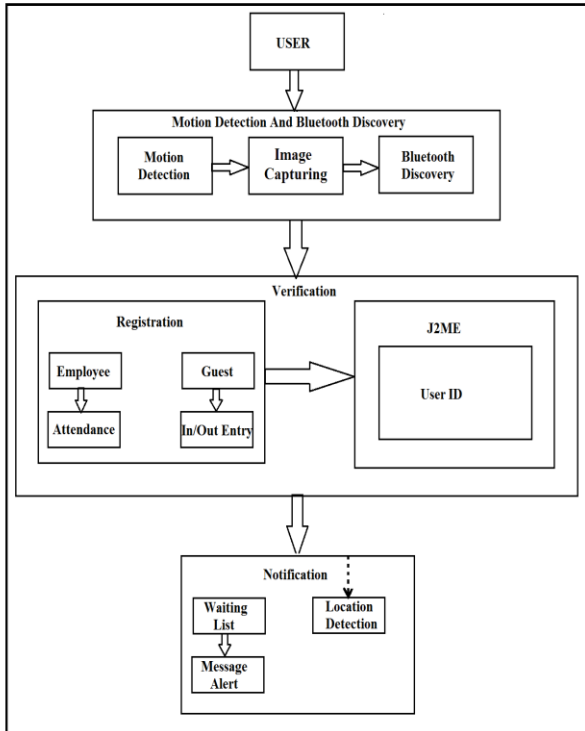


Fig 1: System Architecture

3.1 Motion Detection and Bluetooth Discovery

The process of detection of person motion and capture the image of the person is shown in fig. 2.

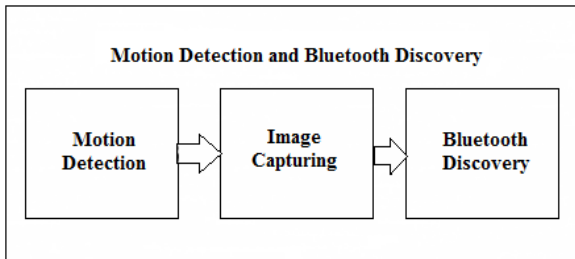


Fig. 2 Motion detection and Bluetooth discovery

In this module, when user enters in the organization, the camera detects the motion of person and then system will start searching the Bluetooth device in the range. The simplest implementation of motion detection is image subtraction. In this method, each image has the previous image in the image sequence subtracted from it, pixel by pixel. This is an approximation of the temporal derivative of the sequence. The absolute value of this approximation is taken and threshold at a suitable level to segment the image into static and dynamic regions. When motion detected it captures the image and searching for Bluetooth device is started. The captured images are stored. There are three types of alarm will be generated as follows:

1. Motion detected but no Bluetooth device found; the people entering are advised to turn on the Bluetooth.

2. The found Bluetooth device is unregistered and registration will be done.

3. The person is registered and he allowed entering into organization.

3.2 Verification

In this module the verification process has been done as shown in fig.3.

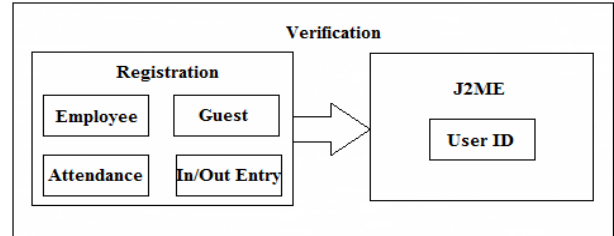


Fig: 3 Verification Module

In this if the person is unregistered then his/her registration will be done. There are two types of person, employee and guest. The complete information of employee/guest is filled and stored in the database. The information contains name, address, phone number, Bluetooth address, joining date, registration date and photo of employee. Same information filled up for guest, except there is no joining date for him. With the help of J2ME application that person can send his user ID to entry server to verify and confirm his entry to the organization. If an employee fails to send his user ID then his attendance will not be considered and do not allow that person to enter into the organization.

3.3 Notification

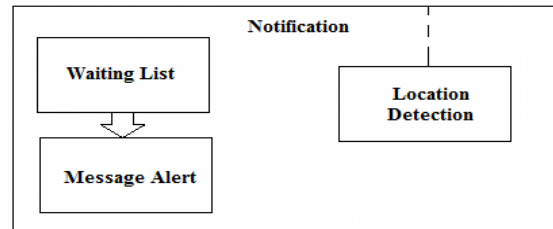


Fig: 4 Notification Module

In this module, authorized person can find the location of all the people in the organization campus as shown in fig 4. He also gets the information of all people passing from his machines Bluetooth range. When any person passes from authorized persons cabin then camera detect the motion of person and Bluetooth searching started. The list of all people passing through authorized person cabin is displayed. In this system log is generated, which displays route of all the people entered in the organization. List shows name of the person, his Bluetooth id, and the laptop address, also his time when person enters into laptops range and exit time.

The waiting list application runs on every authorized person node. This application is periodically checks for the Bluetooth devices in its range. As the Bluetooth device is found it adds one count. Every time it finds the device, the count is incremented. After it reaches five counts, the application adds that Bluetooth device in waiting list of that authorized person. The node then takes username and Bluetooth ID and store in one temporary table. When that

table reaches certain limit of users, node packs that value into the message and then sends them on authorized person mobile device.

4. IMPLEMENTATION

The J2ME application is build using NetBeans and it is installed on every employee's mobile handset. The wireless ad-hoc network is formed by connecting the different devices using the Bluetooth. The high resolution camera has been attached to take pictures of the person.

The implementation snapshots for the system are shown in the fig. 5 and fig. 6.

In Fig. 5 administrator can capture the image for matching it with the image that is already stored in database. In Fig. 6 the logs are generated which shows device name, person name, entry time, exit time, Bluetooth ID to track the person activities and location.

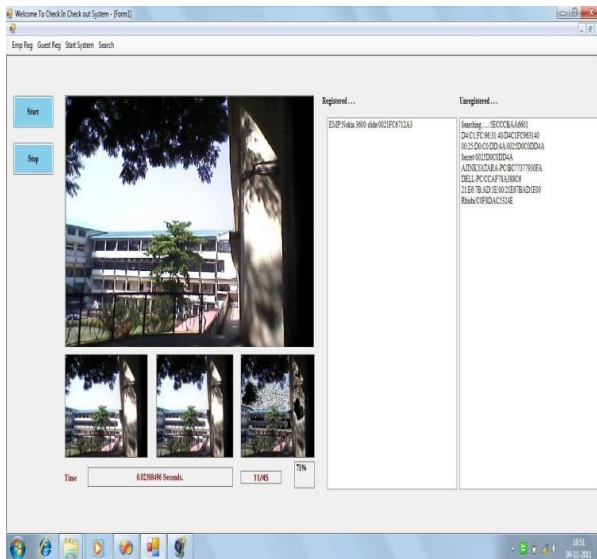


Fig. 5 Capturing image of person

5. RESULTS

The results obtained so far can be summarized as follows,

1. The system maintenance cost is low and it is easy to use.
2. It is implementing within the available infrastructure.
3. Performance of system is directly proportional to Bluetooth speed.

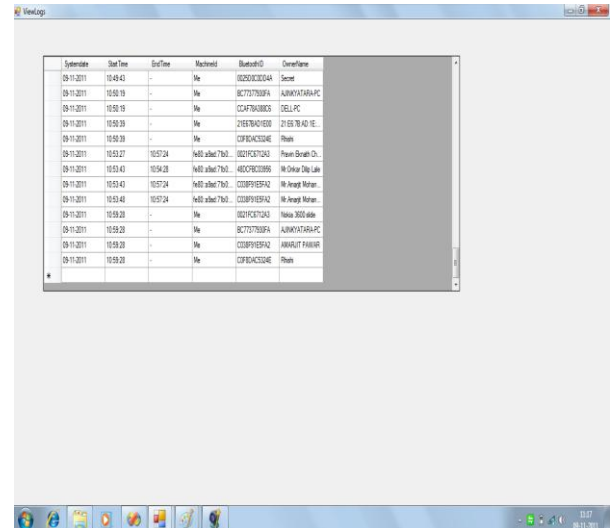


Fig. 6 Tracing location by logs

6. CONCLUSION

This system is very useful for organizations and enterprise requiring check in check out for every person. If the government changes or reengineers the working and security policies, the system may be changed very easily. It is capable of tracking a person at campus wide level. The software may become very useful for military application in terrorism control. This system can be made more reliable and secure by integration with biometric system.

7. REFERENCES

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