RFID Based Smart Attendance Monitoring System with Face Recognition

Priyanka Dharan¹, S. Ragunathan², A. Rahul³, R. Mythili⁴
Student¹, ², ³, Assistant Professor⁴
SRM Institute of Science and Technology, India

Abstract:
Low cost simple attendance system, which is used in the police investigation and nursing entrance, can miscalculate the candidate’s attendance detail to generate report. Our proposed work is mainly focused on the authenticity of attendance-based RFID system with the help of face recognition system. The data of the attendance collected are being stored in the database in a timely manner. The proposed work describes managing the system action in a group which can be used at skilled gatherings of various varieties such as conferences, exhibitions, training courses, etc. The project is the combined work of the RFID tag with face recognition system. The face recognition system is based upon using discriminating robust local binary pattern and local directional pattern descriptors. It involves face detection, Features extraction and matching. Viola Jones algorithm is used for the face recognition system.

I. INTRODUCTION

Attendance management is a significant aspect within every organization that has its candidates as their primary asset and it is responsible for the organization to keep track of their candidate’s attendance and activities. The existing system is a simple and low-cost infrared combine of a transmitter and receiver. It is placed at Associate in nursing entrance or may be used in police investigation and numeration attendees coming into the premise and leaving it. But the downside of that type of system is that it can’t be said clearly whether the candidate is present or not, there will be miscalculation for candidate attendance details and generating report for attendance system like MS Excel cannot be done. The proposed work is based on giving attendance using RFID tag and FACE recognition system. The data of the attendance collected are being stored in the database in a timely manner. The work describes managing the system action in a group which can be used at skilled gatherings of various varieties such as conferences, exhibitions, training courses, etc and with the use of face recognition using discriminative robust local binary pattern and local directional pattern descriptors. Based on the Viola-Jones algorithm the face detection is to detect faces using vision toolbox. It’s even capable of collecting, recording and processing data on the students of a technical gathering. Their activities can invoke combined detail record on the group action of the individuals throughout the event and their most and least general interests and activities. A DRLDP operator works out the keen response values in all the eight directions at the pixel positions and set up the code from the relative strength magnitude. These features are useful to discern the maximum number of samples in an accurate way and it can be matched with the already stored image samples for identifying the member. Passing the entrance from both the directions of the entrance must be sensed, the data should be stored in the database where it can be progressed in a meaningful form such as an MS Excel, CSV files.

II. SYSTEM DESIGN

The authenticated attendance-based system is completed by using RFID tag by equipping the cell phone with a low-power RFID Reader and tagging the owner with a passive RFID token and the face recognition system is based upon using discriminative robust local binary pattern and local directional pattern descriptors. During the system design we faced the following challenges:

1) Reader Design: Bare-metal firmware design for EPC-C1G2 protocol in ARM-based MCU along with its APIs. Hardware design for a computational and energy productive solution.
2) Practical Realization: Relieve false alarms through a two-fold probing scheme for a low-computational and real-time solution.

The proposed work is primarily based on the application design and hence we will brief about the reader design and mainly concentrate on the challenges faced in the resolution of an anti-lost solution in two aspects:
1) Multipath, non-coherent receiver device and body shadowing are used to mend false alarm.
2) In terms of cost, memory, power consumption and computation in discovering optimized android system.

The system design is prepared by using the following components such as the reader module, tag preparation and accelerometer threshold.

READER MODULE:
The reader module contains the design that makes use of TSSI (transmit signal strength indication) feature of the power amplifier itself for calibration. The design includes the processor (microcontroller unit), transmitter and receiver units.

Figure.1. reader module, referenced by https://electrotrick.wordpress.com

http://ijesc.org/
TAG PREPARATION:
The work comes under Off-body Communication in which a tag is pasted on human body and its performance is evaluated through external RFID Reader. As human body is lossy and conducting in nature, electromagnetic emissions are scattered and absorbed depending upon body properties of the candidates.

ACCELEROMETER THRESHOLD:
As cell phone motion can be in combination of x, y, z axis, we calculate Euclidean distance between three motion vectors to find the threshold $P$. We perform ten experiments involving five volunteers. At each sampling time $t$, we use three motion values to measure the Euclidean Norm or Euclidean length, $d_t = (x_t, y_t, z_t)$. The threshold is given by averaging $d_t$ from all five volunteers for ten experiments ($N=10$) as

$$D_{avg}(t) = \frac{1}{N} \sum_{i=1}^{N} ||d_i|| = \frac{1}{N} \sum_{i=1}^{N} \sum_{t=1}^{T} (x_{it}^2 + y_{it}^2 + z_{it}^2)$$

III. FACE RECOGNITION SYSTEM

The modules used in the face recognition system are face detection and matching.

FACE DETECTION:
To detect the face from the candidate the MATLAB vision toolbox is utilized along with the Viola-Jones algorithm. The face boundary vector $[X \text{ min}, Y \text{ min}, \text{Width and Height}]$ is used for texture analysis where the desired regions are cropped off. LDP, known as the Local Directional Pattern, takes the help of the kirsch templates for the local block in all eight orientations to determine edge details where it is converted into binary codes so that it can generate directional pattern.

MATCHING:
Using the Euclidean distance metric the query image features will be matched to the database image features so that verification of the candidate is done. It is defined by

$$Ed = \sqrt{\sum (Q - D_i)^2}$$

Where,
- $Q$ – Input image features
- $D$ – Data base features
- $i$ – Number of samples in database 1 to $N$

WORKING:
The proposed work is based on the combination of the RFID tag and face recognition system. The RFID system consists of the Arduino, reader, tag, and database. The tag consists of the Arduino and the reader where the information of the students is collected and stored in the database of the system. It also has a link to the mobile phone where the students’ details are shown. In case the student tries to put the proxy for the friends it will get recorded by the face recognition system. In the face recognition system, all the features of the students are detected and are crossed referenced with the sample data that has been already updated into the system. The RFID tag is not only used in the attendance checking and alerting the system but also saves up the activities of the student throughout and all the data and information gets stored in the database.
IV. CONCLUSION

The system consists of a smart phone equipped with a low-power RFID Reader that examines a body-worn passive tag. The variability of the power received by the tag analyses in presence of obstacles and other people under various factors like body shadowing, non-coherent receiver design and multipaths. Motivated by our current investigation, we propose that low power SOC RFID chips may be incorporated in the smart phones for a proximity absence scheme. The function of the cell phone is a low-cost mobile RFID terminal. Moreover, the appealing results of current design show that our system can be referenced for academic learning and further experimentation on RFID-based communications.

V. REFERENCES


