

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 2, February 2017

## Automatic Attendance Marking, Attention and Facial Expression Analysis System Using IoT

Piyush Patil<sup>1</sup>, Vivek Sachapara<sup>2</sup>

Student, Dept. of Computer Engineering, SIT, Lonavala, Maharashtra, India <sup>1,2</sup>

**ABSTRACT:** In the new era of technology, IoT Provides the capability to solve real life problems .Current attendance marking methods are monotonous & time consuming .The student in the class may be present physically but not fully attentive so it is also necessary to monitor attentiveness .Our System Proposes an efficient Solution for Current Attendance marking ,Attention and Facial Expression Analysis With the help of new technology that is based on Embedded Linux board named Raspberry Pi .Face Recognition is a biometric method of identifying an individual by comparing live capture or digital image data with the stored record for that person .Our proposed system captures the image of student which will be stored on cloud or central server. After that photos on cloud / Central server gets analysed with the help of Face Recognition API.

**KEYWORDS:** IOT , API , Face Recognition , Image Processing , Raspberry Pi , Cloud Server.

### I. INTRODUCTION

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines , objects, animals or people that are provided with unique identifiers .IoT provides the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction .In Manual attendance system ,chances of accidentally switching details are high. Reporting and Checking attendance data manually is inefficient and expensive .If manual system contains errors or need updating, then it becomes very difficult to make corrections.

Face is a vital part of human body which is unique .Face can be recognized using various Face recognition Techniques. Face Recognition is a biometric method of identifying an individual by comparing live capture or digital image data with the stored record for that person. Our Proposed System takes the picture of students using raspberry pi camera module which is fixed in the classroom. Then, that picture which is stored on cloud or central computer is analyzed by using Face Recognition API which will provide the total count of students in the class. Suppose teacher is delivering content to the students, to understand the content student must give Attention in the lecture. So it is also necessary to monitor the attention of each student. Most teachers daily confront the reality that student's attention wanders in class. They can be seen nodding off, sleeping and gazing distractedly. It's a problem and teachers often find it hard to not take it personally. Our system proposes a solution of problem faced by students as well as teachers.

Facial Expression indicates the mood of person. Mood is an emotional state. It differs from the emotions ,feelings ,or affects less specific , intense and likely to be triggered by a particular stimulus or event .Moods are typically described as having either a positive or negative valence .In other words, people usually speak of being in a good mood or a bad mood. Mainly moods can be classified as joy, surprise, sadness, disgust, fear, anger and contempt. By analyzing Facial Expression we can have statistics of how many students liked or disliked a lecture. One can determine the quality of lecture delivered so that teacher can have feedback about the lecture. Our system also proposes the analysis of facial Expression.

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 2, February 2017

## II. RELATED WORK

A simple yet efficient face detection and recognition system is proposed in [1] paper which has the capability to recognize human faces in single as well as multiple face images in a database in real time. After preprocessing, face detection is performed by using Viola Jones algorithm. This [2] paper proposes a method for student attendance system in classroom using face recognition technique by combining Discrete Wavelet Transforms (DWT) and Discrete Cosine Transform (DCT) to extract the features of student's face which is followed by applying Radial Basis Function (RBF) for classifying the facial objects. They [3] have developed a near-real-time computer system that can locate and track a subject's head, and then recognize the person by comparing characteristics of the face to those of known individuals. They [4] described experiments with eigenfaces for recognition and interactive search in a large-scale face database. Accurate visual recognition is demonstrated using a database of  $O(10^{\sup 3})$  faces. In recent decade, a number of algorithms for face recognition have been proposed [5], but most of these works deal with only single image of a face at a time. By continuously observing of face information, our approach can solve the problem of the face detection, and improve the accuracy of face recognition. The work presented in [6] paper proposes a method to automatically take the attendance of student using face recognition. Continuous observation improves the precision of attendance. The attendance will be recorded by using camera(s), attached in front of the class which is continuously capturing images of the students. It will then compare the faces with the student's database and marks the attendance. The proposed [7] system describes a method like when he/she enters the class room and marks the attendance by extracting the image using Personal Component Analysis (PCA) algorithm. Using Simple Mail Transfer Protocol (SMTP) the report of the attendance information will be sent to the faculty and also to the parents.

## III. FEATURES OF RASPBERRY PI

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. The Raspberry Pi hardware has evolved through several versions that feature variations in memory capacity and peripheral-device support. The Raspberry Pi primarily uses Raspbian, a Debian-based Linux operating system.

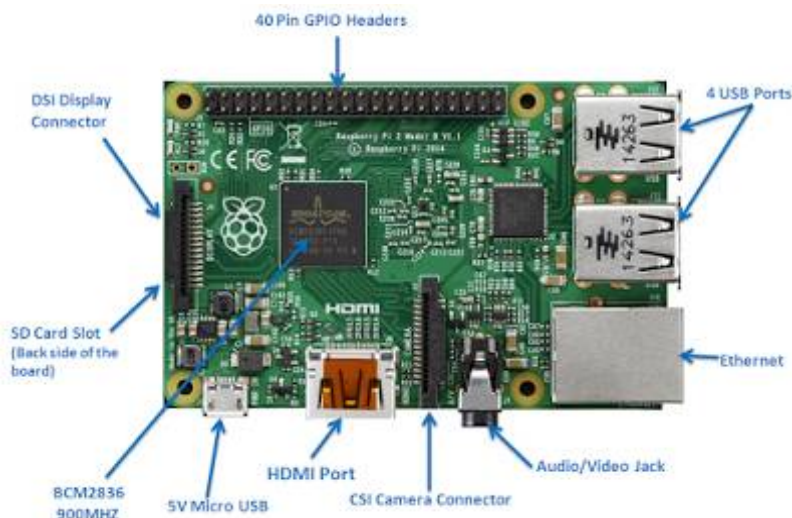


Fig-Raspberry Pi

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 2, February 2017

## Specifications:

SoC: Broadcom 2836

CPU: Quad-core ARM7 800MHz

GPU: Videocore IV 250MHz

Memory: 1GB

GPIO: 40pin

Ports: 4x USB 2.0, 100BaseT Ethernet, HDMI, MicroSD card

Size: 85.60 × 56.5mm (about 3.2 x 2.1-inch)

ELEMENTZ SIM900A GSM MODEM MODULE with SMA ANTENNA is used for communication between raspberry pi and cloud server and also for sending SMS.

## IV. SYSTEM OVERVIEW

### Attendance Marking

It is an established fact that we are facing difficulties in the attendance management. Presently the attendance in most of the organizations is marked manually on paper which is an error-prone process.



Initially, the database will be created by capturing the picture of individual student. Our proposed system will take photo of students in classroom with the help of raspberry pi camera module. After the photo is captured, the captured image will be analyzed using Face Recognition API. If the newly captured image and the stored image in database matches, then attendance of that student will be marked and if some student is absent then our system will send him Notification message regarding his/her absence in the lecture using GSM Module .Suppose lecture is of 60 minutes, then our proposed system will randomly take photos thrice within that time span, thus increasing the overall efficiency of the system.

# International Journal of Innovative Research in Science, Engineering and Technology

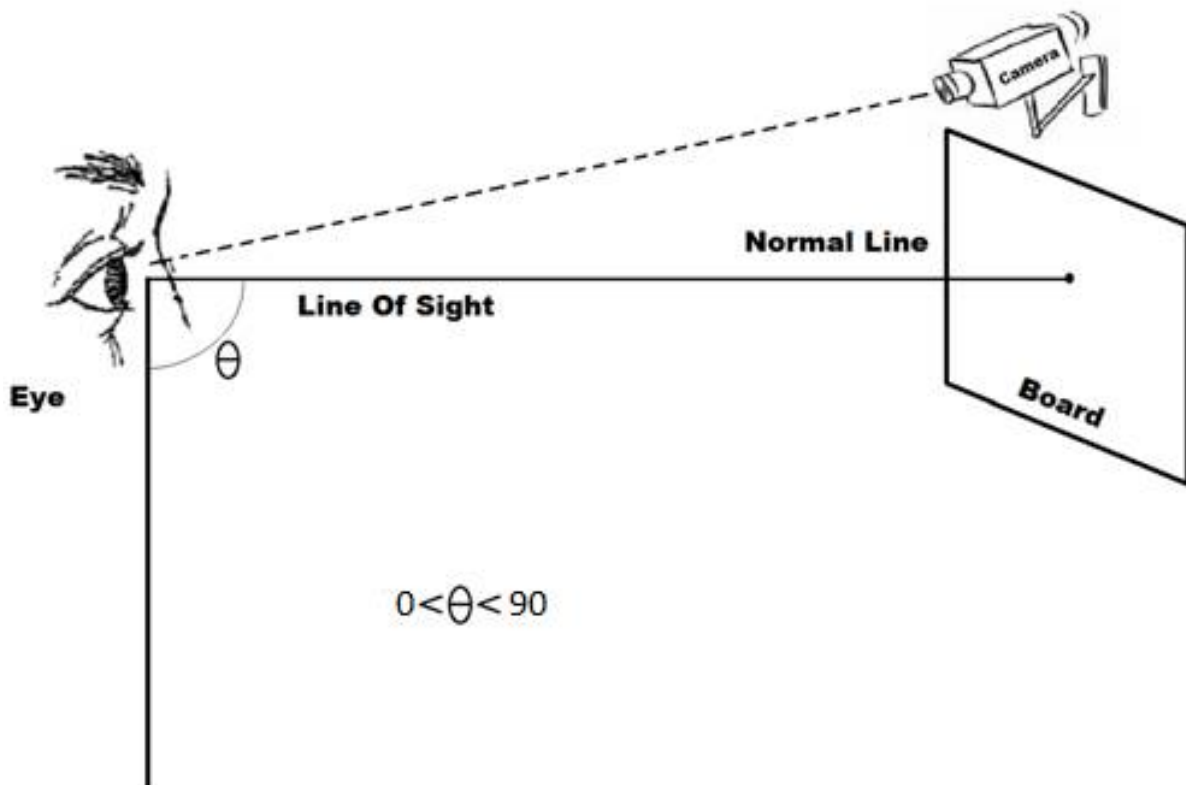
(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 2, February 2017

## Attention Monitoring

Our proposed system will monitor the students in real time using raspberry pi camera module. Attention of student is decided by line of sight. Camera is fixed at 30 degree above the normal line of sight. If the line of sight of student is in between 0 degree to 90 degree then that student is Paying attention in the lecture. If student is looking at the blackboard then his/her line of sight will be 0 degree and if the student is writing the notes during lecture then his/her line of sight will be Greater than zero and less than 90 degree. Line of sight of student will be analyzed using Eye Detection API.



## Facial Expression Analysis

Facial Expression indicates the mood of person .By analyzing Facial Expression we can have statistics of how many students liked or disliked a lecture.



Fig-Facial Expressions

## International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 2, February 2017

Our proposed system will monitor the expression of student using raspberry pi camera module. After Monitoring the expression of student, detailed report will get generated. Suppose teacher delivered a 60 minute lecture and the mood of the student was happy for 41 minutes and sad for 19 minutes. Similarly after analyzing several students, teacher will get an idea about which part of his/her lecture needs improvement.

Emotion API will analyze the facial expression and will generate the report accordingly.

Mood table:-

Mood	Symptoms
Joy	symbolized by raising of the mouth corners (an obvious smile) and tightening of the eyelids
Surprise	symbolized by eyebrows arching, eyes opening wide and exposing more white, with the jaw dropping slightly
Sadness	symbolized by lowering of the mouth corners, the eyebrows descending to the inner corners and the eyelids drooping
Anger	symbolized by eyebrows lowering, lips pressing firmly and eyes bulging
Disgust	symbolized by the upper lip raising, nose bridge wrinkling and cheeks raising
Fear	symbolized by the upper eyelids raising, eyes opening and the lips stretching horizontally
Contempt	symbolized by half of the upper lip tightening up (using what is called the risorius muscle) and often the head is tilted slightly back.

### V. EXPERIMENTAL ANALYSIS

We have implemented an automatic text detection technique from an image for Inpainting. Our algorithm successfully detects the text region from the image which consists of mixed text-picture-graphic regions. We have applied our algorithm on many images and found that it successfully detect the text region.

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 2, February 2017

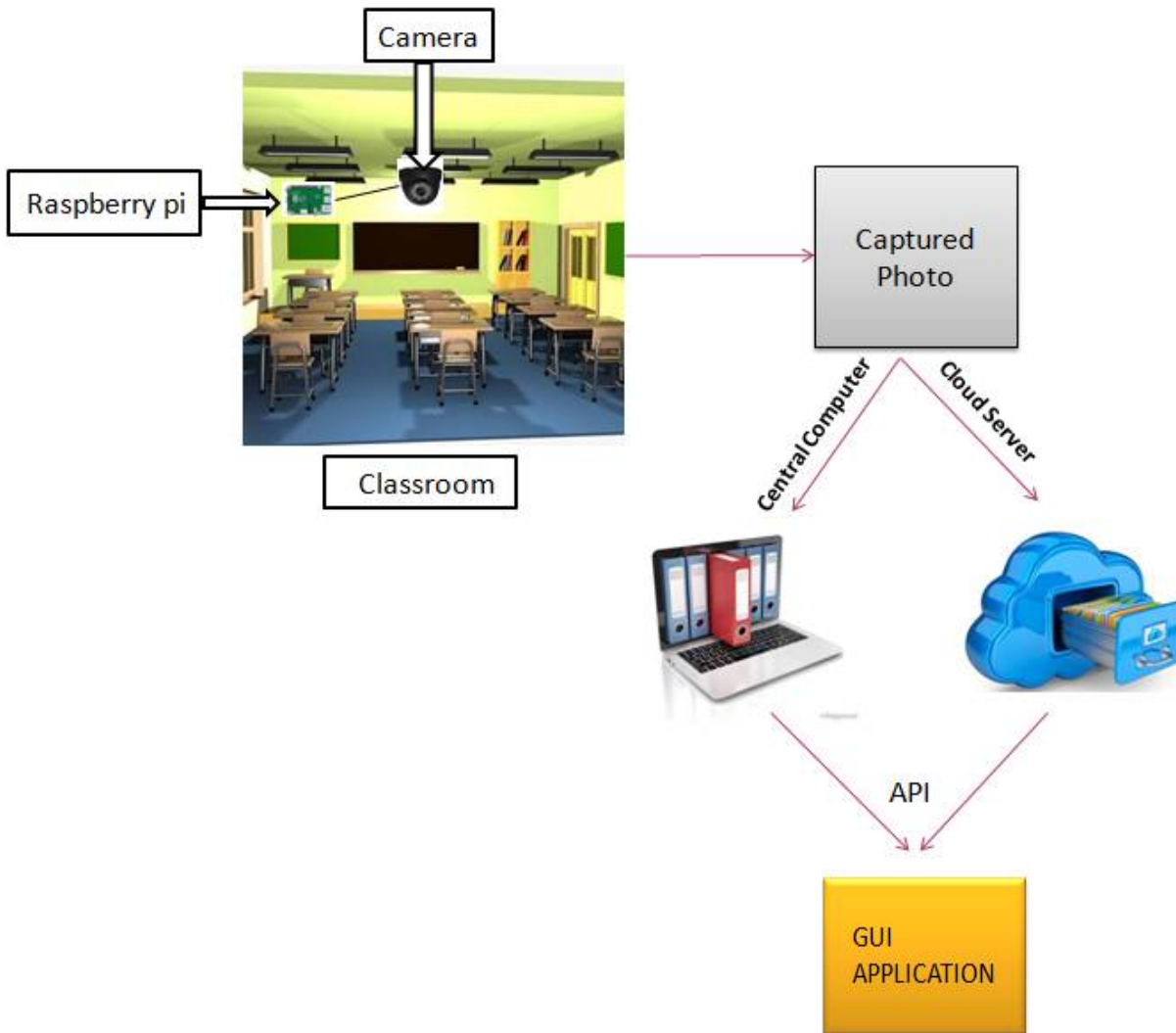


FIG- System Implementation

## International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 2, February 2017

All requests to the API are made via standard HTTP GET and HTTP POST requests.

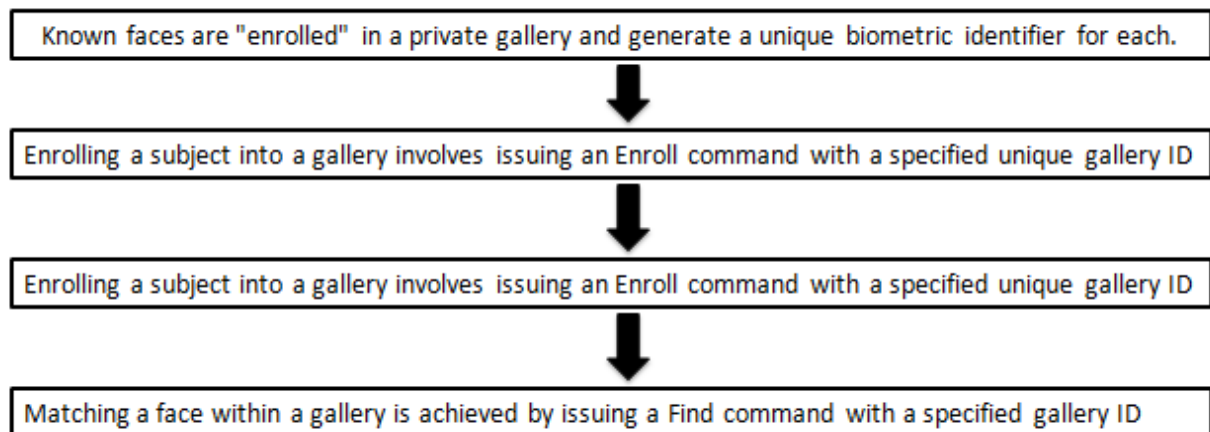


Fig-Work Flow

Raspbian os-Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run. However, Raspbian provides more than a pure OS: it comes with over 35,000 packages, pre-compiled software bundled in a nice format for easy installation on your Raspberry Pi.

Our designed software uses python Tkinter library. Python Tkinter Tk/Tcl has long been an integral part of Python. It provides a robust and platform independent windowing toolkit, that is available to Python programmers using the Tkinter module, and its extensions, the Tix and the ttk modules. The Tkinter module is a thin object-oriented layer on top of Tcl/Tk.

Report will contain following details:-

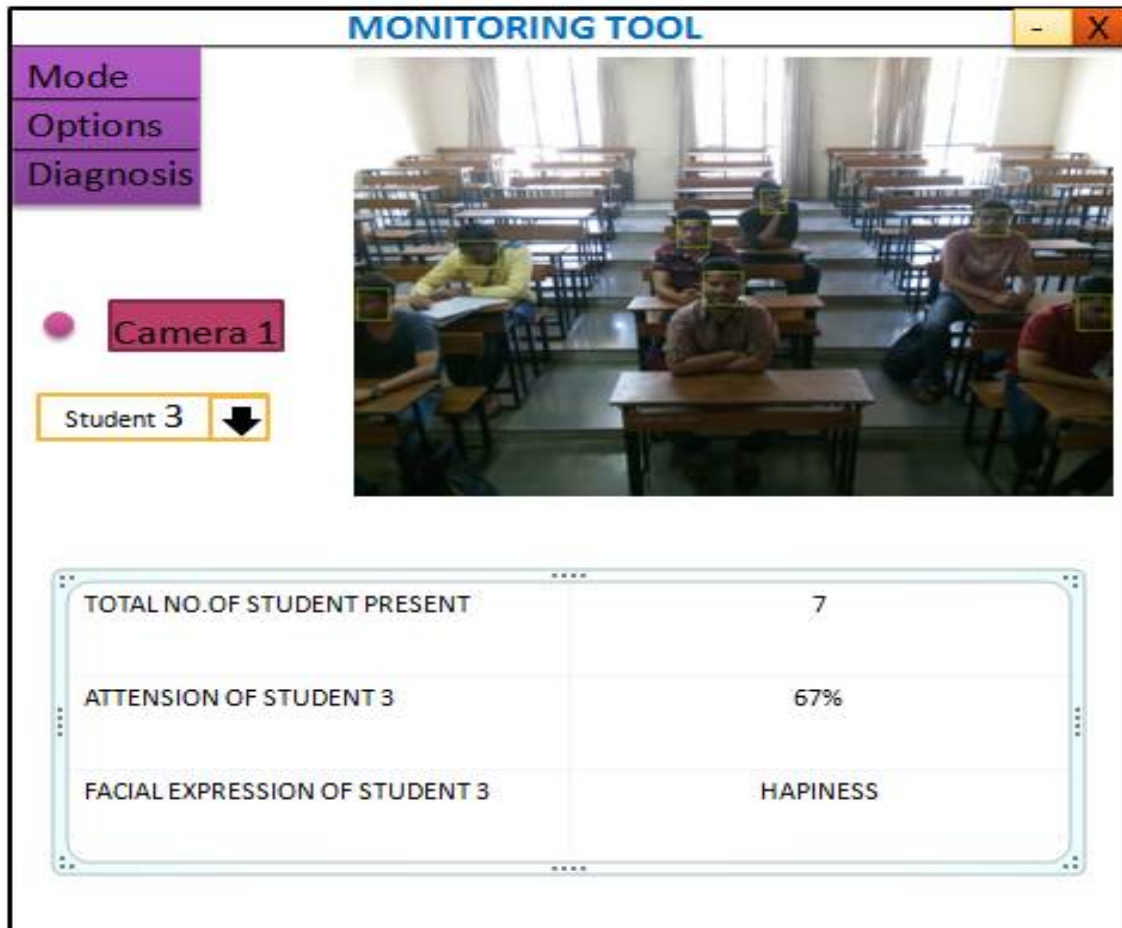
1. Attendance of the Student
2. Attention of the student
3. Facial Expression of the student

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 2, February 2017



## VI. CONCLUSION

In order to obtain the attendance in classroom lecture, we proposed the attendance management system based on face recognition in the classroom lecture. Our system not only provides an efficient attendance system but also it enables the higher authorities to monitor the students. Manual Attendance system is time consuming and inefficient. Attention of students is directly proportional to the knowledge gained by them. The result of our preliminary experiment shows continuous observation improved the performance for estimation of the attendance.



# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 2, February 2017

## REFERENCES

1. M Shujah Islam Sameem ,Tehreem Qasim ,Khush Bakhat, "Real time recognition of human faces", Open Source Systems & Technologies (ICOSST), 2016 International Conference on, 15-17 Dec. 2016
2. Samuel Lukas, Aditya Rama Mitra, Ririn Ikana Desanti, Dion Krisnadi, " Student attendance system in classroom using face recognition technique", Information and Communication Technology Convergence (ICTC), 2016 International Conference, 19-21 Oct. 2016
3. Turk M. , and Pentland A. , " Eigenfaces for recognition , " Journal of Cognitive Neuroscience , vol. 3 , no. 1 , pp. 71 – 86 , 1991
4. Pentland A. , Moghaddam B. , and Starner T. , " View-based and modular eigenspaces for face recognition , " IEEE Conf. on Computer Vision and Pattern Recognition , MIT Media Laboratory Tech. Report No. 245, 1994
5. W. Zhao, R. Chellappa, P. J. Phillips, A. Rosenfeld, "Face recognition: A literature survey," ACM Computing Surveys, 2003, vol. 35, no. 4, pp. 399-458.
6. Shreya Nallawar, Neha Giri, Neeraj Deshbhratar, Shamal Sane, Trupti Gautre, Avinash Bansod "Modern Technique Of Lecture Attendance Using Face Recognition", IJAFRSE, January 2015.
7. D. Nithya "Automated Class Attendance System based on Face Recognition using PCA Algorithm" IJERT, 28-12-2015
8. Muchri M. H. , Lukas S. , and Hareva D. H. , " Implementation discrete cosine transform and radial basis function neural network in facial image recognition , " in Proc. International Conference on Soft Computing Intelligent Systems, and Information Technology , 2015 CrossRef
9. Oh B. J. , " Face recognition using radial basis function network based on LDA " , International Journal of Computer, Information Science and Engineering , vol. 1, pp. 401 – 405 , 2007.
10. Blessie A. A. , Nalini J. , and Ramesh S. C. , " Image compression using wavelet transform based on the lifting scheme and its implementation , " International Journal of Computer Science Issues , vol. 8 , no. 1 , 2011 .
11. Bute Y. S. , and Jasutkar R. W. , " Implementation of discrete wavelet transform processor for image compression , " International Journal of Computer Science and Network (IJCSN) , vol. 1 , issue 3 , 2012
12. Gupta D. , and Choubey S. , " Discrete wavelet transform for image processing , " International Journal of Emerging Technology and Advanced Engineering , vol. 4 , issue 3 , March, 2015
13. Samuel L. , Mitra A. R. , Desanti R. I. , Krisnadi D. , " Implementing Discrete Wavelet and Discrete Cosine Transform with Radial Basis Function Neural Network in Facial Image Recognition " , Journal of Image and Graphics , Vol 4 , No 1 , June 2016

## BIOGRAPHY



Piyush Patil is a student pursuing graduation in computer science from Sinhgad Institute Of Technology, Lonavala, India His research interest are IOT, cybersecurity and wireless and network security.



Vivek Sachapara is a student pursuing graduation in computer science from Sinhgad Institute Of Technology, Lonavala, India His research interest are IOT, Data Mining and Cloud Computing.