**Chapter II**

**REVIEW OF RELATED LITERATURES**

**2.1 Technical Background**

In this field the researchers will discuss what are the software and hardware use for developing the system.

According to Gary Cernosek (2015) In November 1998, IBM Software Group began creating a development tools platform that eventually became known as Eclipse. We first built a new Java IDE with resources from our Object Technology International (OTI) labs, along with the broader platform to go with it. The OTI team had extensive experience building several generations of IDEs with small, highly skilled teams. At the same time, the larger IBM began setting up additional teams to create new products built on top of this platform. We knew that a vibrant ecosystem of third parties would be critical for achieving broad adoption of Eclipse. But business partners were initially reluctant to invest in our (as yet unproven) platform. So in November 2001, we decided to adopt the open source licensing and operating model for this technology to increase exposure and accelerate adoption. IBM, along with eight other organizations, established the Eclipse consortium and eclipse.org. Initial members included (then-partners) Rational Software and TogetherSoft, as well as competitors WebGain and Borland. Membership in the consortium required only a bona fide (but non-enforced) commitment to Eclipse to use it internally, to promote it, and to ship a product based on it. The consortium's operating principles assumed that the open source community would control the code and the commercial consortium would drive "marketing" and commercial relations. This was a new and interesting application of the open source model. It was still based on an open, free platform, but that base would be complemented by commercial companies encouraged to create for-profit tools built on top of it. Most of the committers and contributors to Eclipse came from a short list of the commercial vendors, with IBM being the largest contributor of both content and financial and staff resources.

According to Chris Sevilleja (2014) Sublime Text It is a clean, functional and fast code editor software that support many programming languages and plugins**.**

**2.2 Review of Related Literature**

This are the related systems or literature of the system called DPWH Employees Monitoring System: Facial Recognition with SMS Notification.[1]

According to Mehmet Soydas (2017) Real Time Detection and Recognition with HOG Features and SVM as you know, recently, machine learning has started to gain much attention. The main reasons for this are the development of machine learning algorithms, development of the new hardware’s with high processing power, and the increasing in the amount of data available. Facial recognition systems are one of the important sub-topic of machine learning. While the main areas of use are security, public surveillance systems, mobile applications and social networks such as facebook, snapchat etc., we see these systems will occupy our lives much more. In this article, we will try to establish a face recognition system in a streaming video. As known, pre-processing, feature extraction and recognition process require a lot of processing power even for one video frame. We can understand how difficult it is to process, if we think there are dozens of frames in a video. So, besides the requirement of having high accuracy, we also have to be able to process them very fast for a stream. In order to perform face recognition through a video, it is first necessary to be able to determine the faces in video frames. The next step is training process with these features and then classify the faces with the obtained classifier. The HOG features are still the most commonly using method in object/face recognition systems due to it is very effective, simple and fast. [2]

According to Ahmad S. Tolba (2015) The task of face recognition has been actively researched in recent years. This paper provides an up-to-date review of major human face recognition research. We first present an overview of face recognition and its applications. Then, a literature review of the most recent face recognition techniques is presented. Description and limitations of face databases which are used to test the performance of these face recognition algorithms are given. A brief summary of the face recognition vendor test (FRVT) 2002, a large scale evaluation of automatic face recognition technology, and its conclusions are also given. Finally, we give a summary of the research results. Keywords—Combined classifiers, face recognition, graph matching, neural networks. [3]

According to Manuel Gunther, Laurent El Shafey, Sebastien Marcel (2016) One important type of biometric authentication is face recognition, a research area of high popularity with a wide spectrum of approaches that have been proposed in the last few decades. The majority of existing approaches are conceived for or evaluated on constrained still images. However, more recently research interests have shifted towards unconstrained “in-the-wild” still images and videos. To some extent, current state-of-the-art systems are able to cope with variability due to pose, illumination, expression, and size, which represent the challenges in unconstrained face recognition. [4]

To date, only few attempts have addressed the problem of face recognition in mobile environment, where high degradation is present during both data acquisition and transmission. This book chapter deals with face recognition in mobile and other challenging environments, where both still images and video sequences are examined. We provide an experimental study of one commercial of-the-shelf and four recent open-source face recognition algorithms, including color-based linear discriminant analysis, local Gabor binary pattern histogram sequences, Gabor grid graphs and inter-session variability modeling. Experiments performed on several freely available challenging still image and video face databases, including one mobile database, always following the evaluation protocols that are attached to the databases. Finally, we supply an easily extensible open source toolbox to re-run all the experiments, which includes the modeling techniques, the evaluation protocols and metrics used in the experiments, and provides a detailed description on how to re-generate the results. [5]

According to Jay F. Bortoussi, Andover, Francis J. Cusack, Jr. Groton and Dennis C. Ehn (2014) Real-Time Facial Recognition and Verification System in a Secured access environment, a positive match between the acquired image of the individual and a pre Stored image allows access to the facility. The capture and manipulation of image data with modem identification Systems places an enormous processing bur den on the System. Prior art Systems have addressed this problem by using Principal Component Analysis on image data to reduce the amount of data that needs to be Stored to operate the System efficiently. An example of Such a system is set forth in U.S. Pat. 5,164,992, the contents of which are hereby incorporated by reference. However, certain environmental Standards need Still be present to ensure the accuracy of the comparison between the newly acquired image of the pre-stored image. In particular, the individual is generally positioned at a certain location prior to capturing the image of the person. Additionally, the alignment of the body and face of the individual is controlled to Some degree to ensure the accuracy of the comparison. Lighting effects and other optical parameters are addressed to further ensure accuracy. Consequently, these near real-time Systems are quickly becoming antiquated in today's fast paced and technology dependent Society. [6]

According to Dr. Omaima N. and Al-Allaf (2014) Face detection takes images/video sequences as input and locates face areas within these images. This is done by separating face areas from non-face background regions. Facial feature extraction locates important feature (eyes, mouth, nose and eye-brows) positions within a detected face. Feature extraction simplifies face region normalization where detected face aligned to coordinate framework to reduce the large variances introduced by different face scales and poses. The accurate locations of feature points sampling the shape of facial features provide input parameters for the face identification. Other face analysis task: facial expression analysis face animation and face synthesis can be simplified by accurate localization of facial features. Face identification generates the final output of complete face-recognition system: the identity of the given face image. Based on normalized face image and facial feature locations derived from previous stages, a feature vector is generated from given face and compared with a database of known faces.[7] If a close match is found, the algorithm returns the associated identity. A main problem in face identification is the large differences between face images from the same person as compared to those from different persons. Therefore, it is important to choose a suitable face classification technique that can provide a good separate ability between different persons. Face identification has a wide range of applications. Because it offers a non-intrusive way for human identification, the face is used as an important biometric in security applications.[8]

According to James W. Tanaka and Diana Simonyi (2017) There is an ongoing debate in the literature regarding the most appropriate methodological procedure for testing the face composite task ([Richler & Gauthier, 2013](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5051945/#R56); [Rossion, 2013](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5051945/" \l "R59)). Many researchers use the standard design in which holistic inference is calculated based on trials in which the faces are the “same” in the cued location and “different” in the uncued location ([Le Grand, Mondloch, Maurer & Brent, 2004](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5051945/#R39); [Michel, Rossion, Han, Chung & Caldara, 2006](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5051945/#R49)), while others argue that in order to account for response biases, a complete design should be employed where the “same” and “different” faces appear equally often in the cued and un cued locations ([Richler & Gauthier, 2013](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5051945/#R56)).[7] Despite methodological differences, both versions of the face composite task demonstrate how difficult it is to restrict our attention to just one region of the face in deference to our perception of the whole face.[9]

According to James W. Tanaka (2017) Whereas the face composite task emphasizes holistic attention, the part/whole task emphasizes the effects of holistic processing in our immediate and long-term memories for faces. In the standard part/whole face paradigm, the participant learns a series of name-face associations (e.g. Joe, Bob, Fred). Afterwards, memory for the face parts from the study faces is tested in a two-alternative, forced choice recognition task. The face part (e.g. Joe's nose) is tested either in isolation or in the context of the whole face. The important manipulation lies in the whole-face test condition, as the target and foil faces are identical with exception of the critical part under examination. For example, as shown in, recognition for Joe's nose is tested in a whole face.[10] The non-target features eyes and mouth are kept constant in the target and foil faces. If memory for the individual features of a face is integrated into the holistic face representation, recognition of the face part should be better when presented in the whole-face context than when tested in isolation. The difference in part and whole recognition is an index of holistic processing. The larger the difference in the whole-face, old configuration condition, relative to the isolated part condition, the greater the holistic processing. Alternatively, if a face is remembered in terms of constituent parts (e.g. we remember Joe by his distinctive nose), recognition of the part should be no better when presented in the context of the whole face. Consistent with the holistic prediction, a reliable advantage is found when the face part is tested in the whole, old configuration face than when tested in isolation ([Tanaka & Farah, 1993](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5051945/#R64), Experiment 1) and whole, new configuration face ([Tanaka & Sengco, 1997](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5051945/#R70)). The results indicate that our memory for a single part of a face is embedded in our memory for the entire face. [11]

According to Stephen Mraz (2018) Facial recognition software has gotten 20 times better at searching databases of facial photographs to find a matching image, according to the National Institute of Standards and Technology’s (NIST) recent evaluation of 127 software algorithms from 45 different developers—the bulk of the industry. This indicates there is a rapidly advancing marketplace for face-based biometric algorithms. The evaluation was based on the same test that was carried out in 2010 and 2014 to determine how well an algorithm can match a person’s photo with a different one of the same person stored in a large database. This type of “one to many” search is often used to check for a person who might be applying for a visa or driver’s license under a name different than their own. The algorithms were prototypes, submitted in 2018 as compiled libraries and were evaluated as black boxes behind a NIST-specified C++ testing interface. The report therefore cannot not describe exactly how algorithms operate. [12]

According to Academy & Industry Collaboration Center (2013) Security System with Face Recognition, SMS Alert and Embedded Network Video Monitoring Terminal. Even though there are various security systems consuming large power are available in market now-a-days, robbery rate is very high. The authors are proposing a novel system to prevent robbery in highly secure areas with lesser power consumption.[13] This system has face-recognition technology which grants access to only authorized people to enter that area. If others enter the place without access using some other means, then the system alerts the security personnel and streams the video captured by the security camera. The face recognition is done using PCA algorithm. [14]

According to Peker M. & Zengin A. (2013) This study aims at realizing an effective motion analysis for real time security application by using image processing techniques. After obtaining from the environment, image frames are used to sense and perceive a mobile object, as well as its size and motion degree. In case estimated values exceed its threshold, it is decided whether this image belongs to a human being or a destructive object. Images are stored to the hard disk and then a vocal warning system takes over. The camera is driven by a step motor by which it is possible to track mobile object continuously.[15] The system is enough sensitive to perceive slightest motion and allows user flexibility to select security level. System identifies the person inside by detecting the skin color algorithms and records the image into the computer. The application software has been developed by using C# programming language of .Net technologies. [16]

In the research by Sarath Chandu Gaddam, Narayana Ramesh and Hema Dhanekula (2016) In recent trends industries, organizations and many companies are using personal identification strategies like finger print identification, RFID for tracking attendance and etc. Among of all these personal identification strategies face recognition is most natural, less time taken and high efficient one. It’s has several applications in attendance management systems and security systems.[17] The main strategy involve in this paper is taking attendance in organizations, industries and etc. using face detection and recognition technology. A time period is settled for taking the attendance and after completion of time period attendance will directly stores into storage device mechanically without any human intervention. A message will send to absent student parent mobile using GSM technology. This attendance will be uploaded into web server using Ethernet. This raspberry pi 2 module is used in this system to achieve high speed of operation.[18] Camera is interfaced to one USB port of raspberry pi 2. Eigen faces algorithm is used for face detection and recognition technology. Eigen faces algorithm is less time taken and high effective than other algorithms like viola-jones algorithm etc. the attendance will directly store in storage device like pen drive that is connected to one of the USB port of raspberry pi 2. This system is most effective, easy and less time taken for tracking attendance in organizations with period wise without any human intervention. [19]

According to research of Binyam Tesfahun Liyew and Prasun Hazari (2017) Automated Attendance Management System Based On Face Recognition Algorithms. On this paper they propose an automated attendance management system. This system is basically based on face detection and recognition algorithms, automatically detect the student when he enters the classroom and marks the attendance by recognizing him. Because of LBPH outperforms other algorithms with better recognition rate and low false positive rate the system is based on this algorithm. The system uses SVM and Bayesian as a classifier because they are better when compared to distance classifiers.[20] The workflow of the system architecture is when a person enters the classroom his image is captured by the camera at the entrance. A face region is then extracted and pre-processed for further processing. As not more than two persons can enter the classroom at a time face detection algorithm has less work. The future work they are saying on this paper is to improve the recognition rate of algorithms when there are unconscious changes in a person like tonsuring head, using a scarf, facial hair. The limitation of the system is it only recognizes face up to 30 degree’s angle variations which have to be improved further. Gait recognition should be combined with face recognition systems in order to achieve better performance of the system. [21]

According to Oliver Jerorsky, Klaus J. Kirchberg, and Robert W. Frischolz (2013) Robust Face Detection using the Hausdorff Distance face recognition is a major area of research within biometric signal processing. Since most techniques assume the face images normalized in terms of scale and rotation, their performance depends heavily upon the accuracy of the detected face position within the image. Motion based approaches are not applicable in systems that provide still images only. [22]

According to Jovit S. Albino (2014) The use of Radio-Frequency identification (RFID) technology in automated electronic environment and for tracking objects has been widely researched upon by researchers and deployed by various organizations as part of their automation system. Reference provide examples of real RFID contact less data link deployments that utilize RFID technology for object tracking and automated data collection solutions. RFID is a technology that uses radio waves that transfer data from an electronic tag, RFID tag or label, attached to an object, through a reader for a purpose of identifying and tracking object.[23] In 1945, Leon Theremin invented an espionage tool, (for spy activities) for the Soviet Union which retransmitted incident radio waves with audio frequency information. Sound waves vibrated a diaphragm which altered the shape of the resonator, which modulated the reflected radio frequency even though this devices was covert listening device, not an identification device or tag, it is considered to be a predecessor of radio frequency identification (RFID) technology because it likewise passive, being energized and activated by waves from an outside source. [24]

In the Research by Parul Gupta and Margam Madhusudhan (2017) There are many articles existing on various facets of paper reviewed articles related to the implementation of RFID technology in Indian Libraries. The scope of this study is limited to the articles published during 2010 to 2016 in various journals both Indian and Foreign by the Indian authors and on Indian libraries. The present review focuses on the comprehensive reports published in India keeping in view of the seminal results coming out of the relationship between RFID technology and Indian Libraries.[25] Kumar & Kaur1 discussed the advantages, disadvantages, components, and technical features of a RFID library system to provide guidelines for the evaluation of different systems. They also briefed about the tentative cost of implementing RFID system in a library and how it functions and describes the role of librarians. Madhusudhan opined that the RFID technology could be the future of services provided by libraries, but the involvement of high cost in the working and implementation has been encountered as the primary challenge in its proliferation. Nevertheless, the author forecasted a decrease in the cost of the technology with its adoption, if carried out in large numbers in libraries all over India. The author concluded that the adoption of the technology couldn’t be given a blind eye in an era of constrained funding, because in spite of its limitations, it has provided serious considerable advantages and benefits by curbing many time consuming, monotonous, tedious and complex problems in an efficient manner. [26]

According to Alberto Coustasse (2014) RFID can be applied in a variety of utilization schemes within the hospital setting. Specifically, it can be applied to patient tracking, pharmaceutical tracking, prevention of pharmaceutical counterfeiting, blood tracking, device and supply tracking, and many more uses. Given the potential of each application context to have its own set of benefits and barriers to implementation and rates of adoption, it was decided that the scope of the study should be limited to device and supply tracking. When executing the search, the following terms were used: “Radio Frequency Identification” OR “RFID” OR “RFID standards” AND “supply chain” OR “hospitals” OR “hospital inventory” OR “inventory management OR benefits implementation OR barriers implementation.” A mix of databases and online sources was used to compile a set of references covering both academic, peer-reviewed research and practitioner literature.[27] The following electronic databases and sources were used: ESBCOhost, Academic Search Premier, PubMed, Consumer Health Complete, CINAHL, Health Source: Consumer Edition, and RFID Journal. Given the technology- and enterprise-oriented nature of the current study, literature was selected for review on the basis of, but not limited to, the following key areas: technological issues, organizational issues, and organizational impact of technology. Only articles that were written in English were included for review. In an attempt to stay current in research, all journals and references that were older than 12 years (starting from 2000) were eliminated from the search. This literature review yielded 89 references that were assessed for information pertaining to this research project. Thirteen references were used in the introduction and methodology, while 76 sources were used in the results, tables, and discussion. [28]

In the research of Signh and Mahajan P. (2014) The integration of emerging information technology into organised business environments has often been exemplified in libraries, a space that balances unique client needs with information management systems that are high volume and involve repetitive management of records for books and objects. Libraries in the past 15 years are turning from traditional barcodes to Radio Frequency Identification (RFID) technology (Bahri & Ibrahim, 2013; Mahajan & Singh, 2014; Makori, 2013), a form of identification technology that has found use in machine identification of objects, humans or animals. The potential implications for RFID in information management have been explored to a limited degree in academic papers discussing RFID in machine processes and operational efficiency, but critical case studies exploring the introduction of RFID into traditional barcode environments and the change management process inherent in the implementation of the technology for improved data management efficiency remain elusive.[27] They concluded that the performance of the RFID based intelligent shelving system has been investigated and found to be satisfactory and it has a lot of potential, especially in its ability to alleviate the intensive labor and efforts in shelving book.[29]

According to Course Hero (2019) The demonstration of the first continuous wave radio generation and transmission of radio signals by Ernst F. W. Alexanderson in 1906 signaled the beginning of modern radio communication and, subsequently, radio frequency identification (RFID). RFID is the convergence of radio broadcast technology and radar, although many of its early developments are not widely known due to them significance of this technology. Most documented histories of RFID technology trace its development to the radio-based identification systems from World War II, when the British Air Force used radar to distinguish Allied aircraft from enemy aircraft. [30]

Commercial development of RFID began in the late 1960s. Arguably the first and most widespread commercial use of RFID was in the development of electronic article surveillance (EAS) equipment to counter theft. Although this system could only detect the presence or absence of a tag, the tags themselves could be made cost-effectively and provided an effective anti-theft measure an important application in the early commercialization of the Technology. Research and development by academic institutions, government laboratories and private companies led to applications for animal tracking, vehicle tracking and automated manufacturing. [31]

By the mid-1990s, implantable RFID tags that were initially used to track laboratory animals were being marketed to veterinarians and animal shelters to identify pets. RFID is now used for hundreds of applications including theft prevention, personnel access systems, automated parking, traffic management and library book tracking, along with the monitoring of assets in supply chain management. RFID technology fundamentals RFID systems consist of four main elements: the RFID tags, the RFID reader, the antennas and computer network used to connect the readers. [32]

The tag itself is the building block of RFID, each containing an antenna and a small chip that contains a radio receiver and a modulator to send a signal back to the reader. Tags come in a variety of shapes and sizes allowing them to be implanted into animals and humans, and they can be powered by the incoming radio signal (passive tags) or by a small battery (active tags). The advantage of an active tag is that its reading range and reliability is greater than that of a passive tag; however, passive tags can be much smaller and cheaper to produce and should, in principle, work indefinitely. [33]

In the research of Cristoph Jechlitsheck (2013) In principle an RFID tag works as follows: the reading unit generates an electro-magnetic field which induces a current into the tag's antenna. The current is used to power the chip. In passive tags the current also charges a condenser which assures uninterrupted power for the chip. In active tags a battery replaces the condenser. The difference between active and passive tags is explained shortly. Once activated the tag receives commands from the reading unit and replies by sending its serial number or the requested information. In general the tag does not have enough energy to create its own electro-magnetic field, instead it uses back scattering to modulate (reflect/absorb) the field sent by the reading unit. Because most fluids absorb electromagnetic fields and most metal reflect those fields the reading of tags in presence of those materials is complicated. During a reading cycle, the reader has to continuously power the tag. The created field is called continuous wave, and because the strength of the field decreases with the square of the distance the readers have to use a rather large power. That field overpowers any response a tag could give, so therefore tags reply on side-channels which are located directly below and above the frequency of the continuous wave. [34]

According to Upendra Kumar (2015) GSM (Global System for Mobile communications) is a digital cellular technology used for transmitting mobile voice and data services which is developed by Group special mobile (founded 1982) which was an initiative of CEPT (conference of European post and telecommunication). GSM provide data transfer speeds around 9.6 Kbit/s, allowing the transmission of basic data services such as SMS (Short Message Service). Another major advantage is its international roaming capability, allowing the users to access the same services even when travelling abroad. This gives consumers to have the same number connectivity in more than 210 countries. GSM satellite roaming has also widened its service access to areas where terrestrial coverage is not available.GSM. GSM-1800 is used to send information from the Mobile Station to the Base Transceiver Station (uplink) and 1805 - 1880 MHz for the other direction (downlink), providing 374 channels (channel numbers 512 to 885) and duplex spacing is 95 MHz.. GSM gives worldwide connectivity. [35]

According to Electronic Forum (2019) A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system. The modem (modulator-demodulator) is a critical part here. [36]

These modules consist of a GSM module or GPRS modem powered by a [power supply circuit](https://electronicsforu.com/electronics-projects/plus-minus-5v-supply-from-9v-battery) and communication interfaces (like RS-232, USB 2.0, and others) for computer. A GSM modem can be a dedicated modem device with a serial, USB or [Bluetooth](https://electronicsforu.com/?s=bluetooth) connection, or it can be a mobile phone that provides GSM modem capabilities.[37]

**According to Nikhil Agnihotri (2016) GSM/GPRS module** is used to establish communication between a computer and a **GSM-GPRS system. Global System for Mobile communication (GSM)** is an architecture used for mobile communication in most of the countries. **Global Packet Radio Service (GPRS)** is an extension of GSM that enables higher data transmission rate. **GSM/GPRS module consists of a GSM/GPRS modem assembled together with power supply circuit and communication interfaces** (like RS-232, USB, etc) for computer. The MODEM is the soul of such modules. A GSM/GPRS module assembles a GSM/GPRS modem with standard communication interfaces like RS-232 (Serial Port), USB etc., so that it can be easily interfaced with a computer or a microprocessor / microcontroller based system. The power supply circuit is also built in the module that can be activated by using a suitable adaptor.[38]