DEVELOPMENT OF TOOLS AND TECHNOLOGY FOR VISUALLY IMPAIRED

Project report submitted in partial fulfillment of the requirement for the degree of

BACHELOR OF TECHNOLOGY

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

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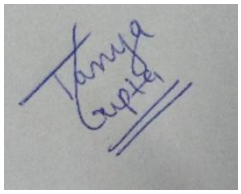
Dr. Rajiv Kumar (Supervisor)



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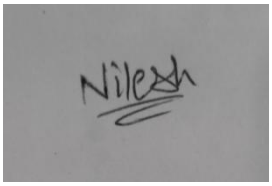

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ABSTRACT

This project consists of a prototype,which will the visually impaired people in their day to day work. With the help of an ultrasonic sensor and a buzzer, this module aims to aid blind people
by increasing the efficiency and accessibility by which they can navigate through everyday life. To avoid the buzzer going off all the time, the ultrasonic sensor only starts sensing (and subsequently, the buzzer starts beeping) the distance of the nearby object from the module when some one pressed the button. The frequency of a buzzer is more when the object is nearer and gets less as the object gets farther from the module.
It also has an additional feature, where the user can send their location (through a Google maps link) to their relatives' phone number, in case they need help. The SMS alert is sent only when the user presses another button located on the module.

Until now we have successfully implemented our two modules using Ultrasonic sensors to detect obstacles and GPRS module for finding the location in case a blind person has somehow lost his way to home, this would help his relatives to locate him easily. All the above modules have been implemented on an Arduino Uno board.

We are still looking for techniques that would aid the blind so that they could be independent in doing their day-to-day chorus. Our aim is not only limited to such extent,but we are willing to help in any way possible so that they could live their lives without any terms and conditions of anyone else.

We will be implementing a module for face detection using a IP webcam application. So, when the user is at home, he can easily identify who is entering his house. The module will be fetched with data beforehand and then it will match the stored data with the data that would be provided at that time. It would help the blind people who mostly live alone. They will feel safer in their house.

There are many places which do not have either lift or escalators so even the blind people need to take the stairs, which is quite difficult them without any help. So another addition we are planning to incorporate in our project is for climbing the stairs using Infrared Sensors, it will give them an indications that there are stairs ahead and guide them at every step.

CHAPTER 1

INTRODUCTION

1.1 MOTIVATION FOR THE PROJECT

As the technologies involved in the world of Internet of Things (IoT) has become more advanced. So we chose to make our project which could help people with severe vision issues, incorporating various concepts in IoT. Blind people often find it difficult to find path and often get lost.

As per the statistics, more accidents occur with visually impaired people. So, our project mainly focuses to make them more independent to perform their day-to-day chorus. Our project is an improved version of the typical blind stick that will help the users to be more independent.

1.1.1 STATISTICS

According to WHO, 2.2 billion people of the world are visually impaired and out of which 1 billion have a disabled vision impairment that could be cured. This 1 billion people comprises those with moderate or acute blindness due to unnoticeable refractive error (123.5 million), cataract (64.75 million), glaucoma (7.0 million), corneal opacities (5.0 million), diabetic retinopathy (2.99 million), and trachoma (1.99 million), as well as near vision impairment and far vision caused by presbyopia (826 million)

and Hyperopia.

1.2 BACKGROUND

1.2.1 STUDY 1: SURVEY CONDUCTED ON 300 BLIND PEOPLE

1.2.1.1 ABSTRACT

On 13th October 2009 a survey has been done according to which many blind people asked many questions related to their daily experiences and how they survived on daily basis [1].

The first survey question reported by the article was based on whether accidents are involving more of a blind person which are in a real life environment, i.e., mishappening when he is walking on an empty road signify their experience of walking, or else they should be another way by considered as insignificant not affecting them. This question must be considered, by anyone who is eventually involved, in the developing a new high profiled working tools for the people having visual disableness. Obviously, other traffic-related accidents must be considered important and should be thought upon by research.

The second survey question was difference in numbers of accidents between blind stick using person and dog guiding useing people. Taking both situations with stick guide and dog guide are intrinsically different, And they were very keen to know whether these two methods help the blind people to know whether they could easily provide with the accurate level of protecting people, or they can provide support to one another so as to reduce accidents frequency.

The third survey question is relating the people who are not familiar with route are more likely to experienced day by day more accidents. By using this information,by means of this survey could help people to identify which section of the society requires more in need of technologies so to prevent accidents related to dependent and independent people [2].

The survey was incorporated with four major parts:

1. Demographics means statistical data.
2. Travelling habits which includes mobility preventions and the number of frequency of travel outside where as inside their own residence and their familiar routes.
3. Occurrence of unexpected obstacle bumping against head-level accidents, its frequencies, its situations, and their consequence.
4. Number of trips which results in a fall, its frequency, its situations, and their resonable reasons.

1.2.1.2 CONCLUSIONS

As per the survey interviewed the highlights of few of the major risks and its issues related to the independent and the normal person. Taking Reference to the several surveys questions arised and discussed previously analysis of the responses which also provides useful data on a number of interesting facts vision i.e. number of visual impaired people accidents represents a non significant risk related to walking without vision. 13% of the responses experienced serious accidents more than once in a month; 7% experienced accidents like falling while walking more than once in a month. These accidents usually needed medical attention so that they can cure as soon as possible and can live happily.

The types of mobility cured used which may not cause a specificly effect on the number of frequencies of accidents. The use of a dog guide versus cane guide didn't provide better protection against serious accidents verses excess use of a blindstick for many individuals who have travelled frequently outside result were not seem at majority of risk of serious accidents as compared to those who have left their home with minimum frequency than them. These results can be assured accordingly and can be interpreted with considering the population which this survey has interviewed and therefore was mainly focused towards younger age groups as compared to the elder age group, expert travelling people with several years of experience using many first aid

techniques, and dog guide users representing 39 % of the responses have less usage of new techniques to safe the blind for accidents [3].

1.2.2 STUDY 2: IN CARNEGIE MELLON UNIVERSITY, PENNSYLVANIA

1.2.2.1 ABSTRACT

- About 90 percent of the blind people cannot travel independently or without any help, 7 percent use a blind stick, 4 percent may use a dog guide but only 1 percent of them choose to use dog guide due to the lot of caring required which is not possible for blind person to care the dog [4].

- Regardless of the tool effects used, the factor that mostly determines a person's ability with regard to mobility is the important use which can be essential personal skills.

- The ability to find and get the accurate current location of a blind person plays an important role as well as challenging, and require skills to acquire the same.

- It is one which is very difficult to get around inside as well as outside because outside risk is more than inside.

- Therefore a thought came into a mind knowing a big thing is more important.

- There is a psychological hindrance and a stigma related with using smart devices, even sticks.

- Speech is actually the best mode for interacting with people, in spite of the fact that it burdens the load on the sense hearing, which the blind rely on to localize with other people around them as well.

- One of the new technologies like cell phone which is the most valuable pack of technology for the blind people.

1.2.2.2 PROBLEM STATEMENT

Based on the initial user and thinkers study and the review of the already existing work, the problem statement has been formulated as follows: to design indoor and outdoor navigation assistance that

• would help in point-to-point location and navigate by giving oral directions,

• would inform the blind about the current location,

• would not attempt to replace traditional mobility aids, such as a stick,

• should employ either tactile, audible or touch sensation interfaces,

• must not ideally occupy the user's free hand to hinder him in any way,

• should allow receiver to control the amount of chatting, or extra spoken words provided by the system.

• must not hinder user's sense of hearing or draw unnecessary attention. At the same instant, the desired output of the system should try to overcome the problems and challenges faced by the navigation and location assisting devices in the past:

• Cost and reliability

• Absence of landmarks,

• Incompetent use of Braille tags in the buildings equipped with the same,

• All target users cannot read Braille.

1.2.2.3 EVALUATION

The evaluation comprises of five parts:

1. **Experimental protocol:**

The purpose of this survey was to determine the usage of the Blind people aid ETA which can reduced the quantity of time accuquired by the user to reach a specified location in an unknown building in comparison to the control known situation of no travelling aid. In spite of the fact the effectiveness and efficiency measured by the user interface is determined by the directions itself [5]. We ask many questions to different thinking people and interview which can help to distinguish between unknown areas and identify destination location problem.

2. **Quantitative Results :**

Now comes the numerical result evaluation, the study in this conveys, the comparison between the controlled and uncontrolled system conditions which are not mathematically significant. The results and conclusions are seemed to get indicating of an improvement version due to the excess use of Blind Aid system, and we were hoping that the usage of more and more participants for future and will help in studies which would results in statistical and mathematical significance of valid conclusions. In contrast with the implementation and evaluation of some of the suggestions given by the survey people and from users will definitely increase the border between the two situations.

3. Qualitative Results :

Important part of the survey is the acceptance by the public i.e. feedback regards to the ETA which was influencing public positively. All survey participants indicated that they were enjoying with the usage of a device which is similar to Blind Aid system, and which can improve the performance with more accurate practice time using this system. Some specified system comments indicates that the device will stand to give successfully decreasing cognitive load that can lead to devotion of navigation so that survey users will concentrate more on conversation and would covey it better. Another survey user exclaimed that the people which get lost with or without the device, the only disadvantage is that without the device, by luck one can find one way only which effect the users without the device which can have negative impact on users, and may lead to device less usage to the users.

4. Budget of prototype:

In general the budget of the survey should be in systematic way that the RFID tags which are purchased should be at each location which are intended to implement the Blind people Aid system. The rest of the budget costing will incurred by the users of the device, though the cost should be efficiently reduced by implementation of the software on own which is already implemented.

5. Cost Estimation:

It is mainly required after the completion which was estimated around 170 tags to equipped many rooms located at Newell Simon Hall 4th floor which consist of over 70 offices including rooms and we estimated that the grand number of pinpoints for the entire floor and ceiling to be around 900. At $0.50 a point, a roughly estimates for the price to equipped a floor of comparison able size in any building approx. $110 dollars. In spite of our lower volume purchased, the price of the tags were still efficiently and the price to equipped a whole floor which is likely to have much less than the price of the Braille signs for an entire floor. Therefore met the goal of an appreciable system to prevent the indoor navigation.

1.2.2.4 SOLUTION

The solution proposed for the problem statement consisted of an RFID reader manual carried by the user, and a network of in budget RFID tags in the building that are to be navigated. The RFID reader will be in touch to an easily accessible and portable computing device such as a mobile phone. The device, ETA, will be using prepared map data in order to determine the users current location and the destination path in which they are going that can be specified either by a voice interface or buttons provided on the device.

1.2.2.5 CONCLUSION

This study has concluded in the development of an effective, reliable, low-cost ETA for blind people and low vision people. This study in which devices and the RFID tags are used to showcase the environment that are not attracting the attention and are low cost so every needy person can easily use it. Moreover the navigation system

is very useful for the normal people as well as makes less severe the impact of the device with a vision disability and providing greater benefits for stakeholders to put the money in making buildings with the use of this technology. For example, directions and sending location information may be useful to deliver it to the workers and other building visitors, search teams and preventing teams, and even museum round can be performed using this technology [6].

These various users using this technology increasing the value of the device for those who would be willing to put their money in implementing their own buildings with the use of RFID tags, and could help better adoption of the system. The use of commercial hardware and software using industry standard rules and protocols for example, Bluetooth lowers the entire cost of the device and increases the rate of adoption by otherwise disinterested other parties. Therefore including other commercially available technology like RFID tags and readers as well as the easily accessible software which can be readily used in cell phones and PDAs for daily use. To make the study to be a success, the whole device must be a worthy investment for blind users in regard to cost of devices used and time required in learning how to use it. This in turn, rely on the large deployment of the RFID tags for all the system, or at least consistent with the deployment in a particular area.

1.2.3 STUDY 3: REHABILITATION OF BLIND

1.2.3.1 ABSTRACT

The blind and the visually impaired people that make a dominant group in our existing culture and therefore, needs greater consideration. Many of the rehabilitation counsellors, especially professional doctors do not attend this group properly [7].

Therefore, the major motive of the study lies in lightening the issue of ignorant attitude of restoration experts, especially occupational doctors, towards visually-disabled and blind people.

In developed and developing countries, visual impairments and blindness are considered as two most important topics to be discussed in the development of health, it also affects economy and social status of the country. As per the data collected by World Health Organization, almost thirty-eight million people around the world suffer from blindness and almost 110 million people are suffering from visual impairments. In addition to the given facts, the number is going up gradually.

Over 92 percent of visually-impaired people live in developed and developing nations. The existence of sightlessness in Asian developed and developing nations is somewhere between 3.2 percent to 4.5 percent.

In the country Iran, almost 165 thousand visually impaired people and 750 to 875 thousand persons suffer from poor vision. According to composed data from 35 universities of health and medicinal sciences in Iran, and it was discovered that existence of problems associated to sight among kids in the age group of four to six years, 1st

base and 3rd elementary, 1st middle, and 1st high school are 4.85 percent, 3.9 percent, 5.84 percent, and 4.3 percent, respectively.

The main goal of rehabilitation of the blind people, especially working therapists, in order to increase and enhance the quality of their life and motivate people with incapacities to participate.

Though there are many visually-disabled and blind people in Iran, these people doesn't want to hire in the services of their restoration and therapists because to the taboos that are cultivated in our society due to culture and social status.

1.2.3.2 RESULTS

On finding available databases, a sum of 115 articles concerning the blind and persons with vision-impairment in Iran were identified. On this basis of the criteria of inclusion and exclusion, 93 articles were uninvolved. Out of which four more articles were removed because to their plagiarism in their material. Thus, review result is built on the remnant seventeen article. Articles that were associated to the area of contribution are categorized in Figure 1.1. It is significant to note that some articles covered more than one subject area [8].

1.2.3.3 CONCLUSION

Because of the increasing number in the visual ailment and blindness cases prevailing around the world, it has become really very necessary to design and implement good and appropriate inventions for them to make their life independent. Occupational therapists have the biggest and most comprehensive role among the members who are involved in the rehabilitation of visually-impaired people. On the basis of their viewpoint of enabling the differently-abled, it is quite necessary that we emphasise on the blind and those who have visual-impairment and do rigorous, deep and comprehensive studies so that the people of this set can get advanced in their day-to-day life.

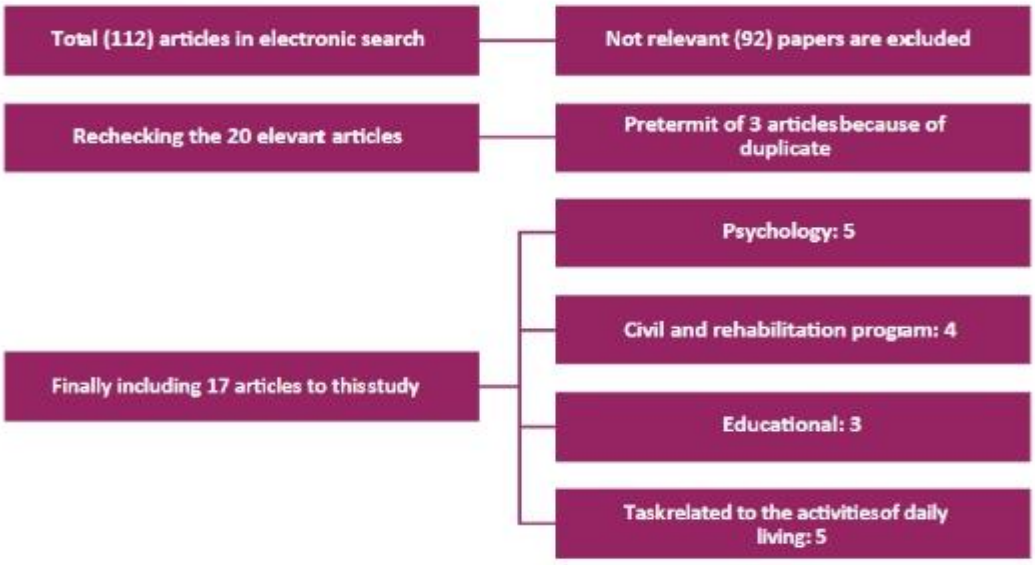


Figure 1.2.3.1: Outcomes of systematic search about proceeding for Iranian blinds and low vision

1.2.4 STUDY ON: WEARABLE FACE RECOGNITION SYSTEM TO HELP VISUALLY IMPAIRED PEOPLE

1.2.4.1 ABSTRACT

In this world of different technology many systems have been established which are used to help so that they could help themselves easily without the support of another person. Over the recent years, many prototyped models have been occurred to solve the problems of visually impaired person with the help of facial recognition technique.

Summary of this facial recognition system technique is described to help the blind and poor-vision people. In one of the system that uses a Microsoft Kinect sensor like a device that can be worn, it performs facial detection, and it can also produce and generates sound related with the uniquely known person, and virtualized at her/his predictable 3-Directional location.

1.2.4.2 INTRODUCTION

As vision impairment act as a barricade in the day-to-day chorus and there is a constant fighting between the new system to benefit these people. Regular activities like walking, any related work and obstacle identifying make it problematic for visually-impaired people to live in. System backing-up new technologies which can support them in some of the activities. The great test faced by the visually impaired are the facial recognition delinquent. It normally occur in many place where they are in societal gathering where the discussion get intermittent not only by saying words but moreover by non-verbal activities that is the face expressions.

By way of day to day technologies are getting advanced wearable devices are being developed to support them. This would be great help to recognize someone distance from them without her/him to speak by knowing he/she could turn according to it and involve her and respond in their conversation. But by doing this hardware stand many things should be keep in mind i.e to be portable and be cost effective to fullfill the usefullness of visually impaired people. By which it can help the low vision people via a diverse system which have been made. Facial recognition system technique is one of which can help the people in social gathering and another section comprises of survey which have been done on different system.

1.2.4.3 LITERATURE SURVEY ON DIFFERENT SYSTEM

1.2.4.3.1 NAVIGATION SYSTEM

The Navigation System, primarily focuses on two sections that are detecting of abrupt neighboring in which environment against complicated work for the visually-impaired people and noticed about hinderance by means of which shaking come along with the audio feedback system. The System techniques mostly consist of designs and developed a multiple deepness, obstacle detect and a RGB sensors and side by side regulator for detection at the lowest possible obstacle and had developed audio recordings and playing modules.

Different possible situations	Announcement which will appear in headphone
User is moving on the grass	You are moving on grass
User is on the road	You are walking on road
User is on zebra crossing	You are on zebra crossing
User is on upstairs	Alarm or specific tune will be generated
User is on downstairs	Different specific tune will be generated

Figure 1.2.4.3.1 Survey feedback at different situations

1.2.4.3.2 CLOTHING PATTERN RECOGNITION

It is very difficult for visually impaired people to choose clothes with different colours and pattern combination. Therefore, for helping this a camera-based technique is used to help the visually- impaired people so as to identify clothing patterns and colours.

The system comprises of three main components:

1. The Sensors includes one camera so as to capture the clothing pictures, whereas one microphone is used for communication regulator inputs and speaker/ Bluetooth else earphone for voice outputs.

2. Data captured and analysed to achieve some commands control, the clothing patterns recognization and colour identification via computer / a smartphone/ a minicomputer one that user can have.

3. Voice outputs to give recognizing outcome of clothing patterns and colours as well as the system status.

1.2.4.3.3 CURRENCY READER USING PHONE CAMERA

In the system pattern identification from the users to click a screenshot and then system work to recognize it. In case the image is not taken perfectly, recognition gets fails and the users had to take a new picture. As this is impossible for the poor vision people for this it has to process the image in the real time, the currency reader which is able to read the video stream and it will try to relocate and distinguish each and every frame in order the user can get the camera which will approach the currencies.

1.2.4.4 CONCLUSION

Overview of different systems can be abridged to resolved the difficulties of the visually-impaired people. Primarily facial recognition systems technique which will help to resolve real time problems and person recognition side by side facial recognition. The (ICIA) iCare Interaction Assistant that uses two algorithms that namely are PCA and LDA. Both algorithms give their best for giving face images. But somehow several issues are needed to be addressed.

CHAPTER 2

LITERATURE REVIEW

2.1 REASEARCH PAPER ON GPS MODULE

2.1.1 INTRODUCTION

Day by day different types of devices are envolving which are used by visually-impaired people as well as blind people so that they can navigate easily in the real environment. The blind stick or a cane is one of the most successful and is most widely used in order to travel to detect any obstacles that are present on the ground, not even surface, and other hindrances [9].

This system has following advantages like it is light weighted and take less space due to small area encorporation but the one who is using it, must be educated to use it which would take more than 100 hours.

Moreover, the blind stick requires the blind people to sincerely scan the path which is in front of him. The blind stick is also capable in, to detect the obstacles that are quite at head level.

Normally, the solution that is often used are the guiding dogs, who are trained to guide for the blind people, but it requires them to through extensive training. The trained dogs are quite expensive and do not fit everyone's budget. Moreover, these dogs are good for about 5 to 6 years. Furthermore, many visually impaired people and blind people are above aged and therefore they find it very difficult to take care of another human being.

Over previous time gone, many smart devices which are based on different sensors and basically based on digital signal processing that have been invented. Such devices are known as ETA i.e. Electronic Travel Aid that possess the ability to improven the mobility of the visually-impaired people and of blind people using in terms of safety that is in an alien manner or drastically changing environment.

There are some way in which most of these devices have quite similar working to the working of radar systems i.e. a laser or ultrasonic waves which are sent in the concerned area and then the echo is reverted that is generated by obstacles and can easily be detected.

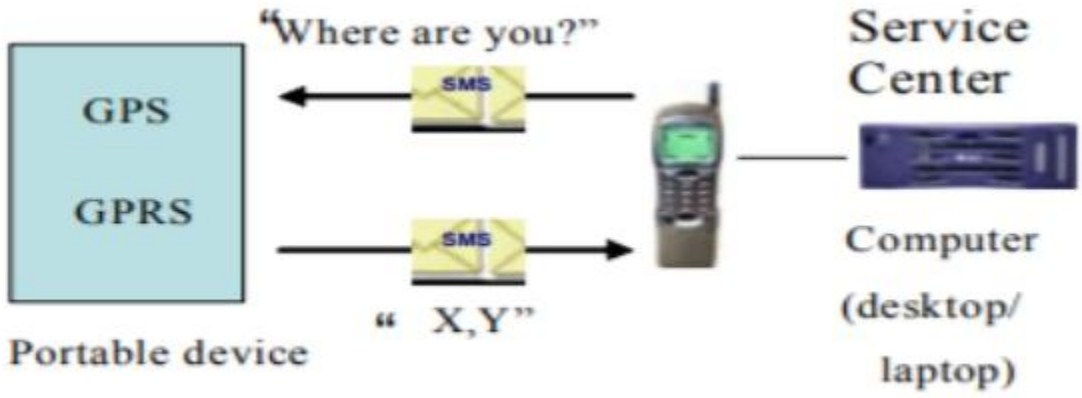


Figure 2.1: Tracking procedure of the subject

2.1.2 RESULTS

The time of the echo reversion is the measurement of the distance travelled from the particle to the position of obstacle. In common scenario, obstacles are not distant than 5-6 meters ahead of the smart device can be detected. In most of the cases seen, the data that is acquired are locally processed and after that the information needed is conveyed to the person using it. Several different tactics like haptic and oral messages are used to convey the message.

2.1.3 CONCLUSION

In the given paper the integrated environment is set to improve the mobility of visual impaired and blind persons in a limited area that is already defined has been stated. The given solution can be any wearable sensing equipment which is placed on the people having under considerations, which helping the visually impaired user to locate and traverse themselves freely and safely with obstacles and avoids them and other stationary equipment, which overlooks the motion, so that it can avoid unexpected events that might happen.

The proposed methodology includes all the modules that are necessary to implement for an effective and efficient global path planning, which is based on the Geographic Information System (GIS system), which can find a local path, which is obtained to be using sensitive data [10].

The future scope and work of the team involved in the research would be focussing on the processed data and data with fusion working collected by sensors, it would use technologies like neural networks and virtual reality.

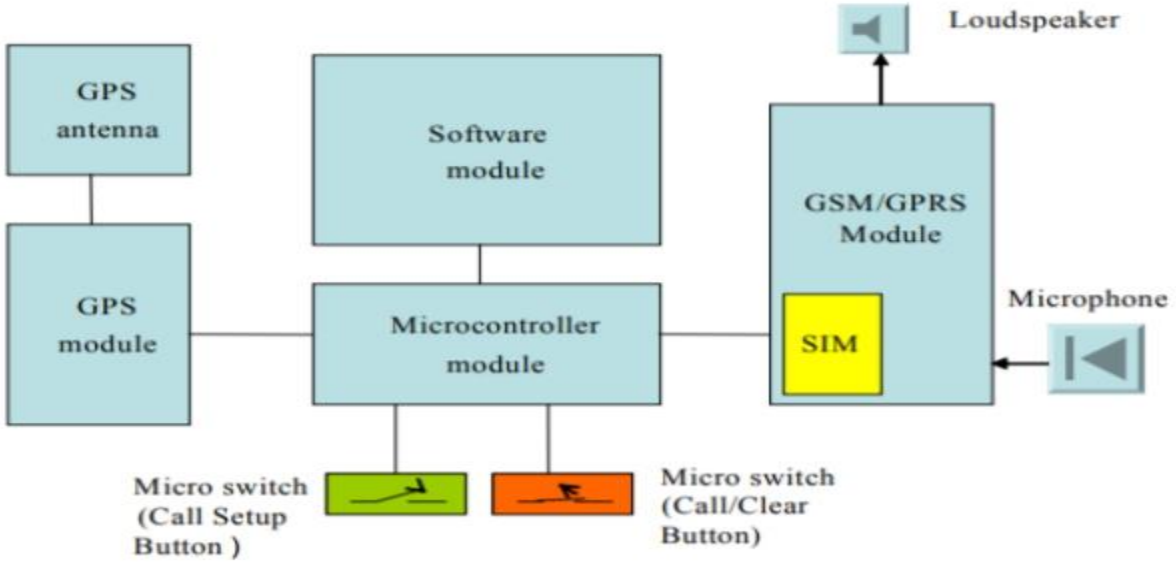


Figure 2.2: Detailed Structure of supervising system

2.2 RESEARCH PAPER ON BLIND STICK BASED IN SENSORS FOR THE NAVIGATION OF THE BLIND

2.2.1 ABSTRACT

The aim of this research paper is to present a conceptual and hardware model that could combine the latest technology in order to provide efficient, effective and smart electronic help for those who are visually-impaired or have low vision. This paper uses an ultrasonic sensor to assist the blind people by locating obstacles around them and uses a sensor that could detect different colour so it measures the specific path that will be used by them. A Bluetooth module that uses GPS technology and the Android mobile app for blind will provide the concerned location and, in the event of an emergency, the app sends an alert via SMS to the registered contact number. The device will help the blind people with real-time and simple location and navigation aids that would help them with artificial vision [11].

2.2.2 RESULT

This hardware made and android application for mobile phones will work at the same time to achieve its goal. First of all, the distance will be scanned on the hardware made using Ultrasonic sensors and then it would check if the obstacles are very close, then it sends pulse to vibrator to inform the blind person that there is an obstacle in front of him. Three vibrators are mounted so that when the user

wants to make his motion forward, sidewise left or right and if there is an obstacle on his way then the vibrator will start vibrating so that he/she can change their path from that way.

The Bluetooth module that uses a GPS device and an Android application for mobile phones for non-visual vision will inform the accurate and appropriate location of the user of the stick, and in the event of an emergency, a notification would be sent through a SMS to the registered contact number submitted by the user.

The device will continuously monitor the panic button if the user presses the panic button in case of an accident, the device will send a command to trigger the android application through blue-tooth, then using GSM connection in the application used, it will observe the current location of the user and send it to the desired phone number on which, the user wants to get the message received. A colour sensor has been mount at the upper side of the blind stick so as to detection the presence of red colour and spot and detect the exact coordinates across the whole colour spectrum, if the user left the colour spectrum then the vibrator would start vibrating in such case [12].

2.2.3 CONCLUSION

In this paper, the authors put forward the concept of how the system can be planned and smart phones, and it is very easy to use for users who are visually-impaired. For blinds and visually disabled persons around the world there are no as such arrangements. Though they also possess the same rights as others and they also want to enjoy and live life to the fullest as we do [13].

The motive to design this project for visually-impaired persons is to facilitate them and reach them out so that they do not need any help of some intruder and become independent. The three vibrators that are used in this paper are the ways to the blind that would be able to know how and the way where they want to go. In the situation of any accidental happening, the guardians of the blind will get the information immediately and they will be able to find and help him. With the help of this system now a blind person can go out of his house all by himself too easily. This development could be more transformed to enhance the ranges for obstructions, obstacles and development in GPS (Global Positioning System) technology continues to improve and increase the accuracy of the location to be sent. The advancement in mobile technology has helped a lot to develop more efficient applications for continuous habitat assessment. The Internet of Things(IoT) and Wi-Fi can also be involved in such devices, so that modules such as weather and traffic forecasts could help visually-impaired people to make better decisions.

2.3 REASEACH PAPER ON VIRTUAL ENVIRONMENT

2.3.1 ABSTRACT

For blind people, it is troublesome and dangerous to explore the environment. From some years, people with disabilities are using virtual reality as a tool for learning and rehabilitation. This research is on the theory that we may assist blind people by giving them appropriate information (perceptually and can say conceptually too)

using compensatory sensitive channels. This research can help the user to verify a virtual ongoing environment by using the advanced developed and the tested BlindAid system. Therefor the main objective of the research was: (a) to evaluate different method (audio and haptic) and navigation tools (b) to evaluate Spatial Cognitive mapping engaged by blind people. The research is done on four people who were blind. According to Preparatory reports, these four people by exploring the virtual environment were able to develop extensive cognitive maps [14].

2.3.2 INTRODUCTION

Human visuals senses which plays a important role in helping a visually blind person in an environment which is not known to them and maily assists him/her to achieve the final destination freely and safely. Unfortunately,the blind people is finding it very difficult to perform common tasks. Research on the O&M i.e. orientation and mobility skills of the blind people specifically in known and unknown places (Passini & Proulx, 1988, Ungar, Blades, & Spencer, in 1996) showed that the performance support for procurement of the spatial mapped and the direction skilled which should be provided by two main levels that is perceptually and conceptually.

The perceptual level can be described as, the message obtained by different senses that it should atoned for the defect obtained in the visual channels. In 1969, Amendola on based on her scouting working in sensory training based on the systematic compile of data collected from the accurately environment through the haptic, olfactory senses, and audios. “Haptic” is derived from the latin word “haptikos” which means “able to touch.” Taking reference to this paper haptic term is confined used to depict the touch mediated manual communications deals with real/virtual environments i.e.VEs by Srinivasan & Basdogan in 1997. Taking the conceptual level it is focused of this training which is in support of the development of some proper orientations and strategies by Jacobson in1993, in spatial models by Fletcher in 1980 and by Kitchin & Jacobson in 1997, orientation problem by solving to get a effective and cognitive mapping of a real/virtual space and therefore exercise that mapped during the navigation. Research of spatial models that shows the blind people which uses the route model only when they can navigate in spaces by Fletcher in 1980[15].

Over the years of the decades, secondary O&M aids are being developed to assist the blind persons to explore real areas. The secondary aids ascpects depicted the below are not a replacement for the primary aids but likely to the long cane and therefore as the seeing-eye dog. The prevailaged inventory of the O&M electronic aids comprises of quite 150 systems, devices and products by Roentgen, Soede, Gelderblom & de Witte in 2008. It comprises of 2 forms of a secondary O&M aids that are preplanning aids that give the user with full data before the his or her arrival within the environment like example description, strip maps, tactile maps, physical models and talking to the tactile maps and so as to unmoved the designing of aids that will give the user with full data regarding the atmosphere of unmoved like example Sonicguide, Talking Signs, embedded sensors within having the atmosphere activation audio exploitation telephone technology, and specifically GPS.

The uses of virtual reality in the domains likely to have simulation based on coaching for the learning and a rehabilitation for any individuals encorprated with many disabilities which has been on the increment in recently years by Schultheis & Rizzo in 2001. Analysis based on the implementation of these haptic technologies at any intervals via a VEs and their prospective potential for supporting in any learning and the rehabilitation coaching that has been reported for the blind people. The Sound-based in VEs that have been analysed through and the developed by D'Atri et al in 2007, by Gonzalez-Mora in 2003, by Kurniawan, Sporka, Nevec, & Slavik in 2004, by Sánchez, by Noriega, & by Farías in 2008 by Seki & Sato in 2010. These analysis have results showed that users needs highly attention to this audience of feedbacks. The advanced technological in the haptic of the interfaces technologies that may help the blind people so as to expand their spatial specific knowledge by using several artificial reality through the haptic and the auditive feedback by Evett & Brown, Battersby, Ridley in 2009, by Lahav & Mioduser in 2005,by Lécuyer et in 2001,by Semwal & Evans-Kamp in 2000, by Tzovaras, Nikolakis, Fergadis, Malasiotis, & Stavrakis in 2004. These analysis may conclude the many results which will show that the users will be able to acknowledge the shapes and objects of the conclusion and to tell about the precised position of this article within the spaces. Tzovaras et in 2004 showed that the vast of their analysis participants were like to have the virtual environments that supported the haptic as well as audio feedback and therefore they anticipated the virtually objects to be closed to that of the physical objects.

2.3.3 RESULTS

Question arises of which are haptic, audio, and exploration tool properties in VE did the users like?[16]

Haptic Properties:

The haptic outcomes (VE3-VE8) show that fifty%-eightyeight% of the contributors display a choice for 9 of the eighteen test objects; 6 of the items were with preferred haptic homes with sleek texture. All the contributors indicated that they like interactions with sleek and strong VE components as a result of they have been much less perplexing and wanted the collection of less statistics.

For instance, B. stated that it is too puzzling, and many textures each item having their very own texture a good way to be almost too much, sure! Preserve it easy and stable.' Among gadgets they favoured 2 haptic types: hard and tender. All the individuals referred to that they might like, for safety reasons, that certain additives example like stairs, alarm door can be decided on with a unique inflexible texture.

The members created differentiation among haptic and audio feedback, the Phantom helped to find gadgets in the VE, and to footprint the structure and object form, and the audio remarks helped them to gather additional facts about the items. As B. Stated, 'I used the Phantom for orientation. Audio allows me to get greater information approximately the object description.

May be distracting with each like Or C. Explains the as speedy as I hear that I'm touching some thing, I don't understand what it looks like anymore'.

Audio Properties:

Three audio modes, counting mono, stereo, and stereo with rotation, were tested in diverse VEs (VE9-VE11). At the quit of those three audio exams, 3 of the members favored the stereo as an audio remarks, and one chose the mono. The player who preferred the mono as an audio feedback, defined, 'I think I determined it [stereo] extra complex [17].

It become type of an introduced variable I had hassle tracking, I did not locate the rotation very beneficial, I think it turned into complicated that the stereo became wanted most effective when deciding which course to move within the map. All the alternative members stated that it turned into the stereo that gave them a feel of ambient sound of the gap, which helped them determine which course to move inside the map, and gave them more course to the general area.

Whereas, the stereo with rotation was an upload on component that they required to song, imagining their orientation within the VE whilst additionally listening to the audio remarks. For instance, D. Said that i didn't locate it terribly useful, it delivered every other measurement, which I didn't locate vita, it adds every other layer of complexity that doesn't help, it we could me confuse myself more'.

Beside the audio mode, the Blind Aid blanketed three kinds of sound – contact, heritage, and landmark. All the members quoted that the short contact remarks is needed to be clear and recognizable. All the members settled on the way the VE components were expressed through ear cons or labelled audio results. The added audio remarks was on-demand.

Usually, after analyzing the VE, they often used this tool to collect more facts about the VEs' additives. As A. Said, 'Actually I want to have both, because my reminiscence does not need to don't forget any specifics, so I use the additional description, I am now not usually positive about name or some thing I need to take into account'. The participants did not cope with being overloaded by way of the audio comments.

Similar to actual space heritage sound example road noise, the VE heritage audio impact assist the users in directing themselves within the space. The endless VE historical past sound with the stereo mode become green and important.

Exploration Tools Properties:

The player became schooled to use each technique in a exact VE (VE12 and VE13). In the end, all 4 of the members favored to apply the Phantom method for the transferring of virtual workspace. They got to know that the Phantom technique changed into a much more directed and natural motion.

It become greater immediately related to the long cane and bring a experience of participation and having control over moves. For example, A. Said, ‘in my mind [it] is associated with a cane or a sort of a traveling feat, so it become type of more immediate…it gave me the sense of really moving[18].

Sense of getting some participation and manipulate over the motion. For others it became a natural movement. D. Stated, ‘It regarded more of a herbal motion to me; with the Phantom on every occasion I push the button I believe I became making the pen keep on with the floor and then pass it over, I can mentally see myself doing that, that just seemed greater herbal to me’.

By using this method, they have been in a position to drag the workspace on an perspective, and not simplest simply flow left and proper or ahead and backward as carried out by way of the use of the arrow keys. In addition, through the usage of the Phantom button the individuals advanced a new approach that served as a place mainstay at some stage in the workspace movement system. The participants have been able to installation and to bear in mind landmarks without problems. They used this device mainly in a complicated VE, and that they typically hooked up only 2 (out of five).

2.3.4 CONCLUSION

There are obstacles to analysis conclusions inherent in any initial examine. In destiny we are planning to conduct a follow-up take a look at, using round 10 blind human beings. In the current analysis the members created verbal descriptions and physical fashions in preference to working in a actual area. The latter has greater outside validity with few alternate-offs.

The preference to use no real areas become installed at the availability and accessibility to spaces in distinct shapes and sizes, and the wide variety of components involved inside the area in the course of the time of studies. This study’s analysis has important implications for the continuation of the analysis, and additionally for implementation [19].

Further research have to study the individuals’ inspection of unknown environments and follow this spatial know-how in the comparable actual areas thru orientation real-area tasks. Additional variables to be taken into consideration have to relate to the contributors’ development of complete cognitive maps for indoor and out of doors areas.

Other analysis may look at the individuals’ capability to assemble cognitive maps because of inspection of several vertical tiers inside the VE. Finally, a comparison between kind of inspection (free fashion mode as opposed to predefined course) on their exploration functionality, construction of cognitive map, practice this perception inside the real space, and its effect on their orientation choice to discover new spaces, and engagement. These new VEs to be analysed and advanced would require to be simple and smooth to research, granting human beings to perform freely and to acquire spatial data in a quick time.

2.4 RESEARCH PAPER ON SMART ASSISTANCE FOR BLIND PEOPLE WITH AUDIO GUIDANCE BY USING FACE RECOGNITION

2.4.1 ABSTRACT

According to the World Health Organization,the scenario of worldwide 289million people are totally visually impaired, 40million people are extremely blind and 249million people have poor vision. Almost 91% people of the world visually impaired people which are living in these developing countries.Now a days technologies always give their best to make human life easier. Therefore, the main purpose of this paper is to make an end to blindness by construction of a microcontroller based on automated hardware which can provide a confirm to a blind people to detect any obstacles or things or any persons in front of them quickly and guiding them about obstacle via audio response.

In this proposed worked model which is trained with certain objects and faces, and after which it is implemented via a Viola-Jones algorithm. This model contsist of microprocessor which receives data via a camera and response of ultrasonic sensor and responseaccording to it. And according to that data it guides the blind person with audio through earphone[34]. Application of this model are used in the self propelling vehicles, automated robotics in automatic production factories and so on.

2.4.2 INTRODUCTION

The methods to calculate the distance of hindrance are many, the method is with the help of the ultrasonic sensor. The applications are generally mobility aid for visually impaired person, self-propelling vehicles and automated robotics. Self-propelling vehicles are famous for automatic tools valuable in industries that are depending on automatic machineries. The first module of the paper offers information about ultrasonic sensors, with help of microprocessor unit and based on the output waveform in which pulse width differs with measuring distance. And also it will provide full information about building of an ultrasonic distance measurement system. In the second module of the paper explain how objects or faces are being recognized by the system. We are using Viola-Jones Algorithm for detection of objects. In object detection we are going to detect fixed shape objects and human faces. And guide blind people according to processed data.

2.4.3 METHODOLOGIES

In the first module of this paper are focused on Detection of any obstacle. To detect obstacles with help of Ultra Sonic Sensor HC-SR04. Ultrasonic HC-SR04 ranging module provides 2cm to 4m independent distance measurement. The ultrasonic HCSR04 module consist of ultrasonic receiver, ultrasonic transmitter and controller circuit[47].

The elementary principle of working:

A. By using input/output, activate for atleast 10µSec at good level signal.

B. The Module works robotically and sends 8 pulses at 40khz and detect the process whether back to receiver there is a echo signal or not.

C. If the above point is true i.e. echo signal is back via high level, time of high output input/output duration is the time I.e from sending the ultrasonic signal to returning the signa[39].

Obstacle Distance = (high level time(sec) × velocity of sound 340m/sec) / 2

Wire connection in ultrasonic sensor are as follows :

- 5V power supply,
- (Input) Trigger Pulse,
- (Output) Echo Pulse,
- Ground

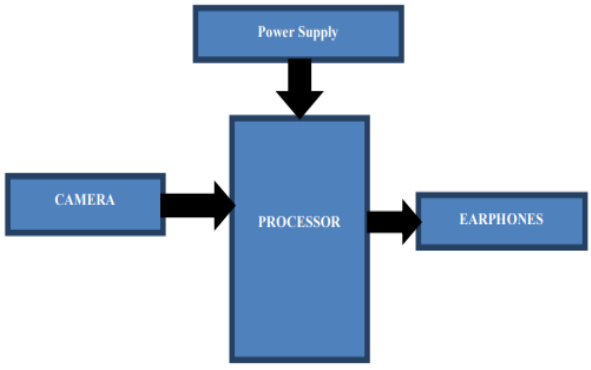


Figure 2.4.3: Block diagram of Object/face detection Unit

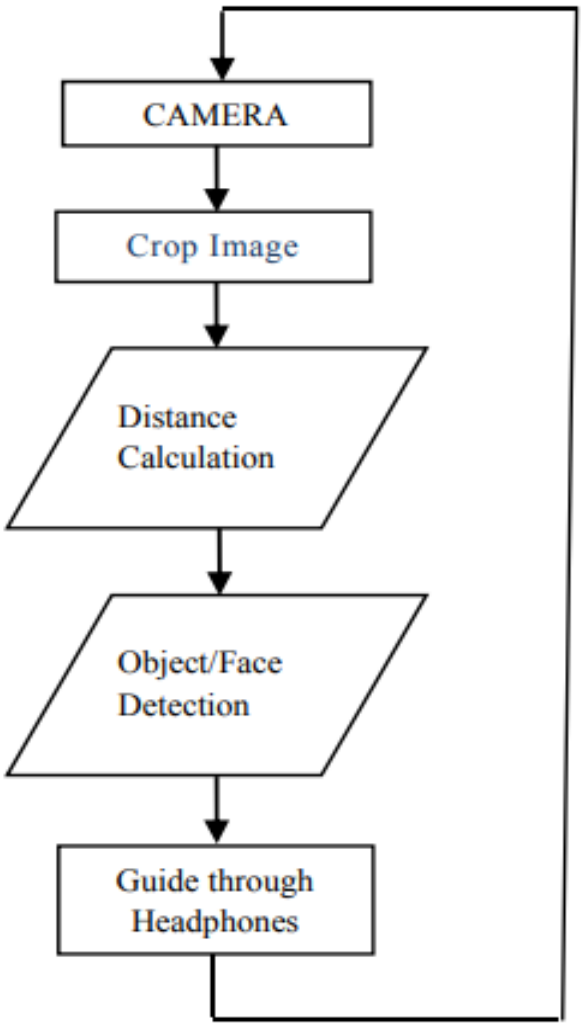


Figure 2.4.3: Flow chart

2.4.4 CONCLUSIONS

This paper results in new design and simple architecture for guidance of visually impaired persons. The combination of different units which makes a real time system and guides the blind person.As this model have many applications which are self propelling vehicles and automatic robots[40].

2.5 FACE AND FACIAL EXPRESSIONS RECOGNITION FOR VISUALLY-IMPAIRED PEOPLE

2.5.1 INTRODUCTION

Human face recognition and detection play an important role in many of the applications like video security and image database management. In this research paper both face recognition and face detection techniques are discussed. The user is made to wear camera lens, and the system recognizes and states the name of the person saved in the database and when his face comes in view of the camera. For facial recognition, some of the algorithm taken into account are Viola Jones for detection of face, PCA (Principal Component Analysis) through which an unknown image is to be recognize and tested, by relating it with the already known images already stored in database. Moreover, it also gives information concerning the person who is recognized. All those techniques works good under robust conditions for example different face positions and complex background. These techniques work fine for Indian faces that have specific appearance varying under a series. Some real-life examples are taken and algorithms are replicated in MATLAB successfully.

It is approximated that 287 million people worldwide are visually weakened among those 245 million with poor vision and 38 million blind[41]. Approximately 87%, these people are from developing nations and 84% of blind persons are aged 55 and over. In Maryland where this study was conducted, there are around 1,00,000 individuals who are completely blind [2]. Each one individual is identified by their face. As we know face is the utmost important part which is used for distinguishing a person from another. Every face has distinct features and have distinct physiognomies of its own. Therefore, facial recognition plays an important role in human behaviour. In particular, facial expressions play a vital role in the human to anthropoid communications and gives very solid clue in determining how much a person is interested in a person while interacting with a machine.

If both of the systems used by the blind. They could be alot of help for blind people. In this paper, blind people will themselves be able to recognize people by the facial recognition and they'll get an voice message about the person recognized, "This is so and so person" and therefore blind people can themselves become able to start the conversation with the people without having to pause for other from opposite side to come and speak to them, it's just he has to recognize the other person(given that person details already saved in system database) .The all new faces can also be feeded time-to-time to the database.

Practically, the knowledge is to bring the people with poor vision and blind a bit closer to the normal-sighted people. It will enable them to recognize other people and their expressions by their own through the help of face identified from the database and video taken [42].

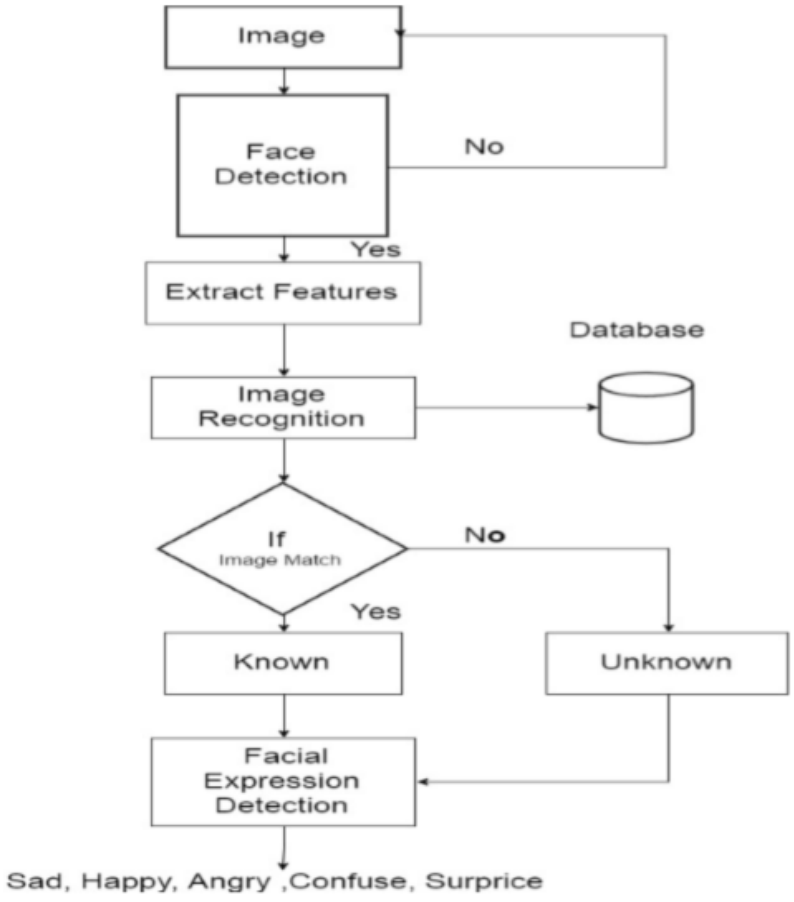


Figure 2.5.1 Algorithm for face detection

2.5.2 RESULTS

The paper represents facial recognition algorithm such as PCA **,** MPCA and LDA (Linear Discriminant Analysis) in which an unidentified test image is recognized by associating it with the already known images for training that are stored in database moreover it also gives evidence related to the person recognized.[44] These techniques work quite well under robust conditions like different face postures and complex background. All the algos give different rates of accuracy under various conditions as experimentally analysed[45].

In face detection module, the algorithm established that can detect different human faces from images. Skin colour is used as a tool for face detection. The technique works fine for Indian faces that have a distinct complexion changing under specific range. [47] Real life examples are taken and the algos are simulated in MATLAB positively.

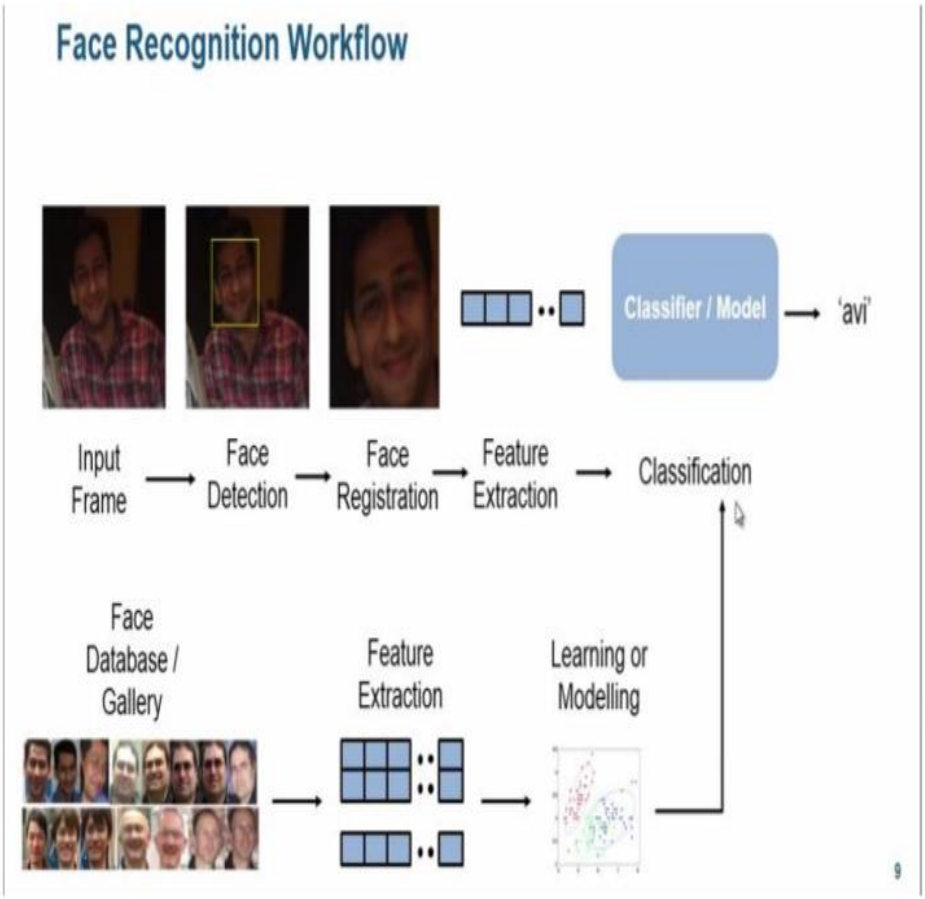


Figure 2.5.2 Experimental setup

2.5.3 CONCLUSION

In general, the research paper tried implementing the idea to bring the level of vision of people with low vision and the normal ones close so they are independent. This paper proposes a device that can enhance the contribution of the visually-impaired people by enabling them to be more actual and effective in societal interactions [49].

2.6 RESEARCH PAPER ON DESIGN AND DATA ANALYSIS FOR BELT FOR BLIND

2.6.1 INTRODUCTION

In this paper, a fresh support system is designed for walking for visually impaired people so that they can walk freely without any help or using any kind of guided cane. With this belt, the user can walk independently like he wants just like a normal human. In this paper, a belt that is wearable around the midriff is having one sharp infrared sensor and four ultrasonic sensors.

A prototype has been developed mathematically that is formed on the specifications of ultrasonic sensors to find best possible orientation of the sensors so as to detect staircase and holes.[50] The sensors are attached to a microcontroller alongside a laptop so that we can get sufficient data for analysing the kind of surface on the walkway of the visually impaired people. By analysing the acquired data, an algorithm is developed that is capable of categorising different types of obstacles. Belt developed for blind device is better because of less weight, ability to detect staircase and hole, low price, lower power consumption, comparatively less training, availability of actuation systems and adjustable. It was implemented and tested successfully to mark all those issues.

For the most part, to do outdoor works, the visually impaired face challenges. So, a large number of them utilize a guide stick as it is modest and accommodating to them.[51] This simple gadget that is mechanical is typically used to identify the outside of the ground, an obstruction in front, staircase, openings, and some more. A guide stick is affordable and light and can be taken to any spots with no trouble. In any case, a guide stick must be utilized ordinarily with the goal that the client can distinguish any change happened to the ground or to evade steps or some other deterrent.

Therefore, only users that are trained will be able to use the stick defiantly [52].Moreover, blind human being needs to take a look at the walking area constantly while they are walking. Another downside is that a guide stick cannot detect any object that is within the range of two-three metres and they can only detect an obstacle when they are touching it. In case there is no contact, the user will ultimately bump into it. It cannot identify any object that is moving and hence are exposed to dangers of accidents.

2.6.2 RESULTS

The issues in design are dealt with experimental setup for identifying various obstacles on the way of the blind [53]. The criteria of selection for the parts of the experimental setup and its specifications will be discussed.

Experiments are done on obstacles that are important for movement of blind people like drop off, holes and staircase movements and so on are done to come up with specific idea in identifying them.

Down Stair case is a part and parcel of every premises. Almost everyone needs to use staircase sometimes every day [54]. People who are absolutely fit may not find any difference between going down and climbing up a stair case. But when it comes to a blind this difference is really significant, downstairs needs to be detected before he step on to the first stair, otherwise some serious mishappening can happen to an extent that can cause death of the concerned person.

Before the detection of the border of the first stair, values from both the ultrasonic and infrared sensors towards the ground remains within a band of 35 to 40 inches [55]. As soon as the sound wave received from these sensors clears the border of the beginning of the first step downward it will instantaneously hit the next step(which is at a lower level than the first one), as such readings of the first two sensors ncreases suddenly, whereas readings of sensors of the other two will remain unchanged.

Stair climbing is the reverse process of downstairs, although, it is not as crucial as stair downwards. In this case, detection of such stairs, the sensors show lower values while the person is walking on a flat surface [56]. Through experiments it is found that first two sensors give readings less than 35 inches while other two sensors show readings that are less than 60 inches.

Drop off is also acritical obstacle like stair down case. It can be in three different ways as follows:

(1) in front of the person

(2) on the left of the person

(3) and on the right side of the person.

Readings of fist two sensors give readings of flat surfaces while readings of the other two sensors remains unchanged. In case since the drop off is very deep, readings at the border of the sensors are found to be around 100 inches [57]. However, the readings would depend on how deep the drop off is. Therefore, to differentiate drop off from staircase down we have chosen values of both the ultrasonic sensors more than 55 inches at the time of drop off. The value obtained is a bit higher than that for stair down.

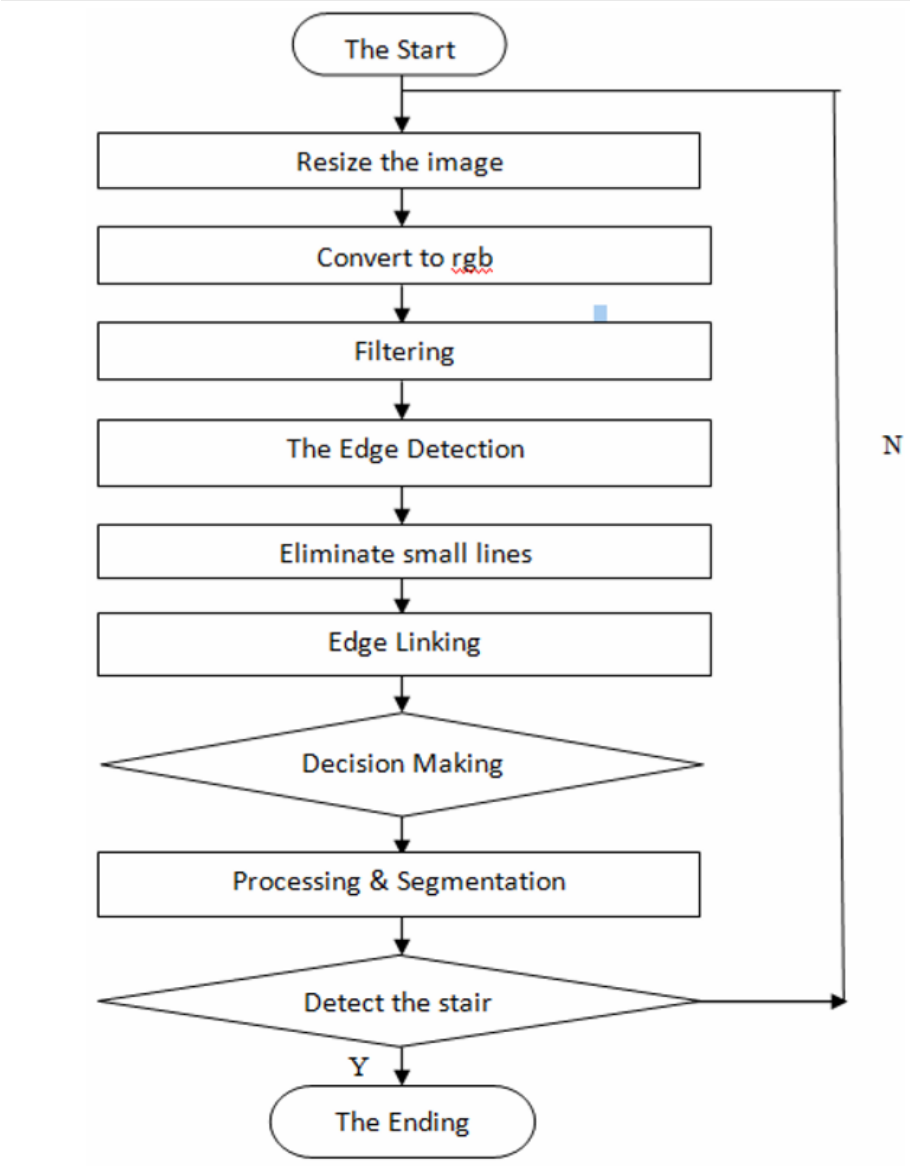


Figure 2.6.1 Work flow

2.6.3 CONCLUSIONS

The belt that is made for blind people is developed through the research aids visually impaired people can walk smoothly and independently[58]. A new moving support system for the visually challenged people, as per the definition of visually impaired where the term blindness refers to those people who did cannot see at all as well as to those considered as blind who have low vision, was proposed, and the purpose of making this walking aid for visually impaired is fulfilled. The objective of this study was to scrutinize through Mathematical model if sufficient data will be gathered using ultrasonic sensor for finding hole or staircase or not, and it was successfully attained at the stages of experimental setup, surface detection and performance analysis.

A mathematical prototype is proposed and developed that helped in determining proper orientation of all the sensors and moving pace of a visually impaired user for identifying obstacles like stair up, stair down, hole, and drop offs [59]. Algorithms were developed through large experimentations and rigorous efforts that are able to differentiate various obstacles around the walking way of a visually impaired. An absolute new walking system

for the blind people is designed for detecting different information about the terrain where the environment consists of different obstacles such as hole, stair, and so on. The designed model cannot differentiate between inanimate and animate obstacles. Therefore, in further works this has to be considered as an issue. To instruct scenario information even better, neuron network must be applied [60].

CHAPTER3
TECHNOLOGICAL AID PROPOSED

3.1 IOT

There's a lot of about new technologies but some technologies rise exponentially in our daily life one such is Internet of Things or IoT and its positive impact on everything from home to the way we travel, shopping to the way from outside world. Then question arises what is the Internet of Things, its working and how important it is in our daily life or to outside world and what are its application.

3.1.1 HISTORY OF IoT

The term Internet of Things is 20 years old according to Kevin Ashton. Perhaps the actual idea of many known connected devices was longer around, since the 70's. As we see back, the idea was first named and called "embedded internet" or by pervasive computing. Perhaps the real and actual meaning of the term as Internet of Things which was therefore invented by " Kevin Ashton" in 1999.By his working with Procter & Gamble and have worked both in supply chain and optimizing and wanted to grab the senior attention to the new arriving technologies such as called to be RFID. As the internet was becoming popular and hot in trend in 1999 and become somehow sensible, he gave his first presentation and titled it "Internet of Things" [20].
Therefore Kevin have been grabbed by the mind of some of the P&G executives but for the time being 10 years Iot it did not get any fame in the global world.

3.1.2 IoT TAKES OFF

1. In the summer of 2010 the conceptual aspects of Iot had started gaining some popularity in a globalized world. The information collected by Google's Street View which had made 360 degree pictures and tons of data related to people Wi-Fi networks which got leaked.
   This was the start of discussion on this which raises the issue on whether it was the initial of a new Google planning which was not for the index people but also index physical world.

2. By the continue year we must say that the Chinese government had therefore announced that it is in the five year plan they would make Internet of things a remarkable priority plan.

3. Gartner in the year 2011 which is called to be the market research company by the invention of hype-cycle which is what famous for the emerging new and old trending technologies including via an emerging and strategic phenomenon on their research i.e on The Internet of Things[21].

4. By the next coming year we can say the title of Europe largest and trending on internet on a conference named as LeWeb that was the Internet of Things. But at the casual time Forbes, a Fast Company which is popular in tech focused magazines and guidelines and starting using IoT as the emerging technology which can describe the phenomenon.

5. In the year 2013 the established IDC which had been published by a report regarding IoT and states that in 2020 the Internet of Things will be a $9.0 trillion market.

6. In January 2014, nest was bought by Google for $4.2bn had reached the term IoT to mass market awareness. At that time in Las Vegas the Consumer Electronics Show (CES) had been held under the name of IoT.

. 3.1.3 WHAT IS IoT

1. Internet of Things is actually equal to sensors and actuators which are embedded in physical objects which are linked through wires and wireless networks which often use the same protocol i.e. Internet Protocol that connects the internet.

2. IoT is defined by a forward suggestion internet development in which network nodes are connected to each other and allow them to receive and send the information.

3. As IoT comprises smart devices, machines which can interact and communicate with other devices, machines, nodes, environmental objects and infrastructures.

4. It represents a universal concept to have ability to sense the network devices and collect required information across the world, and then transfer and share that data on the Internet with no delay where it can be used and be utilized for many interesting purposes.
5. In the cloud, it connects various things and it is a sort of neural network which is global universal.
6. It is a rising new intelligent sensor network technology which connects devices and comprises of smart machines, infrastructures and the Radio Frequency Identification (RFID).
7. It is connected nodes device to the internet for exchanging information and is able to incorporate mirror data and can send different number of data.

3.1.4 HOW IoT WORKS

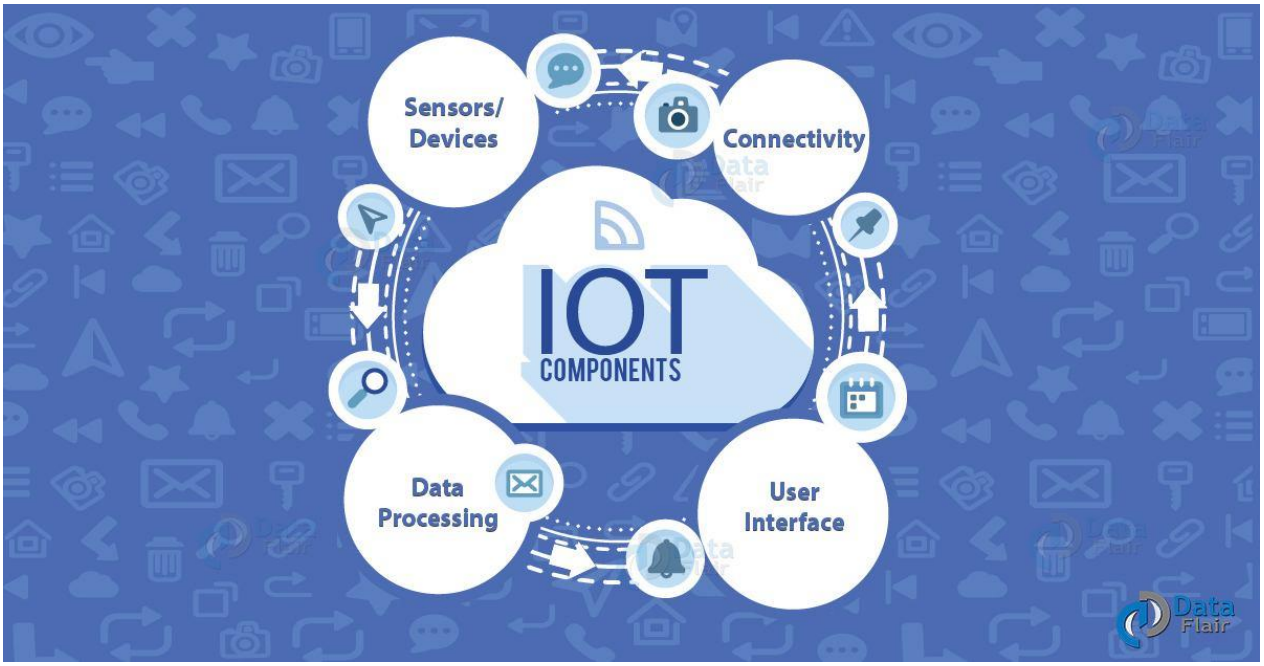


Figure 3.1: IoT components

As internet has changed the path of work and communicates with one another, as it connects the device via the World Wide Web (WWW) and it also aims for taking into another upgradation level by connecting certain common devices at frequent time to the internet connection and therefore capable of providing man to machine interaction & machine to machine interaction.

As this idea came up by the people, they have realized that technology is not limited into one ecosystem which can only be used by a particular interseting field but it has to be business application which is more interested in factory line, home, medical, retail and mankind more kind of automations [22].

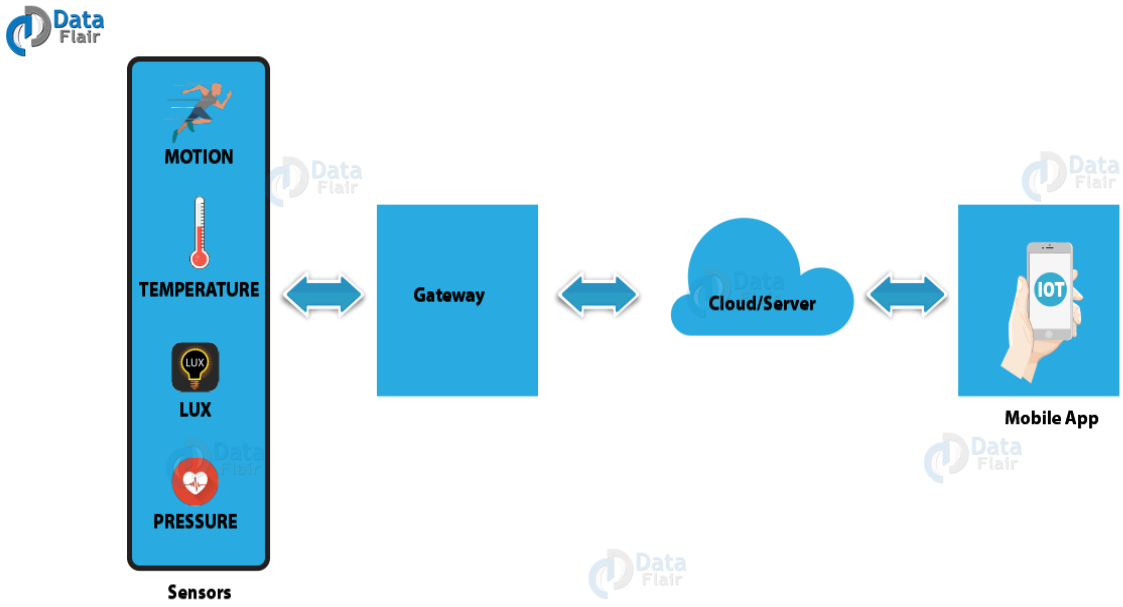


Figure 3.2: Internal working of IoT

1. Sensors/Devices

First of all discuss the sensors or devices which may be help in collecting by a single minute data via the connection from the current environment. All of the data gathered can have various number of degrees which are having complexities and can range from different temperature which is used to monitoring a unique full video feed or sensor.

A System has multiple unique sensors that can bind together which can do more than as compared to sensors. For ex, our mobile phone is full of system that can have number of sensors like GPS, camera, accelerator but phone does not sense the things.

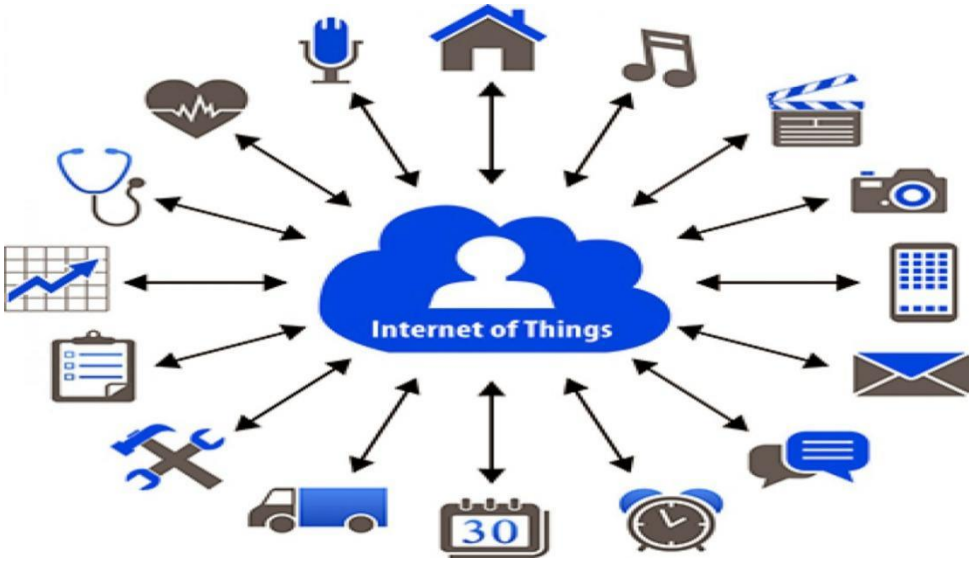


Figure 3.3: Sensors/Devices

2. Connectivity

Next level is, the collected data needs the medium to transport which is a cloud infrastructure. The cloud can be connected via various mediums to communicate and transports to sensors like as cellular network, Wi-Fi, satellite network, Bluetooth, low power wide network, wide-area networks i.e. WAN and many more.

Each and every options that we chosen have some or the other specifications that can be trade-offs between the power consumptions, ranges, and the bandwidth. Therefore, chooses the best verses worst connectivity options in the term of IOT system which is very important.

Figure 3.4: Connectivity

3. Data Processing

The data collected which has completed the task and when it has go to the cloud based on the acquired data by the software start processing and ranging from very simple to the maximum that cannot be as counted as single like as checking the temperature readings based on certain devices like as AC or heaters which are in the range within in acceptable form of range.

It can be sometimes very complex situation that cannot nbe handled like where as identified consitent objects like intruders obstacles for your home which is used by the computer vision for video/audio.

But there might be any different situation where it can be a number of using interacting are required like for example: where if we when it is before the temperature which goes too high or too low either by if they was any an intruder obstacle which do it in your way to home. That's like the picture comes in the views of users.

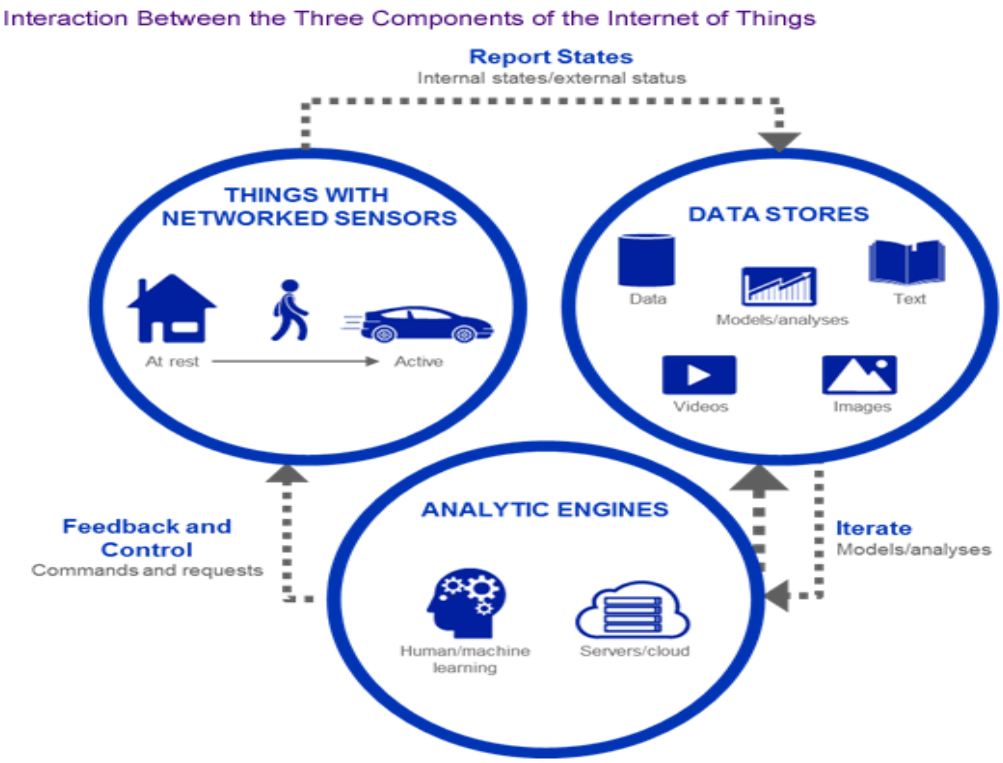


Figure 3.5: Data Processing

4. User Interface

Now comes the information which can be made available to the basic end-user in one or some way. Therefore can be achieved by doing triggered alarms checked on their mobiles/ phones or notification through texts/calls or emails.

Also, a user sometimes may be also had an interfacing via when they are active checking in by their IOT system. For ex, users had a camera install in this home; he may wanted to checked the video/chatting recordings and that all the feeds have going through with a web services.

However, it's may not be always this by easy and a known one-way street. Depended on the IoT applications and complexities of the system, the user might be able to perform any action that would cause backfire and can affect the device. For ex like if any users could detects some changes regarding in the refrigerator with the users which can remotely adjust and handle the temperature phenomena through their phone.

There have been many cases where certain actions are performed automatically. Therefore establishing and implementing them in some predefined rules and regulating the entire IOT system which can adjust the

whole settings automatically and no use of human can causes that has to been physically present. Also in the case of any intruders object which are sensed under the system could generate an alert but not only to the upper owner of the home but with the concerned organization.

3.2 ARDUINO UNO

It is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button.

It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

"Uno" is an Italian word meaning one and was chosen for the release of Arduino Software (IDE) 1.0. The board and the version 1.0 of Arduino Software (IDE) were the testimonial versions of Arduino, that are now evolved.

The Uno board is the first one in a sequence of USB Arduino boards, and the reference prototypel for the Arduino platform; for a large list of current, past or outdated boards see the Arduino index of boards.

Figure 3.6: Arduino Uno Board

DIFFERENCES WITH OTHER BOARDS:

The Uno is different from all preceding boards as it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

POWER:

The Arduino Uno board can be supplied via the USB connection or with an external supply. The power source is selected automatically.

External power can be either from an AC-to-DC adapter or battery. The adapter can be attached by plugging a 2.1mm center-positive plug into the board's power jack. Lead from battery can be inserted in the ground pin and input pin headers of the POWER connector. The board can operate on an external supply from 6 to 20 volts.

If the supplied voltage is less than 7V, however, the 5V pin may supply less than five volts and the board may become unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

Vin:

The input voltage to the Arduino/Genuino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

5V:

This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.

3V3:

A 3.3-volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

GND:

Ground pins.

IOREF:

This pin on the Arduino/Genuino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs to work with the 5V or 3.3V.

MEMORY:

The ATmega328 has 32 KB (with 0.5 KB occupied by the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

INPUT AND OUTPUT:

See the mapping between Arduino pins and ATmega328P ports. The mapping for the Atmega8, 168, and 328 is identical.

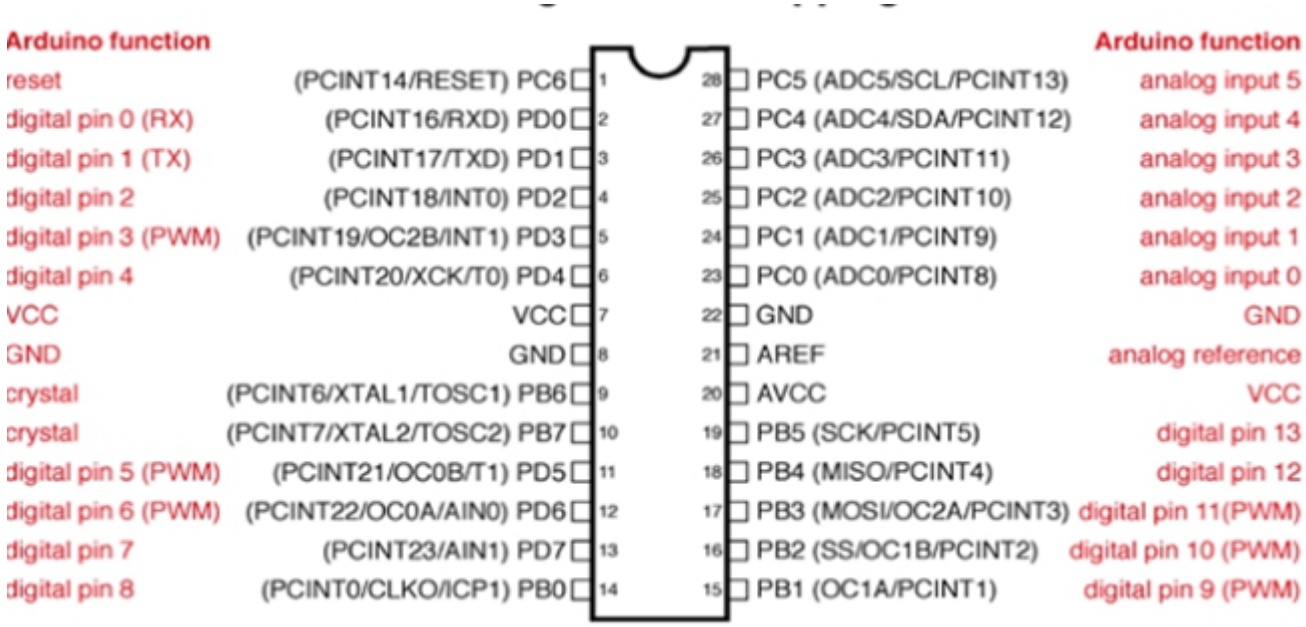


Figure 3.7: Arduino Uno pin diagram

Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive 20 mA as recommended operating condition and has an internal pull-up resistor (disconnected by default) of 20-50k ohm. A maximum of 40mA is the value that must not be exceeded on any I/O pin to avoid permanent damage to the microcontroller.

In addition, some pins have specialized functions:

Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.

External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt () function for details.

PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analogWrite() function.

SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.

LED 13: There is a built-in LED driven by digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

TWI: A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library.

The Uno has 6 analog inputs, labelled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default, they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function. There are a couple of other pins on the board:

AREF: Reference voltage for the analog inputs. Used with analogReference().

RESET: Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

3.3 ULTRASONIC SENSOR

An ultrasonic sensor is a device that calculates the distance of an object using the ultrasonic sound waves. An ultrasonic sensor takes in use a transducer to send and receive the ultrasonic pulses that transmit back information of an object's closeness. High-frequency sound waves replicate from boundaries to yield distinct echo patterns.

These sensors work by sending a sound wave out at a frequency over the range of human hearing. The transducer of the ultrasonic sensor acts as a microphone to send and accept the ultrasonic sound.

The ultrasonic sensors, use a solo transducer to send a sound pulse and to receive the echo back. These sensors calculate the distance to a target by computing time gap between the sending and receiving of the ultrasonic sound pulse.

Figure 3.8: Ultrasonic sensor

3.4 UBLOX NEO-6M GPS MODULE

The NEO-6M GPS module is a complete GPS receiver that has a in-built 25 x 25 x 4mm cube ceramic antenna, which provides a durable satellite search capability.
Incorporated with the power and the signal indicators, one can monitor the status of the module. All thanks to the data battery backup, this module can save the data in case the main power is shut down inadvertently.

It's a 3mm mounting hole can ensure relaxed assembly on your aircraft, which thus can fly progressively at a fixed position, return back to Home automatically, and involuntary waypoint flying, etc. Or one can apply this on one's smart robot car for automatic returning or heading to a certain destination, making it a smart robot.

FEATURES:

A whole GPS module with an active antenna, and a in-built EEPROM to save configuration, Fixed 25 x 25 x 4mm cube ceramic active antenna gives strong satellite search ability. It is equipped with power and signal indicator data backup battery and lights. Power supply between 3-5V, Default baud rate:9600bps.Interface: RS232 TTL.

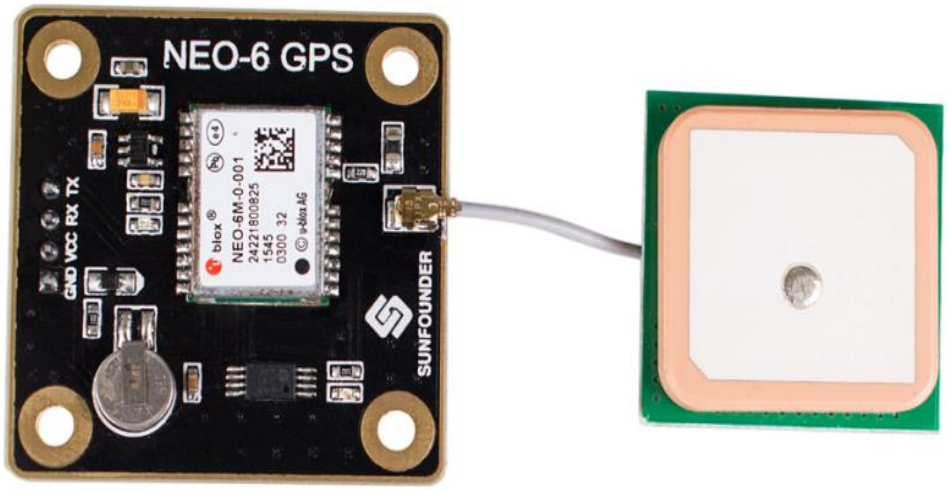


Figure 3.9: GPS Module

A GPS receiver, GPS navigation device, or purely GPS is a device that is proficient in receiving the information from the GPS satellites and then to compute the device's geographical location. Using appropriate software, the device might display the position on a google map, and it may propose directions.

The UBLOX NEO-6M GPS engine on the modules is a good one, and it also has very high sensitivity for indoor apps. Moreover, there's one MS621FE-compatible and rechargeable battery for the backup and EEPROM for loading configuration settings. The module works good with a DC input between 3.3- to 5-V range.

3.5 BUZZER AND BUTTON

The buzzer is a electronic device that makes a sound (a buzz) when the crystals in his interior are excited by electric current.

COMPONENTS NEEDED:

→ One push-button, A Buzzer, One 1k Ohm resistor, Protoboard, Jumpers

Figure 3.10: Buzzer

We attach one side of the push button to a 5V by connecting any one of the two legs to the 5V pin present on the board. The supplementary side of the push button is attached to the ground using a 1Kilo-ohm resistor. The same end of the resistor which connects to the ground is also connected to the digital Input-output pin2. The digital I/O pin three is attached to the positive leg of the Buzzer and the negative leg is connected to ground.

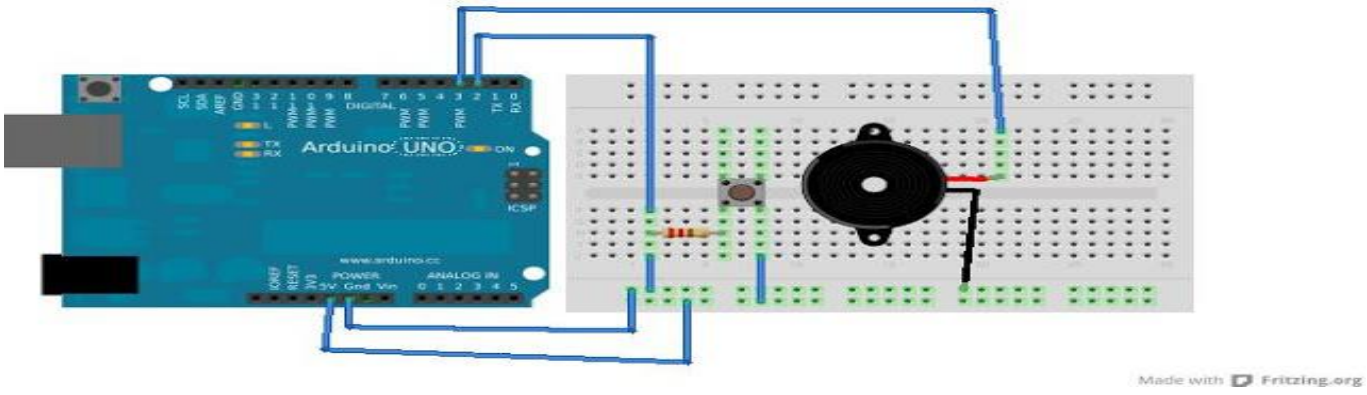


Figure 3.11: Buzzer and Button connected with Arduino Uno

3.6 OPEN CV

OpenCV is mainly aim at real time computer vision(CV) which is the library of many exciting programming mainly functions. It is first developed by Intel and later hold up by Willow Garage and then Itseez.Its library are under open source i.e free and cross platform cross-platform and free BSD license. It supports some of the models regarding deep larning frameworks that make standards like TensorFlow, PyTorch, Torch and Caffe according to which its defined list of supported layes works. It promotes many OpenVisionCapsules which are a portable format and compatible with all other formats.For our project we need to know about how opencv works and how to use opencv to perform face recognition.

3.6.1 HOW OPENCV WORKS:

For that we need to know about interseting three things i.e. Computer Vision(CV), OpenCV's associated programming languages, and OpenCV application.

WHAT IS COMPUTER VISION?

Our eyes which gives the exciting signals to our brain and function according to it then it analysis that what we need to see so as that we can able to recognize faces, obstacles and movements, determine for something which is going to be good or bad for a particular scenario.And therefore , Computer vision which it wants to achieved this what our eyes are specially doing. It makes the sense that possible and deals with the exciting computers and many for the electronic equipments for gaining of the information via a digital images and videos. It is also to be analyzed complex images audio,videos which execute the comparisons and establish the main differences.

zz 

Figure 3.6.1: Exciting view of Computer Vision

OVERVIEW OF OPENCV

Major domains of opencv are image processing, face detection, video seized and analysing of the picture and object detection that are mainly associated with the laptop imaginative and the prescient however it is because it desires a lot of crossed-platform library to be expand for a real-time programs. This is wherein and whilst OpenCV here in, i.e. which become initially have evolved in C++ and later be observed via the Java and Python

as where it runs on numerous various platforms along with Windows, Android, macOS, Linux and iOS

It is a via a perfect tool for the laptop vision but by the way for device improvement with out considering its broadest and targetted market which continues to be a huge trouble amongst entrepreneurs.

Also, As there are times when both events- clients and developers - have a false impression on what sort of a fulfillment they need to obtain by using doing this. Thus as each parties have to have a not unusual evaluation of OpenCV on managing laptop imaginative and prescient.

The subsequent section will provide an overview of the OpenCV library and its associated modules.

FEATURES OF OPENCV LIBRARY

Opencv library functions are:

1. Read and write images.
2. Capture and save videos
3. Image processing like as transformation and filtering.
4. Feature detection.
5. Image or video object detection like as human body parts, signage,cars etc.
6. Video analysis.

OPENCV LIBRARY MODULES:

It can read and write images from the scratch, capture and save videos, draw an picture through code, process images, detect specific objects, perform feature detection and analizing videos and determine by the direction and by the motion of an objects.

The main library modules under the OpenCV library:

1. Core Functionality.

2. The core functions for OpenCV libraries covers the basis of facts and systems along with the Scalar, Point, Range, and so on.

3. To shop images and needs to be the multidimensional array Mat.

4. Image Processing.

5. This module covers the diverse image processing operations which includes photograph filtering, and geometric photograph and transformations and shade space by conversionand histograms and so on.

6. Video.

7. This module covers the most important point video evaluation standards by including the motion of estimation, historical past subtraction, and object monitoring.

8. Video I/O

9. This module explains the specifics video capturing [vc] and video formats where we are using the OpenCV library.

10. Calib3d.

11. This module consisting of algorithms by concerning the primary and multiple view geometry algorithms, single and, stereo camera calibration, object posed estimation,;stereo correspondence and elementary of 3-D reconstruction.

12. Features 2d

13. This modules includes by the principles of the feature detection and outline.

14. Obj detect.

15. This module includes the detection of gadgets and instances of the predefined classes which include faces, traffic lighting fixtures, human beings, eyes, automobiles and so on.

16. Highgui.

17. This is a smooth-to-use by interface with the simple of UI capabilities.

OPENCV APPLICATIONS:

It is used in mainly robotics, industrial automation; medicine, transportation and security. For robotics the OpenCV are to used to be determine by a robots location. It is also used in the navigation, Human-Robot Interaction and Obstacle avoidance.OpenCV is also used in the medicine and which could help in patients through via a classification and by the detection of the cells or by the tumors, 3D organ reconstruction, 2D/3D segmentation and vision-guided robotic surgeries.

3.6.2 HOW OPENCV TO USE OPENCV TO PERFORM FACE RECOGNITION:

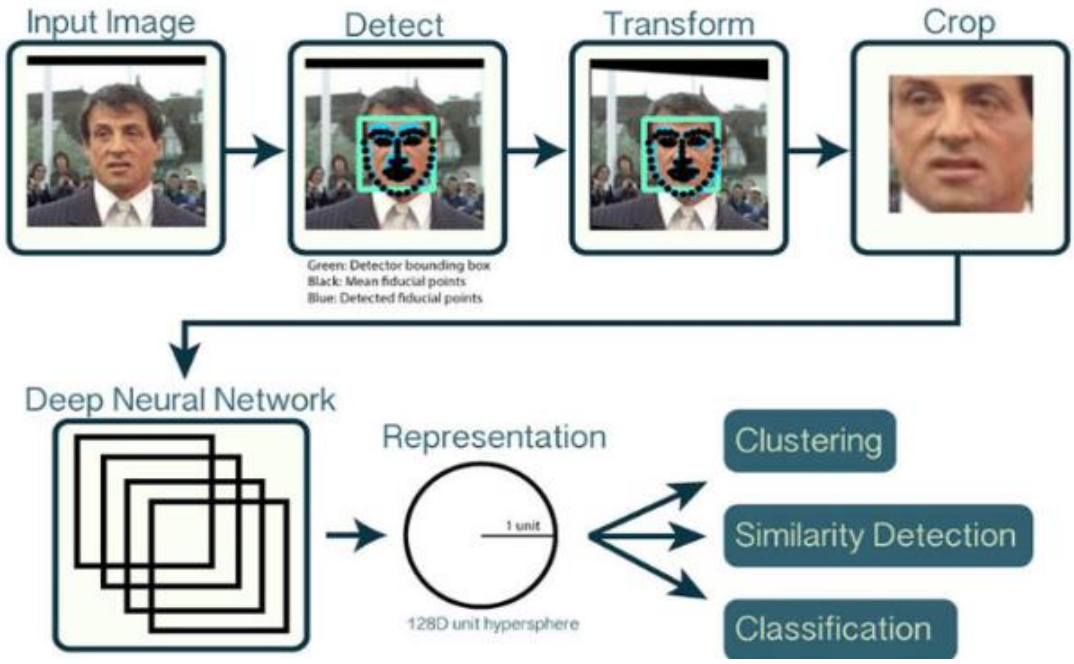


Figure 3.6.2: Overview of working opencv to perform Face recognition

Figure 3.6.2 : Face dataset for face rcognition with opencv

3.7 ANACONDA

3.7.1 INTRODUCTION

The Anaconda Cloud is a whole package management service by the company named Anaconda itself. The Cloud makes it easier to search, more accessible, easier storage and share public, environments, notebooks and PyPI and the conda package. The Cloud also makes it easier to stay up-to-date with updates that are applied to the environments and packages we use. The Cloud usually hosts thousands of very useful Python packages, projects, environments and notebooks, for a very varied variety of applications. One does not need to log-in, or to have a Cloud account, to find for various public packages, download and to install the useful ones. One can create all new conda package by use conda-build, and then we can upload the packages to the Cloud to share quickly with them with others or contact oneself from anywhere around remotely. Anaconda Cloud's Command Line Interface(CLI), the anaconda-client, permits one to manage its account – that including tokens, authentication, upload, download, remove and search.

3.7.2 ANACONDA PROMPT

Anaconda command prompt is just similar to command prompt, but it makes sure that one is able to use anaconda and all the conda commands from the prompt easily, without needing to change directories or the path.When one has to start Anaconda command prompt, it is noticed that it adds or prepends a bunch of locations to the PATH. All these locations contain commands and scripts that one can run. So as long as one is in the Anaconda command prompt, one knows he can use all these commands.At the time of the installation of Anaconda cloud there is also a choice to add these commands to the PATH by default, and if checked one can also use all these commands over the regular command prompt. Irrespective of this, the anaconda prompt will always work.

3.7.3 THE ANACONDA NAVIGATOR

TheAnaconda Navigator is basically Graphical User Interface (GUI) on desktop which is included in the Anaconda cloud distribution which allows the user to launch all the applications and to conveniently manage all conda packages, channels, and environments short of using any command-line commands. Navigator can be used to quest for packages on the Anaconda Cloud or in the local Anaconda Repository. This is available for all Linux, Windows and macOS.

For running, various technical packages depends on some specific versions of other packages. Data scientists often use various versions of most packages and use numerous environments to bifurcate these various versions. All the command-line programs, conda is both an environment manager and also a package manager. It helps the data scientists to confirm that every version of every package has all the required dependences it requires and therefore works suitably.

3.7.4 THE SPYDER

The Spyder is a very influential scientific environment that is written in Python, for working in the Python, and designed by and for scientists, and data analysts. This contains a unique amalgamation of the highly progressive editing, analyses carried, fixing done and the profiling functionality of an extensive expansive tool with the exploration of data, interactive implementation carried out, deep examination and amazing visualizing capabilities of a scientific package. Moreover, Spyder also proposes already in-built integration with various universal scientific packages, that includes SciPy, Pandas, NumPy, QtConsole, IPython, Matplotlib and many more. This can be used as a PyQt5 library extension, that allows user to shape upon its functionality and also entrench its components, for example the cooperative console or an cutting-edge editor, in user’s software.

3.7.5 JUPYTER

Jupyter notebook is one of the most used Python Integrated Development Environment by Data Scientists to write code in Python. It is a browser-based IDE, that means user doesn’t need to open it in some other application. Once an user start a jupyter server, a notebook will open in the user’s internet browser.

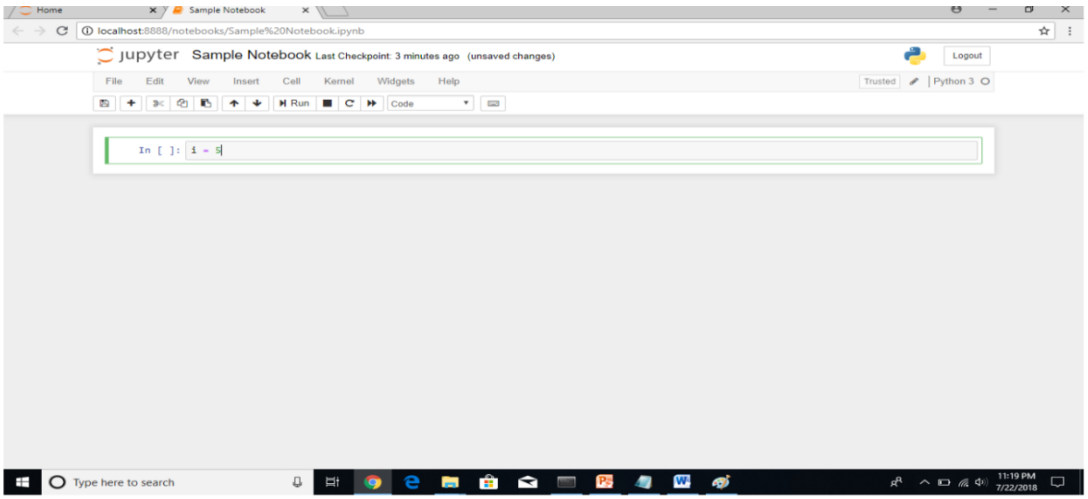


Figure 3.7.3: Jupyter interface

4. IP WEBCAM

3.8.1 INTRODUCTION

An IP camera, meanwhile, is a tool intended for streaming video footage throughout the internet. For example, this might be a traffic camera or another static camera that's publicly accessible. And it could be security cam you may access remotely.

IP cameras capture photographs in the same manner as a digital camera, and then compress the files to transmit over the network. IP cameras can be used with a wired network connected via Ethernet cable to a broadband or router, or wirelessly through a Wi-Fi router.

3.8.2 USING PHONE AS A WEBCAM

To use Android phone as a security camera:

1. Connect your computer and Android phone to the common Wi-Fi network.

2. Install IP Webcam app on your Android.

3. Close all 📷 apps. Force close them if needed.

4. Start Webcam app. Go to the bottom and tap Start server.

5. The app will now use your phone's camera and will display URL.

6. Enter this URL in browser on your computer.

7. In the browser, you'll see a drop down menu next to Video renderer. Select Browser.

8. Below that, you'll see Audio renderer. Select HTML wav.

192.168.0.100:8080

IP Webcam

Video renderer

No video | Flash | Browser | Java | Javascript | Fullscreen

Audio player

No audio | Flash | HTML5 Wav | HTML5 Opus | Why the lag?

Recorder control

CHAPTER 4

IMPLEMENTATION

To help the Blind people we are focusing on estimating near things and can help himself without need of any one. It will help blind people and may help them just like a human eye. This project consist of two modules which we have implemented one by one to help the blind people in everyday work life so as to reduce tragedy happening with them.

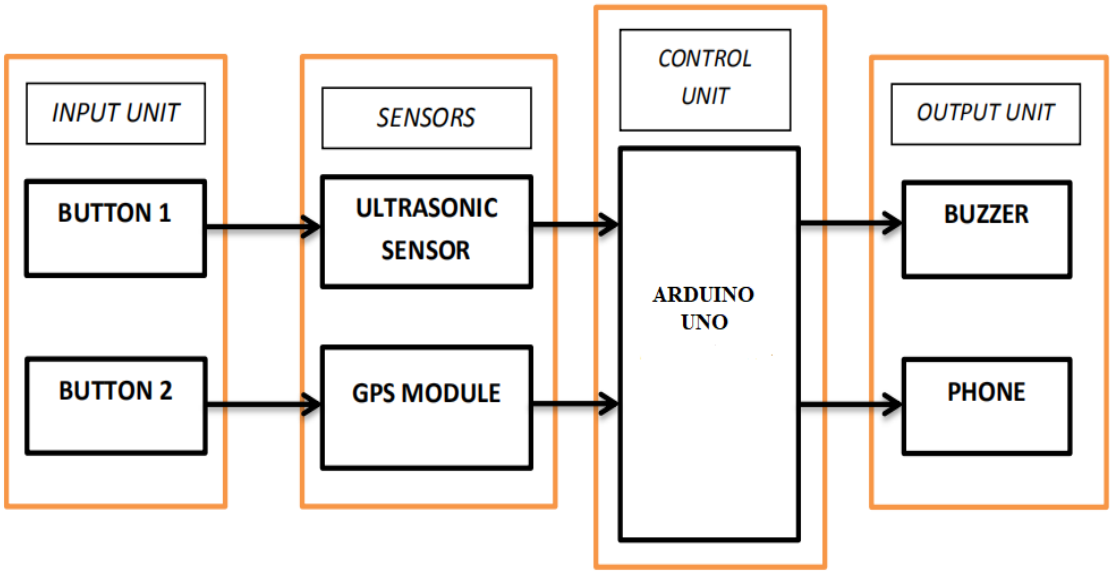
Our two modules are so smartly implemented to achieve the success of helping visually impaired person and makes it so much befits of using that like easy to handle, resonable in cost, and fast working.

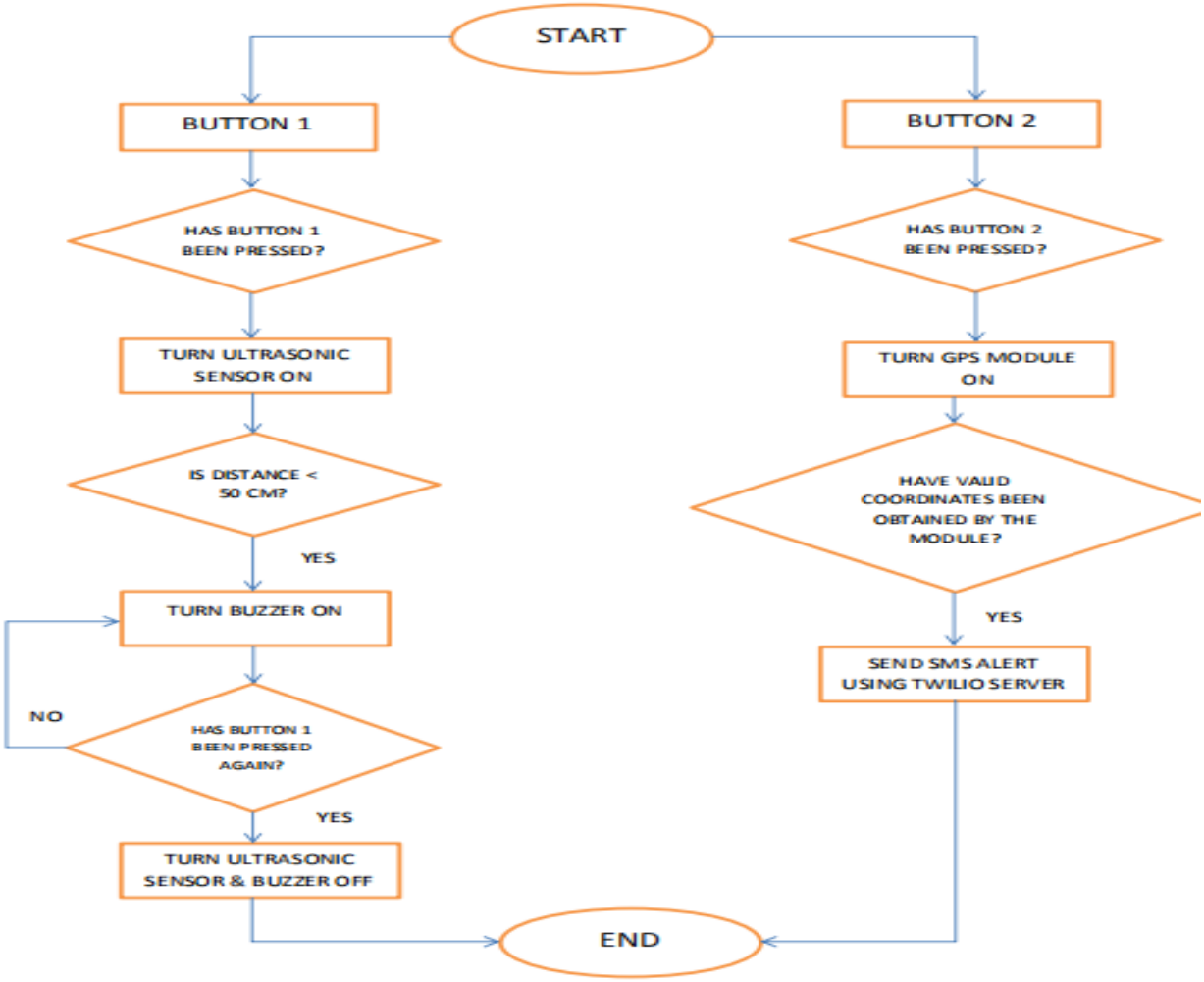
4.1 FIRST MODULE:

Our first module motive is that our implementation could make a little step towards helping them by using Ultrasonic sensors, GPRS module in such a way that it will help blind people and may help them just like a human eye. To get desired output from Ultrasonic sensor we need Arduino Uno whereas for GPRS module we need Temboo and Twilio.

This project consists of a prototype, meant to be attached to a conventional blind helping module. With the help of an ultrasonic sensor and a buzzer, this smart module aims to aid blind people by increasing the efficiency and accessibility by which they can navigate through everyday life.

To avoid the buzzer going off all the time, the ultrasonic sensor only starts sensing (and subsequently, the buzzer starts beeping) the distance of the nearby object from the stick, when a button is pressed. The frequency of the buzzer is more when the object is nearer and gets less as the object gets farther from the stick. It also has an additional feature, where the user can send their location (through a Google maps link) to their relatives' phone number, in case they need help. The SMS alert is sent only when the user presses another button located on the stick.





In our project we are using cloud technology to send the location using GPRS module. The softwares used are Twilio and Temboo.

TEMBOO:

Temboo allows any kind of the engineer by constructing and run the net-enabled automated structures. It can connected to any type of the hardware to any cloud carrier which is to be taken as this interoperability by simplifies the retrofitting present system and its systems. It auto-generates and editable software code for the engineers that also permits the interconnections. Generated for the code for manufacturing-geared up and its optimized for the your hardware.

It handled the “final mile” for linking the sensor and records to the cloud, enabling the just-in-time facts the shipping from the device-automatic and structures.

TWILIO:

This server is used to send a SMS or call alert to a number. Firstly, we have to create an account on it. The phone number which we want the location gets verified. We also get an phone number from twilio from which the SMS will be sent. All these credentials will be used in our code.

CREATING TEMBOO ACCOUNT:

```
#define TEMBOO_ACCOUNT "sonia123" // Your Temboo account name
#define TEMBOO_APP_KEY_NAME "myFirstApp" // Your Temboo app name
#define TEMBOO_APP_KEY "DkdAb460fdVSQjsowvNfKRb4kP7lFs0y" // Your Temboo
app key
//#define TEMBOO_APP_KEY "UIdKqrQEB9rQh2ROTNDbE1IY6rv8LWsX" // Your
Temboo app key
#define WIFI_SSID "Tanya"
#define WIFI_PASSWORD "123tanya”
```

4.2 SECOND MODULE:

Our second module motive is to reduce the tragedies with visually impaired people as they cannot identify who are their known and who their unknown and can take advantage of their blindness. As their will be database of known people which will help the blind people to identify the person with name in a audio form.

Firstly , it needs to recognize the face and then it should be checked in a database whether it is added or not, if it is added then its name will be spoken and that person will be identified as a known person of the user.

4.2.1 FACE RECOGNITION:

It is used to recognize the face in the picture and using many fuctions and in built packages.It consist of many python files and all are indirectly liked by anaconda prompt where all the commands to install and unstill the packages are used. This requires two things :mobile and laptop as the application is in the mobile to click the picture who is in front of the blind person.

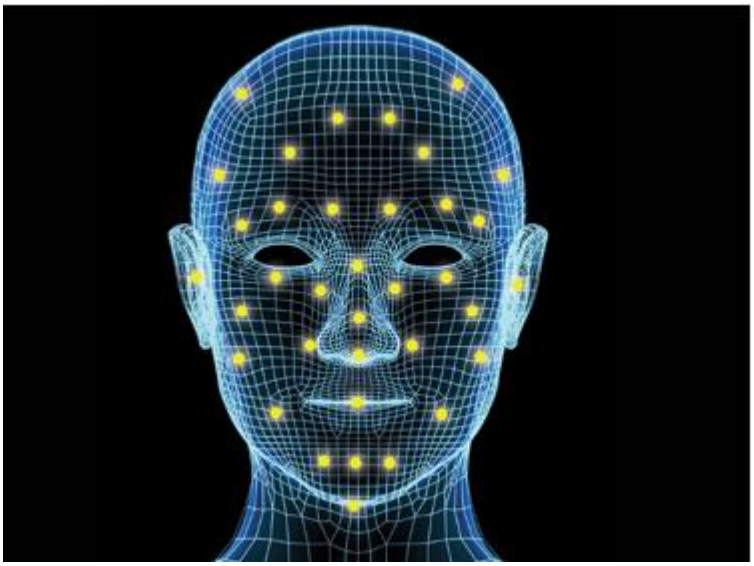


Figure 4.2.1: 3d effect of face recognition

Following steps are there to perform Face recognition :

1. Latest version of Anaconda should be downloaded with all the packages with the help of https://www.anaconda.com/products/individual.

2. Open Anaconda prompt.

3. Opencv should be downloaded in anaconda with all the packages with the help of :

   conda install -c conda-forge opencv

5. For recognizing the face we need to work in anaconda with opencv environment with the help of:

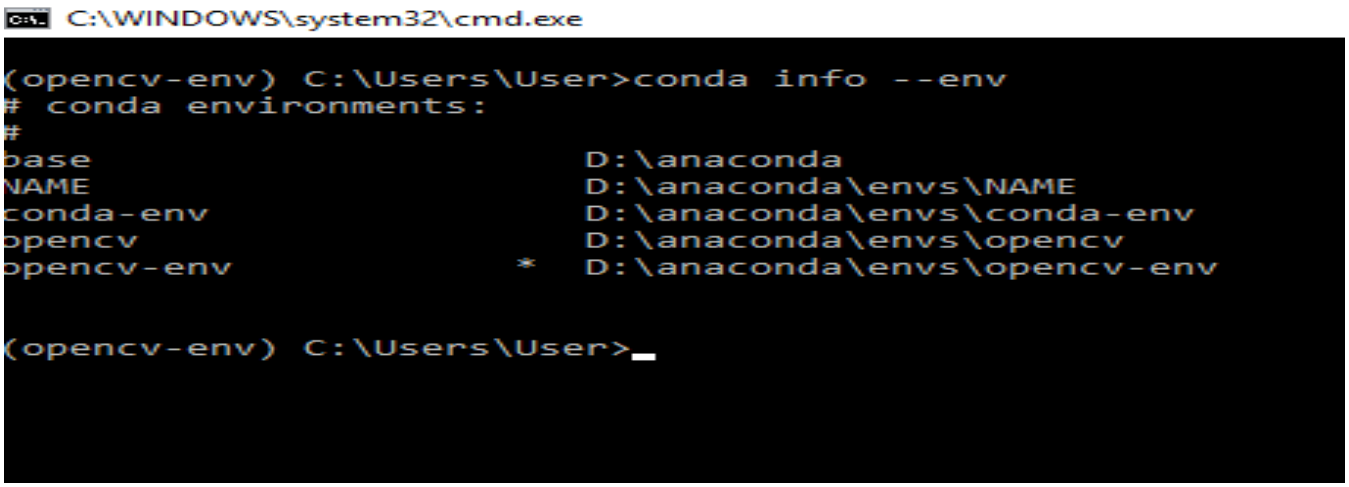
conda create --name opencv-env opencv

6. To check whether we are working on opencv environment :

conda info --env

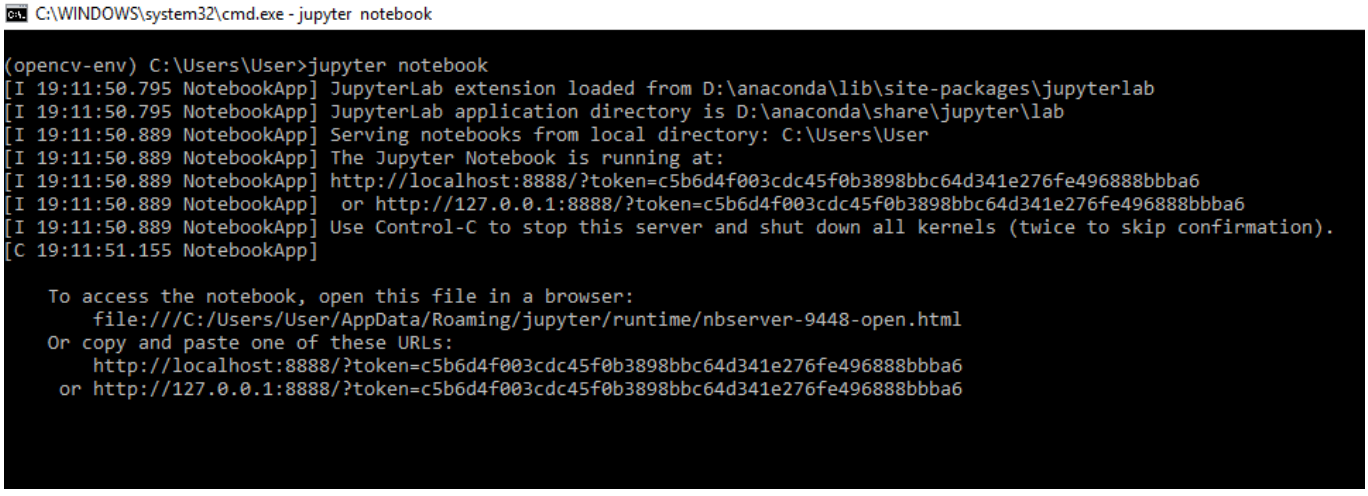
7. To activate the environment :

conda activate opencv-env

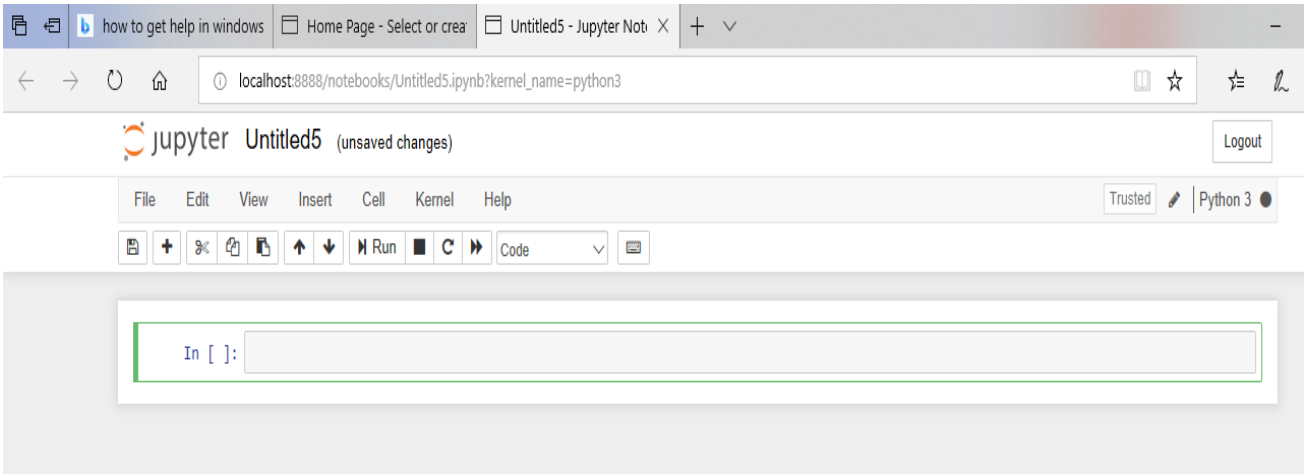


8. Now to run the code of Face detect we need to open jupyter notebook by the command:

jupyter notebook

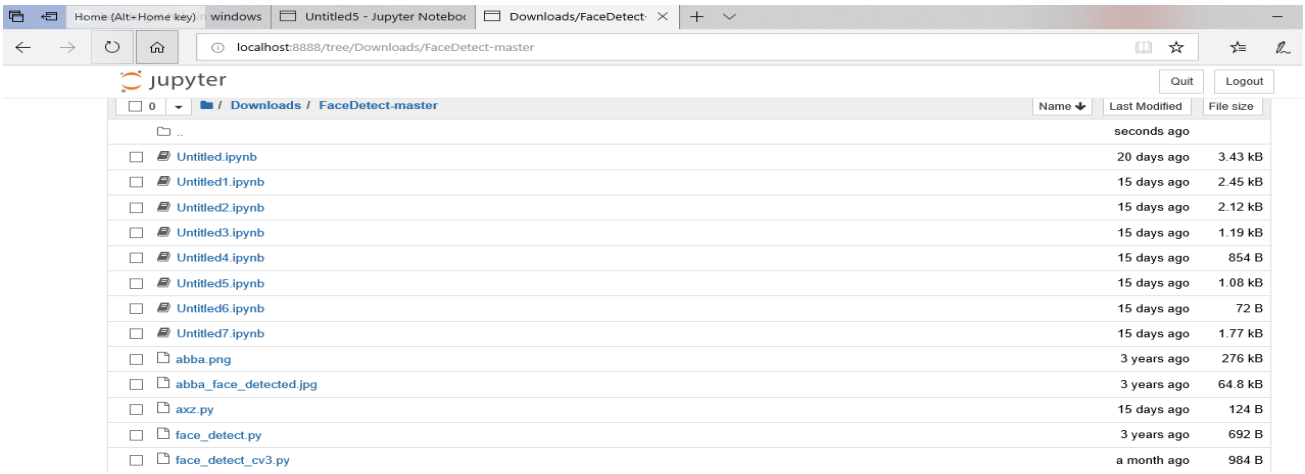


9. Now connect IP webcam application to the laptop as it will provide a URL and copy that URL into the file abba.py and run that file into jupyter notebook.



9. Till now we have got the picture of a person who will be standing in front of a blind person.

10. Now we have python file face_detect.py, we have to run this file in jupyter notebook and result will be shown in the form of picture and counted faces will be shown.



4.2.2 SVM IMAGE-CLASSIFICATION-MASTER

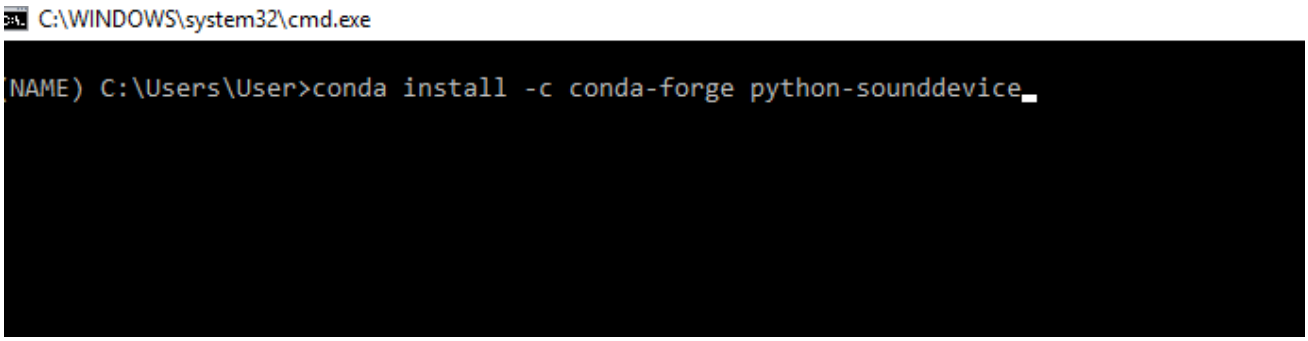
As we have a face now we have to search in our database whether it is known or unknown .It will give its name in an audio form. But for this we required so many packages and some commands to intall them in anaconda prompt.

1. Create the Name environment as we have to work on it.

conda create -n NAME python=3.6 scikit-learn scikit-image matplotlib

2. Install package for sound device which will convert the image name into audio one by using the command :

conda install -c conda-forge python-sound device



3. Install package for pathlib by using the command:

   conda install -c menpo pathlib

4. Install package for matplotlib by using the command:

  conda install -c conda-forge matplotlib

5. Install package for numpy by using the command:

  conda install -c anaconda numpy

6. Install package for scikit-learn for dataset and svm by using the command:

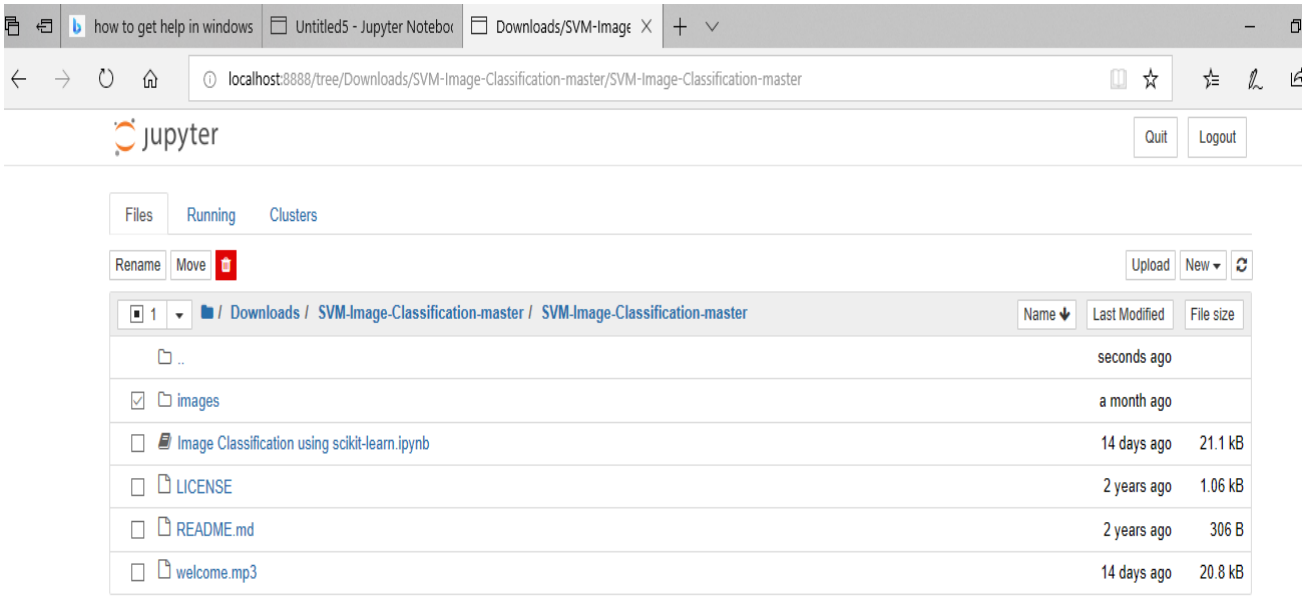
  conda install -c anaconda scikit-learn

7. Install package for cliff by using the command:

  conda install -c conda-forge cliff

8. Install package for scikit-image by using the command:

  conda install -c anaconda scikit-image



9. Finally run the file Image classification using scikit-learn.ipynb which will give the result as name of a person in the form of audio.

CHAPTER 5

CONCLUSION

5.1 FIRST MODULE

5.1.1 ULTRASONIC SENSOR AND GPRS MODULE

The first module of our project will work according to every situation just like below flow of operation.

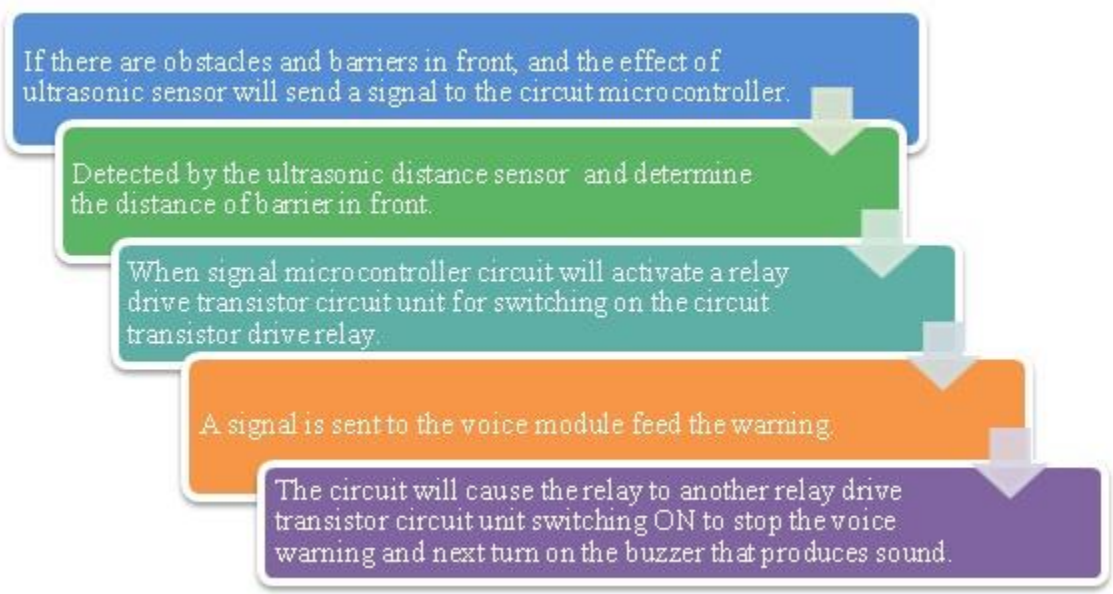


Figure: Flow chart

It is a flow of basic operation for our project. Firstly, if there is an obstacle and barrier in front, then the ultrasonic sensor will send the sound signal to circuit microcontroller. The microcontroller will read the language of programming which will know how the PIC function into ultrasonic sensor and convert it into buzzer form.

Combination of ultrasonic sensor, microcontroller, and GPS module are good for detection and distance measured. This project is for the people with disabilities that are visually-impaired to facilitate their movement and increase safety.

WhatsApp Video 2019-12-12 at 10.44.54 AM.mp4 (Command Line)

5.2 SECOND MODULE

5.2.1 FACE RECOGNITION AND DETECTION MODULE

In the second module of our project we are focusing on the elderly or blind people who live alone in their houses. To make them more independent, we have formulated a strategy to help them on daily basis.

A camera is placed at their main door which would click the pictures of the people coming to their home. The camera would click the picture in every angle possible. In our module we are using IP webcam which will send the photograph to the server. Then, it would match the clicked picture with the photographs already fed in in the database (containing pictures of the people who are already familiar to them).

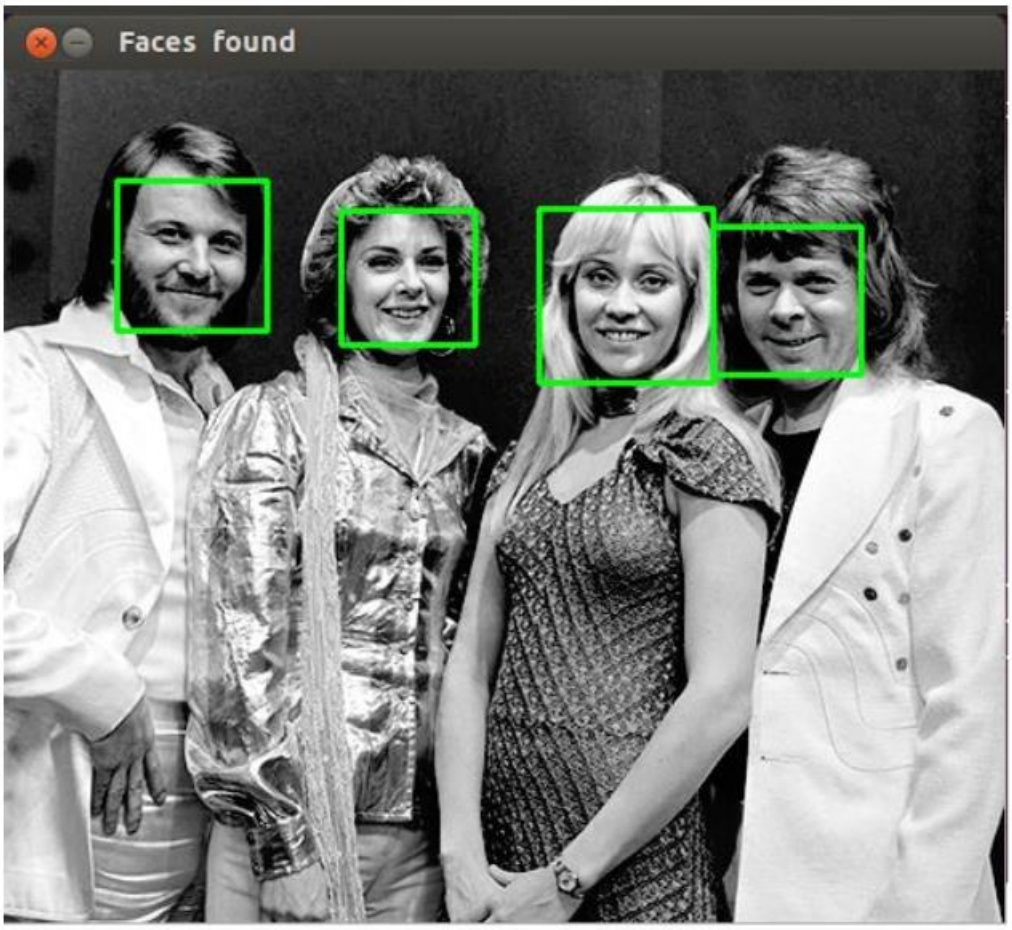


Figure 5.2.1 Faces are being detected

The clicked picture is matched with the all the other existing photographs in the database with the help of opencv. A code is written in the anaconda implementing various environments and modules. It helps in matching the picture at every angle so that there are no chances of any discrepancy.

After successful detection of the photograph, it has to be converted in audio so that it can be easily understood by our user. A package is installed to convert the text into audio form.

If it matches with any of the existing picture, the name of the concerned person will be called. On the other hand, if it doesn't match with any of the picture "Match not found" would be called.

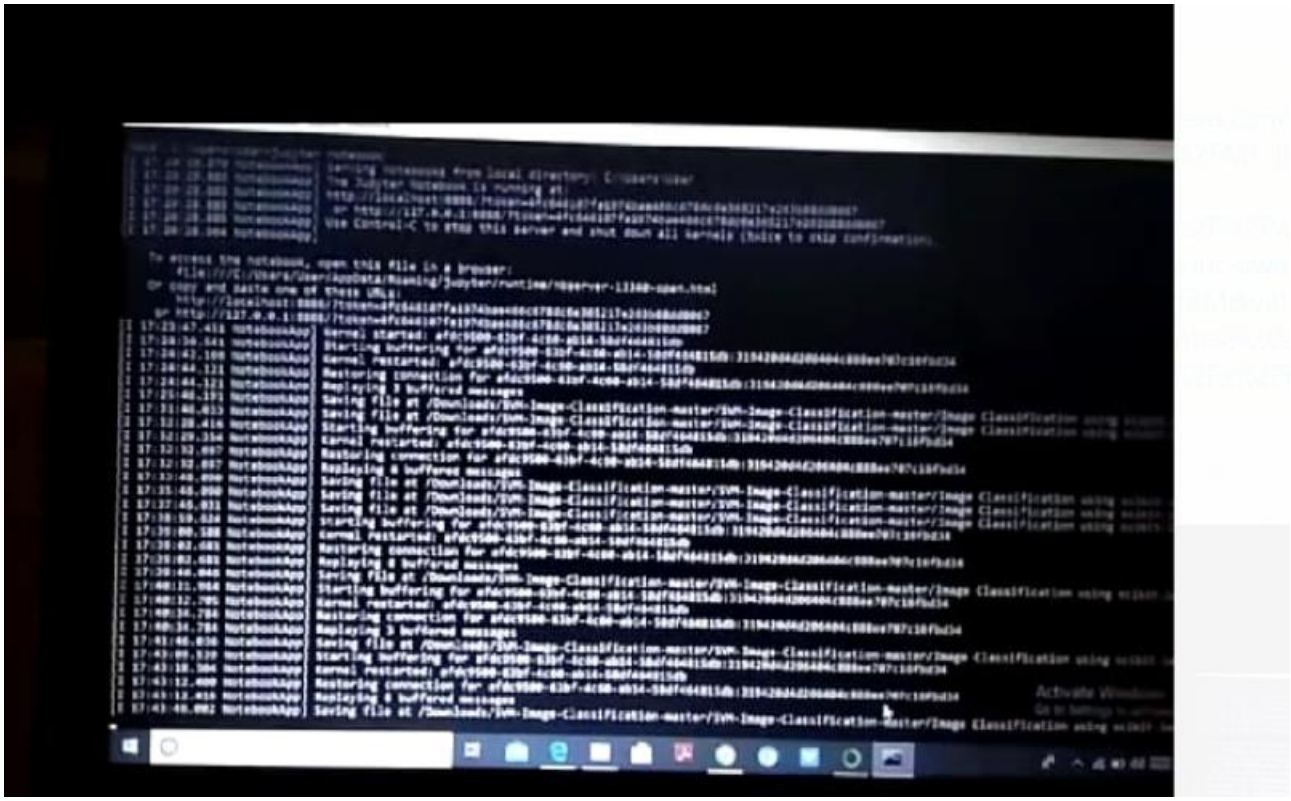


Figure 5.2.2 Name is being called as the screen processes the data

The link to the video of our results is given below:

WhatsApp Video 2020-04-27 at 5.59.31 PM.mp4 (Command Line)

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APPENDIX

CODE:

1. Arduino Uno with Ultrasonic Sensor:

```
const int trigPin = 9;
const int echoPin = 10;

float duration, distance;

void setup() {
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  Serial.begin(9600);
}

void loop() {
  digitalWrite(trigPin, LOW);
  delayMicroseconds(3);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(12);
  digitalWrite(trigPin, LOW);

  duration = pulseIn(echoPin, HIGH);
  distance = (duration*.0343)/2;
  Serial.print("Distance: ");
  Serial.println(distance);
  delay(100);
}
```

2. Arduino code for GPRS module:

```
#include <LiquidCrystal.h>
#include <SoftwareSerial.h>
#include <TinyGPS.h>
float lat = 28.5458,lon = 77.1703;
SoftwareSerial gpsSerial(3,4);
LiquidCrystal lcd(A0,A1,A2,A3,A4,A5);
TinyGPS gps;
void setup()
{
Serial.begin(9600);
gpsSerial.begin(9600);
lcd.begin(16,2);
}
  void loop(){
```

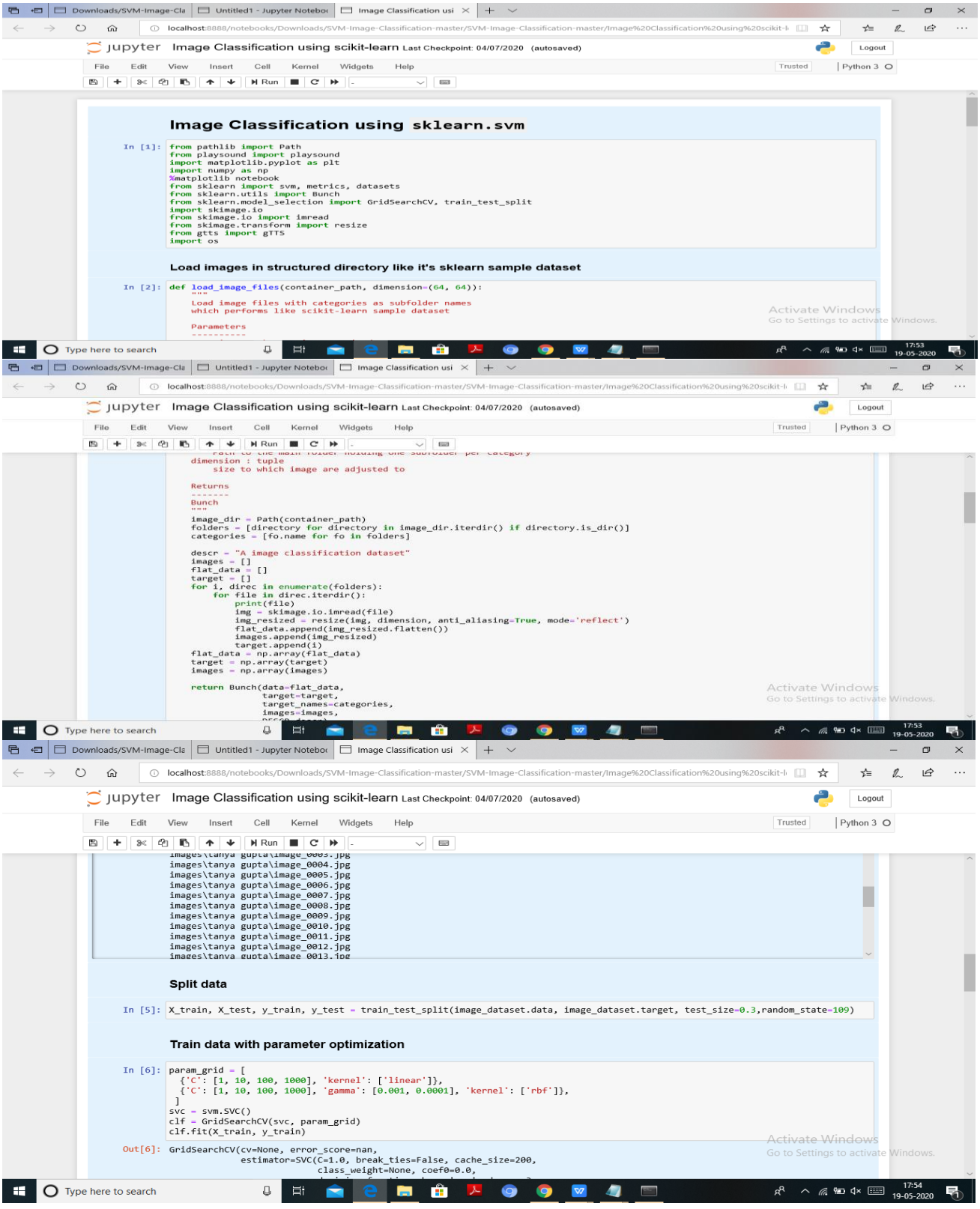
```
  while(gpsSerial.available()){
  if(gps.encode(gpsSerial.read()))
  {
  gps.f_get_position(&lat,&lon);
    lcd.clear();
  lcd.setCursor(1,0);
  lcd.print("GPS Signal");
  lcd.setCursor(1,0);
  lcd.print("LAT:");
  lcd.setCursor(5,0);
  lcd.print(lat);
  lcd.setCursor(0,1);
  lcd.print(",LON:");
  lcd.setCursor(5,1);
  lcd.print(lon);
 }
}
String latitude = String(lat,6);
  String longitude = String(lon,6);
Serial.println(latitude+";"+longitude);
delay(1000);
}
```

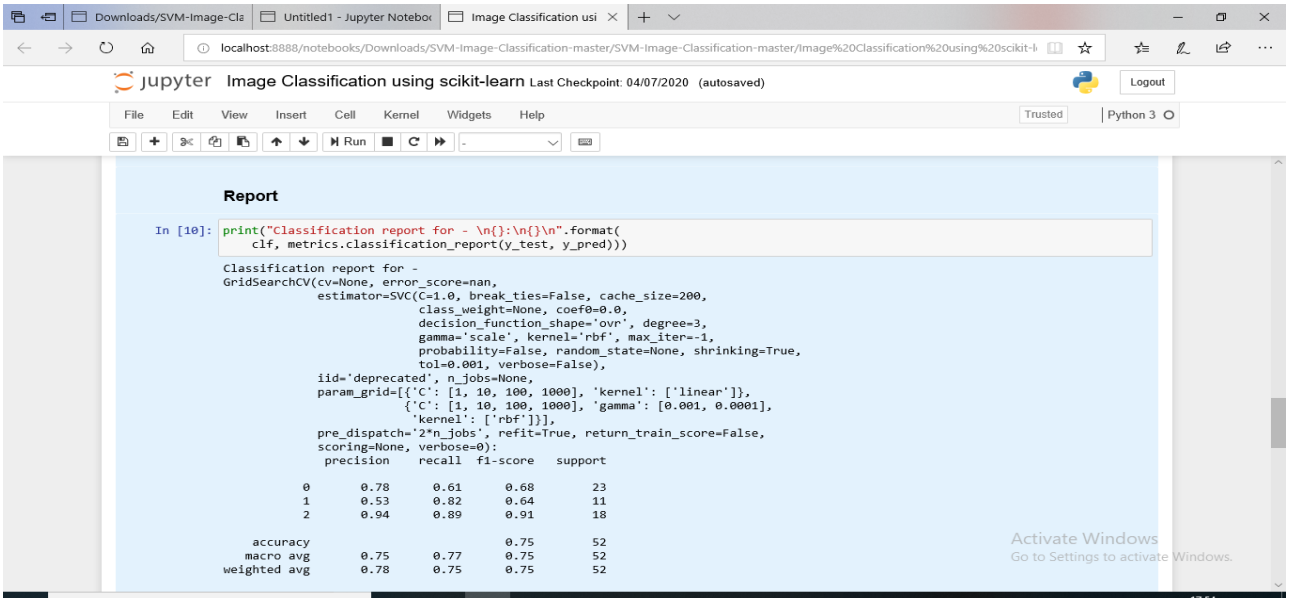
3. **Face detection**

```
import cv2
import sys

# Get user supplied values
imagePath = "abba.png"
cascPath = "haarcascade_frontalface_default.xml"

# Create the haar cascade
faceCascade = cv2.CascadeClassifier(cascPath)

# Read the image
image = cv2.imread(imagePath)
gray = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)

# Detect faces in the image
faces = faceCascade.detectMultiScale(
    gray,
    scaleFactor=1.1,
    minNeighbors=5,
    minSize=(30, 30),
   # flags = cv2.cv.CV_HAAR_SCALE_IMAGE
)

print("Found {0} faces!".format(len(faces)))
```

```
# Draw a rectangle around the faces
for (x, y, w, h) in faces:
    cv2.rectangle(image, (x, y), (x+w, y+h), (0, 255, 0), 2)

cv2.imshow("Faces found", image)
cv2.waitKey(0)
```

4. SVM Image Classification

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Trusted
Python 3
Run
Report
In [10]:
print("Classification report for - \n{}:\n{}\n".format(
clf, metrics.classification_report(y_test, y_pred)))
Classification report for -
GridSearchCV(cv=None, error_score=nan,
estimator=SVC(C=1.0, break_ties=False, cache_size=200,
class_weight=None, coef0=0.0,
decision_function_shape='ovr', degree=3,
gamma='scale', kernel='rbf', max_iter=-1,
probability=False, random_state=None, shrinking=True,
tol=0.001, verbose=False),
iid='deprecated', n_jobs=None,
param_grid=[{'C': [1, 10, 100, 1000], 'kernel': ['linear']},
{'C': [1, 10, 100, 1000], 'gamma': [0.001, 0.0001],
'kernel': ['rbf']}],
pre_dispatch='2*n_jobs', refit=True, return_train_score=False,
scoring=None, verbose=0):
precision recall f1-score support
0 0.78 0.61 0.68 23
1 0.53 0.82 0.64 11
2 0.94 0.89 0.91 18
accuracy 0.75 52
macro avg 0.75 0.77 0.75 52
weighted avg 0.78 0.75 0.75 52
Activate Windows
Go to Settings to activate Windows.
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17:54
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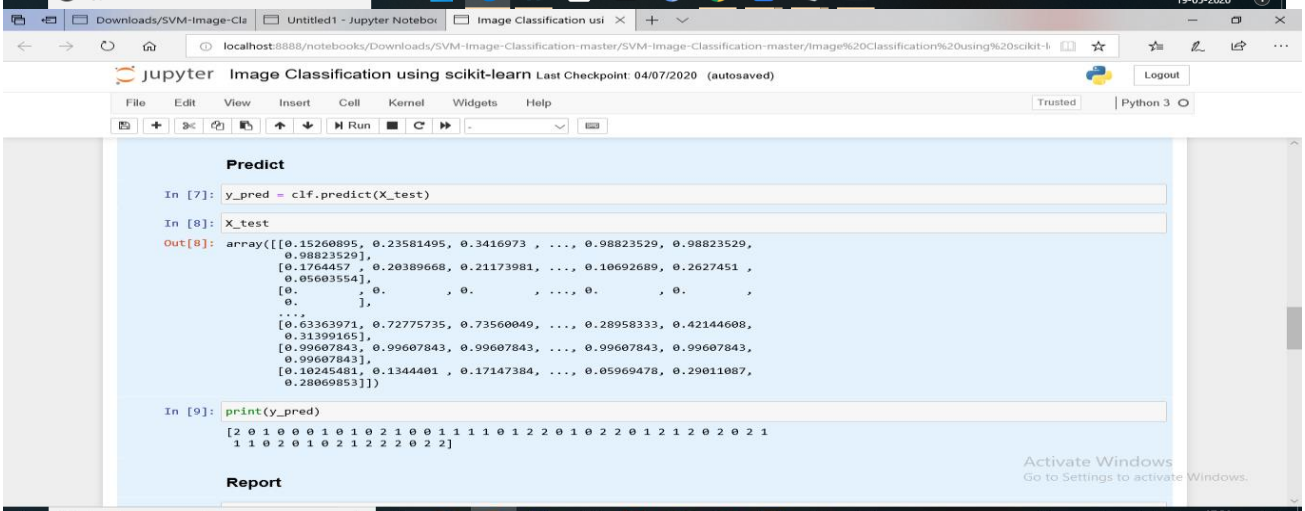
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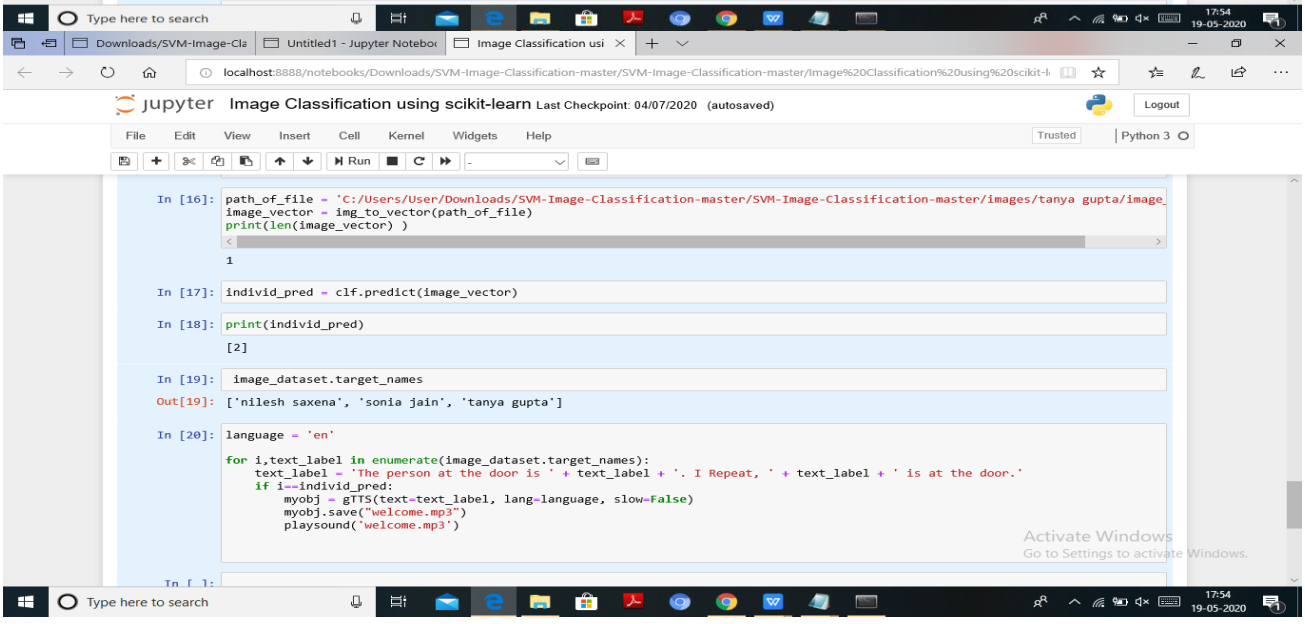
Python 3
Run
Predict
In [7]:
y_pred = clf.predict(X_test)
In [8]:
X_test
Out[8]:
array([[0.15260895, 0.23581495, 0.3416973 , ..., 0.98823529, 0.98823529,
0.98823529],
[0.1764457 , 0.20389668, 0.21173981, ..., 0.10692689, 0.2627451 ,
0.05603554],
[0. , 0. , 0. , ..., 0. , 0. ,
0.],
...,
[0.63363971, 0.72775735, 0.73560049, ..., 0.28958333, 0.42144608,
0.31399165],
[0.99607843, 0.99607843, 0.99607843, ..., 0.99607843, 0.99607843,
0.99607843],
[0.10245481, 0.1344401 , 0.17147384, ..., 0.05969478, 0.29011087,
0.2806953]])
In [9]:
print(y_pred)
[2 0 1 0 0 0 1 0 1 0 2 1 0 0 1 1 1 1 0 1 2 2 0 1 0 2 2 0 1 2 1 1 2 0 2 0 2 1
1 1 0 2 0 1 0 2 1 2 2 2 0 2 2]
Report
Activate Windows
Go to Settings to activate Windows.
Type here to search
17:54
19-05-2020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jupyter Image Classification using scikit-learn Last Checkpoint: 04/07/2020 (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted
Python 3
Run
In [16]:
path_of_file = 'C:/Users/User/Downloads/SVM-Image-Classification-master/SVM-Image-Classification-master/images/tanya gupta/image_
image_vector = img_to_vector(path_of_file)
print(len(image_vector))
1
In [17]:
individ_pred = clf.predict(image_vector)
In [18]:
print(individ_pred)
[2]
In [19]:
image_dataset.target_names
Out[19]:
['nilesh saxena', 'sonia jain', 'tanya gupta']
In [20]:
language = 'en'
for i,text_label in enumerate(image_dataset.target_names):
text_label = 'The person at the door is ' + text_label + '. I Repeat, ' + text_label + ' is at the door.'
if i==individ_pred:
myobj = gTTS(text=text_label, lang=language, slow=False)
myobj.save("welcome.mp3")
playsound('welcome.mp3')
Activate Windows
Go to Settings to activate Windows.
Type here to search
17:54
19-05-2020

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