

# A REVIEW PAPER ON ASSISTIVE CAP FOR VISUALLY IMPAIRED PEOPLE

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## ABSTRACT

*Mobility of a blind is restricted by their incapability to recognize their surroundings [1]. According to the World Health Organization (WHO), worldwide there are 36 million people that have total vision loss. The paper's main objective is to provide talkative assistance to visually disabled people. The paper discusses a smart system that works efficiently both indoors and in the outdoor environment. The proposed device for the visually impaired focus on interacting with the known ones and to detect the obstacle nearby. The proposed device has the primary objective that helps in guiding individuals who are visually impaired. Moreover, it provides voice messages to avoid obstacles based on sensors.*

**KEYWORDS:** *Ultrasonic sensors, Obstacle, White Cane, assistive technology, Bluetooth.*

## I. INTRODUCTION

The World Health Organization (WHO) Fact reported that around 285 million people are visually-impaired worldwide. Among these individuals, there are 39 million who are blind in the world [2]. Over the past years, blindness that is caused by diseases has decreased due to the success of public health actions. However, the number of blind people that are over 60 years old is increasing by 2 million per decade. Unfortunately, all these numbers are estimated to be doubled by 2020 [3].

The human visual system plays a significant role in recognizing information regarding surroundings. Everyone have challenges in their life, but blind people face a lot more. Visual impairment not only limits people's ability to perform everyday tasks but can also affect their quality of life and ability to interact with the surrounding world. They can't climb upstairs, or cross the road or travel the world or interact with people with much ease without knowing who is in front of them or anything that usually people do with ease. They are not able to spend their life with much independence as others do. They always need assistance to guide them around their surroundings, and for whatever comes in their way. The traditional way of assistance is having a white cane with them is most common among all the blinds and now it became a symbol of the blind.[13] Gaining independence and getting rid of the white cane is what blinds want. They need an assisted tool that doesn't trouble them or need not be a handle or not to hold them forever. So, to create a system that will help in gaining independence to the blinds and to assist them, the proposed system, i.e. the smart cap which is simple, cheap, and user-friendly that uses camera and ultrasound as the main component in finding and recognizing the objects and known person respectively.

## II. LITERATURE SURVEY

In 2012, Mahdi Safaa A., et al, said "A method to implement a mobility aid for the blind person there are various methods to measure the distance of the obstacle. One of them is by means of ultrasonic Shoes were used to guide the blind person, fitted with an array of ultrasonic sensors

around the sole. The sensors are supported by the proprietary circuit located inside the shoe of the user.”[4]

In 2012, M. Nassih quoted “The smart cane utilizes the technique of RFID (Radio Frequency Identification) RFID is used to detect obstacles and objects ahead of the user and detects the RFID tag if any that has been placed in various areas to navigate the users. This invention is simply sort of a normal cane but is provided with a bag, worn on the back by the user. The bag supplies electrical power to the system and gives the output to the user through speakers inside the bag. However, this system is confined in a small area because it is limited to the areas where the RFID tags have been placed. Otherwise, at the places without tags, it will behave as a normal stick.”[5]

In 2013 Alshbatat and Abdel Ilah Nour said “According to this paper, the blind Cane is one of the assisting tools for the blind and it is really important. The Guide Cane is meant to assist the visually-impaired users navigate safely. Guide Cane is employed just like the widely used white cane, where the user holds the Guide Cane ahead of the user while walking. The Guide Cane is considerably heavier than the white cane.”[6]

In 2006 Shinohara said, “Smart Cane is one invention which was originally the creation of a common blind cane, but it is equipped with a sensor system. This invention resembles Guide Cane where this invention features a number of ultrasonic sensors and servo motors. This invention is mainly designed to help the blind in navigating. Ultrasonic sensor got to detect and avoid obstacles and objects located ahead of the user.”[7]

In 2015 Sonal Shrivastava, et al said “In this invention, the technology using ultrasonic sensors and sound vibrations came into existence. However, this invention also has several weaknesses; it can't be folded and difficult to stay. In addition, this invention is not equipped with sensors to detect water areas.”[8]

In 2013 Muhsin Asaad H., et al cited “White cane is assigned to detect the obstacles up-to knee level within the range of 2 to 3 feet (0.91 m). When an obstacle is detected the cane vibrates or makes a sound. The sensor and therefore the controller are embedded inside the cane, and it always offers a battery lifetime of 10 hours. The delay time can be calculated by the calculation of the time taken to reach the waves to the obstacle and its return journey. Distance information is given to the user through a buzzer.”[9]

In 2015 Manisha Bansode et al. [10] “designed a voice based system for blind using voice recognition module and GPS module implemented on the Arduino board. In this system, blind man will give the destination's name because the input to voice recognition module. GPS receiver continuously receives the current location, its latitude and longitude and compare with the destination's latitude and longitude.”[1]

Anushree Harsur and Chitra.M [11] “developed voice based system for visually disabled using ultrasonic sensor, which enable blind persons to explore autonomously within the outside environment. This project mainly includes different 6 module like Initialization, interface , Address query translate, Route Query, Route transversal, and Obstacle detection. Initialization is that the first module during which initialization of the system library is completed. In the second module i.e. User Interface, during this step obtaining the destination address from user employing a microphone. Here, the voice interface implemented uses services such as Text To Speech for the voice outputs and the Google Voice Recognizer API. In the third module, i.e. Address query translate, which translates geographic to coordinate this includes latitude and longitude.”[1]

Dr. Boyina.S.Rao et al. [12] “developed indoor navigation system for visually impaired person using GPS and navigate autonomously within the indoor environment. This system the Global Positioning System (GPS) and it also uses a Zigbee protocol for continuous tracking of the visually impaired person (VIP). Figure 5 shows the overall diagram of system. This system consists of eight main parts: Micro controller (ATMEGA 164PV is used during this system), GPS receiver (iTRAX02 is used during this project), Zigbee transceiver, Ultrasonic sensor, HM 2007 (it could also be one chip CMOS voice recognition LSI circuit with the on chip analog front end), APR 9600 (it is sound record/reply IC incorporating flash analogue storage technique), Keypad and LCD display.”[1]

### III. DESIGN FOR THE SOLUTION

In the literature survey of the assistive technologies being developed for the blind over the decade. So, we design and implement a smart cap that helps the blind and visually impaired people to recognize the faces that are known to the user. It uses Face detection technique, recognition algorithm, and came to transform visual data collected through PiCam into tactile information. It uses a new concept of a known and unknown person. There is a button that triggers the microcontroller to find the faces that are known to the user based on the database it stores. If the person's information is already stored in the database, it is a known one otherwise it is unknown. Users will get to know the existence of a known person or unknown person through voice output. If it is an unknown person Camera installed on the system captures 150 frames of the person that is in the front of the user, it will store the information about the person and if the person will meet for the second time it will no longer an unknown one. The processor collects the frames of the person, surrounding and converts it to voice output. The voice output is delivered by earphones installed on the system giving information about surrounding. It uses GSM Module to provide a feature of sending the location of the user to the known ones and also has a feature of obstacle detection that uses an ultrasonic sensor to find the obstacle in the range of 1 m to 3 m to avoid a collision. Sensors are used to give users better mobility.[14,15].

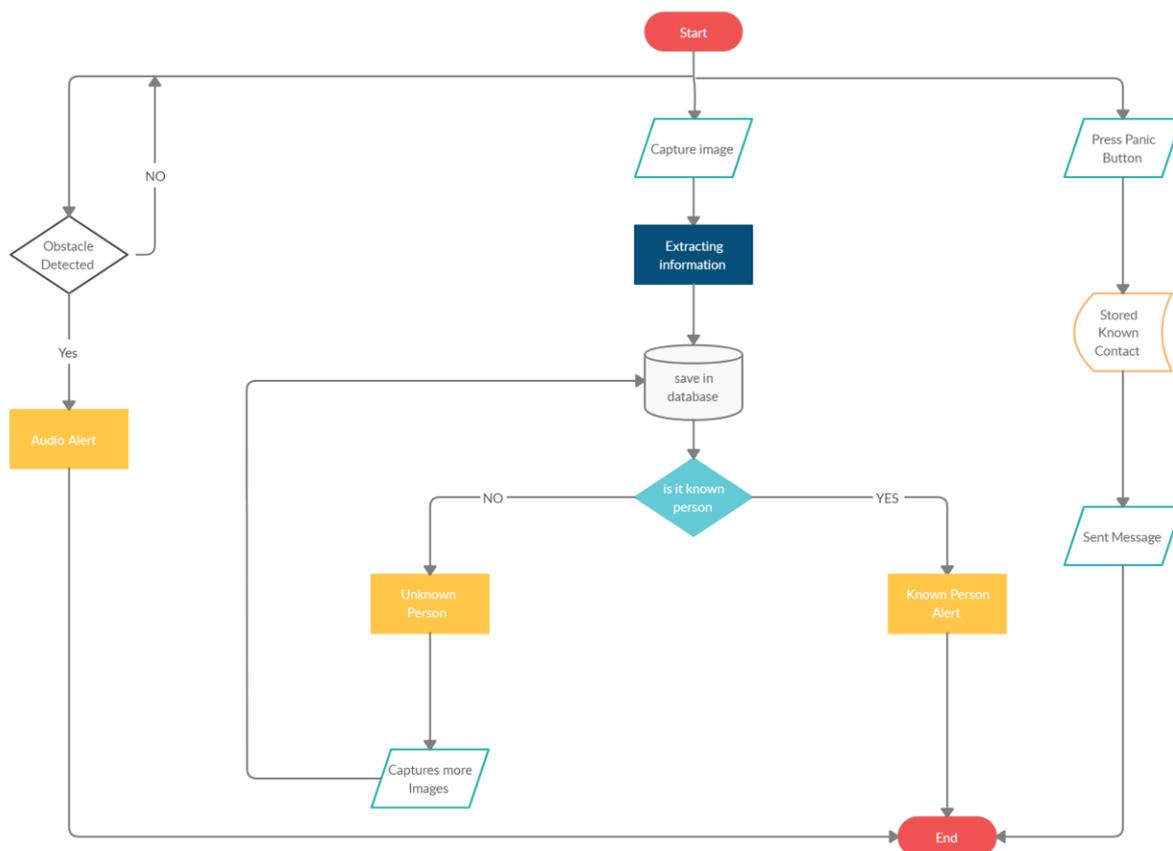


Fig.1 Flow Chart of the system.

### IV. RESULTS AND DISCUSSION

The above a proposed system would help in gaining independence to the blind in the future. This system will help them to get rid of cane and getting rid of the difficulty in handling and holding the cane. The system will help them to interact with others without any need for other assistance. Other assistance and involvement that leads to frustration will decrease using this system. The cap reduces human effort and will work more efficiently than the above smart canes do.

## V. CONCLUSION

This review paper will help the visually impaired in their day to day tasks and guide them in a proper way by using audio output. It will decrease the dependency of especially abled on others. The function to provide the emergency alerts will be a good support in case of emergency. All this will be done using a better way and advance use of technology by implementing the real time visualization using image processing with the camera.

## VI. FUTURE ASPECT

The proposed devices reduced the human effort to much extent but to make this device comfortable to use it can be integrated with mobile phones of the user to give better experience. The proposed device feature of voiced output can be improved for better interaction, and also voice interaction between device and user will be possible in the future.

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