REVIEW PAPER ON ASSISTIVE DEVICES FOR VISUALLY IMPAIRED PEOPLE

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Abstract- Mobility is very important for every human being. People need to travel from one place to another. The visually challenged people also travel from place to place as they go for work. But they face problems while travelling. As visually impaired beings have vision problems, they need to walk slowly and carefully. There may be many obstacles on their way. So visually challenged people employ white cane for mobility outdoors. Even with these white canes cannot be totally relied on. Therefore, it is our responsibility to create a world where visually challenged can travel without any worries. In this study we discussed about the recent trends and advancement in smart canes which has made travelling secure and easy for visually challenged people.

Keywords- **Visually challenged, mobility, smart cane**.

I. INTRODUCTION

One of the basic and most important senses of the human body is vision. According to the World Health Organisation, over 285 million people in the world are visually challenged, of whom 35 million are blind and 246 million have moderate to severe visual impairment. In India 53 million people are suffering from some form of vision loss. The various problems faced by a blind person are using stairs, bumping into obstacles, falling through a curb, etc. To overcome all these problems the visually challenged individuals largely use white cane to aid their mobility. The white cane is a very rudimentary device which provides information about ground-level obstacles to the user. However, the information the cane provides is limited as it is ineffective at detecting obstacles that are above the knee. The white can typically detect obstacles within a distance of 1m, making it less effective in outdoor areas where fast moving vehicles and other obstacles are present. One of the simplest and effective way to make mobility easier for visually challenged people is to replace the conventionally used white canes to smart canes.

There have been projects developed in the past to aid in this mission, these prototypes still face several drawbacks and limitations. The C-5 Laser cane - was introduced by Benjamin in 1973. It is based on identification with three laser diodes and uses three diodes as receiver. The laser cane can detect up to a range of 1.5m to 3.5m ahead of the user. The Mowat sensor – is a hand held ultrasonic based device that informs the user of the distance to objects that has been detected by using tactile vibrations. The models reported are cost effective but cannot detect changes in terrain or send SOS messages. Devices that can indicate the distance of the obstacles present in the path of the user were developed. The distance of the obstacle is indicated by different vibrational patterns, which would be time consuming for the user to analyse and understand.

II. SENSOR BASED CANES

The cane unit and the shoe unit, which are integrated together and works as a dingle unit. The output is given to the user in the form of voice commands which are per recorded. This provides an active feedback. The cane unit and the shoe unit work's as an effective single unit by Bluetooth connectivity. The user is provided with a pressure switch which is used to alert the user to not lose hold of the cane. The microcontroller that is used in this paper is PIC microcontroller for both the shoe unit and the cane unit. The use of long-range IR sensors in this system gives high accuracy [1]

Components like the zigbee module interface, microcontroller Arduino UNO, vibration unit, gyro sensor are used. Zigbee module is used to monitor and inform the movement of the user. It has voice commands which are pre-stored and vibration unit to alert the user of any obstacle. Gyro sensor is used for the body balance of the user. This shoe doesn't require power backup because it is integrated with self-power generation. For the object detection ultrasonic module is used. Piezoelectric ultrasonic sensors are used for better accuracy and of their low cost [2]

The shoes and the cane are integrated as a single unit. They are connected via Bluetooth technology. Two modules are used, they are shoe module and cane module, which are also known as auxillary module and primary module. But there are some delay in the

working process of the modules feedback. Only the front and right side detects using sensor in the shoe. The cane detects for the left side. The major components used are Arduino NANO, Arduino LILY, IR sensors and Ultrasonic sensors. Based on the classification, the shoe module has two IR sensors for front and right, which sends the command to the microcontroller. The cane module has only one IR sensor for the left side. The show module is for the ground level detection and the cane module is for above knee level detection. The cane module does dual functions of receiving signal from the shoe (i.e, form the sensors in the shoe module) as well as from the cane and processes the signal and gives the output as voice command [3]
The aim of this paper is to get familiar with the work done in making walking stick smart and more helpful. The literatures related to this topic were reviewed and analysed. As technology improves these smart sticks need to be modified. The simulation results are expected for the ultrasonic sensors, water sensor and Bluetooth model in one microcontroller. So in this paper wide survey of the work related to this project is done and we have shortlisted some useful aspects from each project. This will also help to decide designing approach [4]
The conventional walking stick is limited in range because the stick only detects the object when the stick taps the object or ground. A walking stick with a distance sensor can help them to avoid the obstacles better without tapping the object or ground. Sharp infrared distance sensor is consumed to detect the object within the distance range of 10 cm to 80 cm because it is small in size and very efficient in detecting the object. A buzzer is employed as the signalling element which generates sound when the object is sensed by the IR distance sensor. As the object is getting closer to the IR distance sensor, the sound produced is becoming louder. The sound of buzzer is depending on the output voltage of IR distance sensor by varying the distance between object and the sensor. The data taken from the experiment show that the output voltage of IR and Ultrasonic distance sensor is decreasing when the distance between object and IR and Ultrasonic distance sensor is increasing which in turn the sound volume of the buzzer is also decreasing. In conclusion, the objective of this project is successfully achieved because a walking stick for the visually challenged using infrared distance sensor is successfully created to detect the object in front of the user within the specific distance range which can help them in mobility [5]

An intelligent stick that aids blind as well as deaf people for any kind of obstacle detection including water, potholes, AC mains. It has an added functionality of GPS and GSM module that will enable immediate provision of help to the person in case of an emergency. The objective is to provide an aid to visually impaired and deaf people which will assist them everywhere they go [6]

Only few of the navigation systems available for visually impaired people can provide dynamic navigation through speech output. None of these systems work perfectly for both indoor and outdoor applications. In this paper, we propose a navigation device for the visually impaired which is focused on providing voice output for obstacle prevention and navigation using infrared sensors, RFID technology, and android devices. The proposed device is used for guiding individuals who are partially sighted or blind. This device is used to help blind people to travel with the same ease and confidence as sighted people. The device has proximity infrared sensors. RFID tags are installed into public building and also integrated into blind person's walking stick. The whole device is designed to be small and is used in conjunction with the white cane. This device is connected to an android phone through Bluetooth. An android application is designed which gives voice navigation based on RFID tags read and also updates person's location information on the server. One more application is designed for family members to access the blind person's location through the server whenever needed [7]

Based on the limitations in existing aids, proposed an enhanced assisting electronic aid using latest technology like Ultrasonic waves, Camera, GPS, GSM for the visually impaired people, In addition to that, where GPS system cannot be used we make us of the camera with some algorithm for to identify the obstacles. Also, aims to develop emergency trigger alert system along with design [8]

The technologies behind blind sticks are upgrading day by day. And our model ensures one thing that is making the task of moving of a blind person easy and comfortable. The stick is also very light and handy to carry. And the components or parts that we used in the stick are also easily available and less in cost. And besides all that the manufacturing cost is also quite low, that makes the stick affordable for people of all class and age. In future, if further improvement and investment is carried out with the stick then it will be an even more effective device for the future world. [9]

Typical obstacles (walls, openings, and vertical rods) have been used to draw the protection zone of the Ultrasonic Sensor. The ability of the Ultrasonic sensor to find a path wide enough for a person to go through has been demonstrated. Theoretical and radiometric calculations based on optical geometry have been made to improve the design and performance of the system. The importance of intensity distribution to determine the protection zone has been highlighted. The technical compromises used in our new generation of Ultrasonic devices have been presented [10]

An intelligent stick that aids blind as well as deaf people for any kind of obstacle detection including water, potholes and fire zones. If it developed with at most accuracy, the blind people will able to move from one place to another without others help. The prototype gives good results in detecting obstacles paced at distance in front of the user and also the obstacles which are on the sides. It meets all the goals and give a confidential walk for blind people without others guidance [11]. The device has a great suitable and easy used to blind and deaf than white cane. The sufficient range of this device is 40-150cm and can reach to 200 cm by extending a hand and can be used in three dimensions [12].

III. CONCLUSION

The Study of Assistive device for visually impaired is done to integrate the available technologies applicable to the disabled people and the most reliable, user friendly technology. The Study can help the visually challenged people to overcome their travelling problems. The components used are easily available and can be fabricated easily. The visually challenged people will not need any external assistance so they will feel more independent.

IV. REFERENCES

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