**LITERATURE REVIEW:-**

1. Ahmed EL-KOKA has designed a smart blind belt instead of blind stick which is sometimes makes some extra carriage for the blind users. So for this reason they have made this belt with pic microcontroller, some sensors and some vibration motors. Actually this kind of belt is attached with the body in the waist part , giving different kind of vibration in different direction after detecting the object near around the blind person.[13]
2. The research of C. H. Lin, P. H. Cheng and S. T. Shen has proposed a mobile real-time dangling objects sensing (RDOS) prototype, which is located on the cap to sense any front barrier. This device utilized cheap ultrasonic sensor to act as another complement eye for blinds to understand the front dangling objects. Meanwhile, the RDOS device can dynamically adjust the sensor’s front angle that is depended on the user’s body height and promote the sensing accuracy. Meanwhile, two major required algorithms, height-angle measurement and ultrasonic sensor alignment, are proposed with this prototype. They also integrated the RDOS device prototype with mobile Android devices by communicating with Bluetooth to record the walking route.[12]
3. Ayat A. Nada, Ahmed F. Seddik and Mahmoud A. Fakhr propose a light weight, cheap, user friendly, fast response and low power consumption folding smart stick based on infrared technology by using pic microcontroller. A pair of infrared sensors can detect stair-cases and other obstacles presence in the user path, within a range of two meters. They have also added an earphone to alert the blind person with speech warning message about the detected obstacles with the help of ISD 1932 voice recorder. [05]
4. Instead of using the traditional mobility aids include the white stick and guide dog B.S.Sourab, Ranganatha Chakravarthy H.S and Sachith D’Souza have made some researches on this issue and finally concluded with a new features on mobility aid devices that is nothing but a smart blind jacket, which includes the IR sensors in different orientation to detect the objects and notify the blind person by the loudspeaker and also find the best route to overcome the obstacles. [14]
5. Ashwini B Yadav, Leena Bindal,V.U Namhakumar, K Namitha , H Harsha have designed to help the blind person to navigate alone safely and to avoid any obstacles that may be encountered, whether fixed or mobile, to prevent any possible accident. The device provides voice output giving direction to the blind Using RFID technology, the destination of the bus is detected and voice announcement is given regarding the destination of the bus. The location of stick is added advantage to the current multipurpose device. Using RFID technology the location of the stick is achieved. The blind is provided with a push button to locate the stick. [20]
6. The Assistor which is made by Akhilesh Krishnan, Deepakraj G, Nishanth N, Dr.K.M.Anandkumar uses ultrasonic sensors and image sensors to detect obstacles and identifying it by echo sound waves and image processing respectively. It is also helpful for navigation by capturing runtime images and a Smartphone app is used to navigate the user to the destination using GPS (Global Positioning System) and maps. [11]
7. Akshay Salil Arora and Vishakha Gaikwad from Ramrao Adik Institute of Technology Navi Mumbai, India, have made a convenient and easy navigation aid for unsighted people by using IR sensors along with ultrasonic range finder circuit for hurdle detection and bluetooth module which along with GPS technology and an Android application for blind, which will provide voice assistance to desired location and in panic situations will send SMS alert to registered mobile numbers.[06]
8. Making of “Hot Glass” for visually challenged people makes A Srinath Diwakar, A R Ram Praveen, R Siva an extra passage in the utilisation of Science in modern era. It gives a virtual vision to the blind person , consists of spectacles with inbuilt camera, earphone, microphone and processing unit. Initially the inbuilt camera of the glass capture the image in front of the blind person and then process it and match it with images stored in the database then converted it in the audio form and deliver through the earphone to the blind person’s ear, so that the person can recognise the objects easily in the virtual form.[19]
9. An automated smart stick made by Kunja Bihari Swain, Rakesh Kumar Patnaik, Aparna Mishra give the blind person’s life much easier. Generally it consists of IR sensor, ultrasonic sensors GPS module and GSM module for object detection and position monitoring of blind person if the person losts his/ her location through the registered mobile easily.[07]
10. Zeeshan Saquib, Vishakha Murari and Subhas N Bhargab has made an IOT based smart Electronic Traveling Aid (ETA) called BlinDar for giving the better life to the blind persons. It consists of ultrasonic sensors for detection of objects and potholes , gass sensor for ignition and RF TX/RX module in case of lost of blind stick. They have also used the GPS module interfacing with ESP8266 wifi for location measurement and Arduino Mega2560 microcontroller for overall control management.[18]
11. The research of Giva Andriana Mutiara, Gita Indah Hapsari, Periyadi gives the blind cane a modified form rather than the traditional usage. They have used module NRF24L01, module XBee Pro S2C, and module USR-BLE10 for better communication and location detection. Maybe the XBee Pro S2C module is expensive , but it gives a high communication performance in the development of blind person’s life.[08]
12. Instead of carring a big , complicated sensible stick , Md. Mostafa Kamal abd his friends have designed a new assistance which is nothing but a small , wearable , lightweight and low-cost spectacles where the system can calculate the smoothness of the surfaces both for the daylight and cark using RGB data through the microcontroller and smartphone. Here they have used LinkSprite JPEG Color Camera for image capturing , Embedded microcontroller LPC1768 for controlling camera sonar sensor and vibrators , Bluetooth, PIC12F683 microprocessor for image processing and a smartphone. [17]
13. Mukesh Prasad Agrawal, Atma Ram Gupta the student of NIT Kurukshetra have tried to give a modified form of the white cane instead of traditional. For giving a better and safety life they added MSP430 Microcontroller , GSM Module for location detection, water sensor, Ultrasonic sensor for object detection and RF module in case of losing the blind stick. So by adding all these stuffs now the stick become the smart blind stick.[04]
14. The student of MNIT JAIPUR , Himanshu Sharma and Amit Kumar have given a modified form to the traditional blind stick with some embedded smart equipment. They have used Aurdino microcontroller , three ultrasonic sensors, buzzers, moisture sensor, vibration motor and RF module. For pothole detection in 20 cm apart in front of the stick one ultrasonic sensor is used at 20 degree angle, another for detection the bellow knee obstacles and one for detecting the knee above obstacles,. These all are connected with either buzzer or with the vibration motor . The RF module has used for finding the stick in case if it is lost. [02]
15. Student of Electrical and Computer Engineering, San Diego State University, San Diego, CA 92182, USA has proposed a SWSVIP–Smart Walking Stick for the Visually Impaired People using Low Latency Communication where they have used the ATMEGA-16 microcontroller , buzzer, vibration motor , Ultrasonic sensors ,GPS system and smart phone application with the nearest base station. The ultrasonic sensors helps to detect the objects , gps for real time monitoring location and the smart phone application connected with the nearest base station in case of emergency. [09]
16. Pritha Ghosh, Rahul Dey and Ankita paul have also designed a smart blind stick with ultrasonic sensors ,HCSR04, PIC Microcontroller 16F877A for object detection around the blind person to help the blind person to walk with more safe navigation.[01]
17. Without including various items the VIT students have made the blind stick with some extra ordinary by including SOS navigation system. Where they have used the Raspberry pi with portable camera which helps the blind person in this way that if the person feels any kind of discomfort while navigating then he can press an e-SOS distress call button on the stick to give a video call to his family member. The video is streamed in an Android mobile via Android application. The Android application also shows the location of the blind person to his family member. [16]
18. Like other smart blind stick Md. Allama Ikbal, Faidur Rahman and M. Hasnat Kabir the students of Information and Communication Engineering Faculty of Engineering, University of Rajshahi, Rajshahi-6205, Bangladesh has setup the same smart stick with ultrasonic sensors with microcontroller except they have used the the 3D CAD software to design the sensor holder and Up-Mini 3D printer to print the sensor holders have mounted on the walking stick for safe navigation.[03]
19. Have proposed an intelligent assistance system where they have made a model of smart stick with a smart glass which helps the visual impairment person to detect the obstacles in front of the blind person. This system consists of an infrared (IR) transceiver sensor module, a 6-axis (Gyro + accelerometer) micro-electromechanical (MEM) sensor module, a microcontroller unit (MCU), a Bluetooth low energy (BLE) wireless communication module and a battery charging module mounted on the wearable glasses.[15]
20. For improvement of blind person’s life style Arvin C Frobenius and his team members has proposed a system where they have develop a speed Gablind app connected with a smart glass which have the max sonar sensor to detect the obstacles. Initially the max sonar sensor has the capability to detect the obstacles 1 to 6 meters ahead within a capture range of 45 degree to 145 degree. The users should have the smart phone and the Gablind App speed on the smartphone worked effectively at speeds 21 to 66.8 cm / s to detect obstacles with distance 123 cm to 63 cm.[10]
21. Again for further modification Arjun Pardasani, Sashwata Banerjee and Aditya kamal student of VIT, made a smart glass with a pair of smart shoes using Raspberry pi and other sensors. Where they implemented Braille code for upmost enhancement by letter recognition with optical phenomena and object detection by ultrasonic sensors through the shoes.
22. In another paper for improvised navigation of outdoors and indoor by detecting obstacle at different heights on flat road, the students Srinidhi Srinivasan & Rajesh M. from Amrita School of Engineering, Bengaluru made a smart version of blind stick where leg weakness, balance loss and improper navigation of indoors and outdoors can easily be avoided by Force sensor, Ultrasonic sensor & Pressure Sensor with the help of alarms.
23. Like other smart stick Mrs. S. Divya, M. Praveen Shai, A. Jawahar Akash, Shubham Raj and Ms. V. Nisha have made a smart design with arduino microcontroller, object detecting sensors and GPS with GSM module for object detection and location monitoring to give the blind person a better life.
24. The student of Department of Computer Engineering Maharashtra Institute Of Technology Pune provides an efﬁcient solution for the visually impaired in the form of a hardware automated stick based on Google's Cloud Video Intelligence API. This system uses real time video processing to analyze the obstacles or objects coming in the path of the blind and provides feedback in the form of voice messages. Hence the system facilitates real time navigation in both indoor and outdoor environments easily.
25. In another paper Priyanka Ambawane, Devshree Bharatia, Piyush Rane made a modified e-stick using IOT, face detection technique, Object detection technique with google cloud version API to give a better and easy life to the visually impared person.