

INDOOR SHOPPING SYSTEM FOR VISUALLY IMPAIRED PEOPLE

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Abstract – Shopping is the one of the most essential activities that people has to perform in there day to day life. But there are some people that faces many difficulties in shopping such as VIP(visually impaired people). They have to depend on others to shop in unfamiliar places so to address these difficulties by providing an device that will help the visually impaired people to shop independently by using different technologies .The proposed system consist of different modules such as product recognition and section information which will process on raspberry pi model. Product recognition include Optical Character Recognition and Text to Speech software which will help user to identify the product. Section information will help user to get the section information by using Radio Frequency Identification (RFID) technology . Ultrasonic sensor will detect the obstacle and alert the user using buzzer.

Key Words: Optical Character Recognition, RFID, Text to speech, Raspberry Pi, Ultrasonic Sensor

1. INTRODUCTION

Now a days we are surrounded by multiple devices and technologies. We are unable to imagining our life without making use of this technologies. Starting from communication to online shopping many of our actions are depended on the smart devices, but there are some people around us those are unable to take the complete benefits of these resources such as visually impaired people. According to WHO (world Heath Organization) there are 256 Million people are visually impaired people. [9] They faces many problems in there day to day life. They also find difficulties while performing task such as shopping in the mall or supermarket, they have to depend on other people to know about the sections and also in recognizing the products they want to buy. So we are trying to develop such a product which will help them to walk and shop independently in indoor public place like shopping mall or supermarket. Many have delved into the field of computer science in hopes of coming up with a solution that solves the inconveniences of visual impairment. One such difficulty is the everyday task of grocery shopping.[9]Till date many proposed system had addressed this problem in many different ways and using many technologies such as RF transmitter and receivers, RFID tags and readers, zigbee, Arduino, NFC tags, GPS etc..for helping VIP to navigation and product recognition. But most of the

system used GPS for navigation which is only applicable only for outdoor navigation. In the existing system, they made use of RFID tags for product recognition and RF transmitter and receivers for reading the data. The proposed system provide a device for visually impaired people which uses RFID, raspberry pi, camera TTS, ultrasonic sensor and buzzer to help them for choosing a product via earphone/headphones.

2. RELATED WORK

2.1. LITERTURE REVIEW

Aim of this paper is to developed ETA (Electronic Traveling Aid) kit to help the blind people to find obstacle free path this kit is fixed to the stick of the blind people. When the object is detected near to the blinds stick it alerts them with the help of vibratory circuit. The blind person will give the destination's name as the input to voice recognition module. GPS module continuously receives the latitude and longitude of the current location. They are guiding or navigating the blind people using voice. [1] This paper made analysis study of the actual problems faced by the VIP .It also discuss the technologies the purpose of this study was to acquire an in-depth understanding of the indoor navigation behaviors and strategies used by visually impaired people when walking inside buildings full of unfamiliar features. The study findings are analyzed and classified into 5 categories: (i) use of assistance, (ii) distance estimation, (iii) way finding and orientation, (iv) unfamiliar spaces, and (v) obstacle and hazards. [2] This paper presented Follow Us an android app, by using mobile app and cloud services .They are using matching, indexing and segment mapping algorithm to enable indoor graph construction and automatic trace generation. It is a P2P navigation systems Recording(as "leader")In this they are using sensors to detect user motion events including step, turns, and level changes Navigation (as"follower") user can follow trace over any pre-recorded path. Distance-based hashing: DBH is a family of hash functions that can map data under an arbitrary distance into real numbers. Segment Follow Us uses SVM to classify DTW synchronization results between segments to determine whether segments are matched with each other. Heuristic search algorithm to find the corresponding pathways on the map. To illustrate the advantage of this algorithm, we use traditional Depth-First Search (DFS) and Breadth-First Search(BFS) as comparisons and evaluate both accuracy

and efficiency. In the evaluation, accuracy is measured by the percentage of trace segments that are correctly mapped. [3] This paper presented the automatic document reader for visually impaired people, developed on Raspberry Pi. It uses the Optical character recognition technology for the identification of the printed characters using image sensing devices and computer programming. It converts images of typed, handwritten, or printed text into machine encoded text. In this research these images are converted into the audio output (Speech) through the use of OCR and Text-to-speech synthesis. The conversion of printed document into text files is done using Raspberry Pi which again uses Tesseract library and Python programming. The text files are processed by OpenCV library & python programming language and audio output is achieved. [4] The paper The proposed system automates the navigation for the disabled by using raspberry pi along with ultrasonic sensors and 360 degree camera technology. This system incorporates eSpeak module for text to speech conversion of data, to help the blind user hear about the upcoming obstacle. A GPS sensor is used to find the current location of the visually challenged person. There is also a weather determination system, which updates the user about upcoming weather statistics. [5] study about the various difficulties in their daily activities in comparison to people without visual impairment and solution to it. Much research has been done to find smart solutions using mobile devices to help people with visual impairment perform tasks like shopping. Shopping Preparation help to prepare shopping lists and store them in a database. These is implemented using Optical Character Recognition(OCR) module to read the printed text which analyses and convert it into text. [6] The project consists of the smart shoes and the smart cane (stick) that alerts visually-impaired people over obstacles coming between their ways and could help them in walking with less collision. The main aim of this paper is to address a reliable solution encompassing of a cane and a shoe that could communicate with the users through voice alert and pre-recorded messages [7] the paper presented a wearable smart system to help visually impaired persons (VIPs) walk by themselves through the streets, navigate in public places, and seek assistance. The system employs a set of sensors to track the path and alert the user of obstacles in front of them. The user is alerted by a sound emitted through a buzzer and by vibrations on the wrist, along with the system location, is sent as a phone message to registered mobile phones of family members. [8] proposed one such development: a wearable object recognition device in the form of eyewear. Device is specialized to recognize items from the produce section of a grocery store, but serves as a proof of concept for any similar object recognition wearable. It is user friendly, featuring buttons that are pressed to capture images with the built-in camera. A convolutional neural network (CNN) is used to train the object recognition system. After the object is recognized, a text-to-speech system is utilized to inform the user which object they are holding in addition to the

price of the product. With accuracy rates of 99.35%. [9] study focuses on the modification of the design of an existing "smart backpack" by integrating photoelectric sensors, Radio-Frequency Identification (RFID) and ZigBee technology in order to assist blind people. The photoelectric sensor emits light continuously until an obstacle blocks its line of sight and receives the reflected light. RFID reader and tags are incorporated to help the user identify specific objects. For indoor position tracking, ZigBee modules are mounted on the ceiling of the target area of application. Moreover, an audio output would be heard to inform the user's specific distance from the obstacle and the direction where the user was detected, the user's current location and the identified object. [10] to provide the indoor navigation for the visually impaired people by using RFID tags, RF transmitter, receivers and Zigbee. In this they are using the RFID technology, it is used for identifying the product placed in the shelf. The hand glove is embedded with RFID reader, RF receiver, microcontroller, Arduino UNO, Earphone, SD card adapter and zigbee module. Navigation is provide by played as audio file. After hearing the directions, the customer walks towards the section. In order to confirm the name of the section the RF transmitter is placed at the section ends. RF receivers are interfaced with the arduino and section name file is read from the Secure Digital(SD) card and played through the earphone. [11] Assistive technologies are being developed for visually impaired people in order to live confidently. This project work proposes a camera-based assistive text reading framework to help blind persons read text labels and product packaging from hand-held objects in their daily lives. The project work is framed into three stages. First, Image capturing Using a mini camera, the text which the user need to read get captured as an image and have to send to the image processing Platform. Secondly, Text recognition Using text recognition algorithm, the text will get filtered from the image. Finally, Speech output. A filtered text will be passed into this system to get an audio output. This project work can be able to insist the blind people in their daily life. The entire application will run on Raspberry Pi. [12]

3. COMPONENTS

RFID tags: Tags are identified by using electromagnetic field. There two types of tags (i.e active tag and passive tag) Active tag has its own power supply but the passive tag required for the power. Passive tag is composed of antenna, chip and means to collect DC power for reader. In proposed system, we have used passive tags because that is less costly and is scalable to a larger area in the super market.



Fig - 3.1 Passive RFID tag[11]

RFID Reader: RFID reader is used to read as well as write the data onto the tags. Tag needed come in the range of reader to retrieve data from it.



Fig - 3.2: RFID reader [11]

Raspberry Pi: It is the Micro processor or a small computer. It consists of RAM, Processor unit, input ports, output ports, graphics card and also SD card. It is designed to work on linux as well as on windows platform. It can be operated with SSH, or use FTP to transfer the files. It has 1GB RAM. It uses python language for coding. It also provide camera port, USB connections etc.



Fig - 3.3: Raspberry Pi[5]

Optical Character Recognition -

OCR is an application to convert printed text on the image into machine encoded text format (text file).

It is the technique to edit, search, stored the printed text .OCR uses techniques such as “pattern matching”

And “features extraction” to process the printed text on the image captured.

eSpeakNG: It is a open source, software for speech synthesizer which works on linux, windows, and other platforms also. It uses a formant synthesis method, providing many languages in a small size. It support speech synthesis markup language (SSML). The language’s ISO 639-1 code is used to identify the languages voices. These are text files which can change characteristics such as pitch

range, add effects such as echo, whisper and croaky voice, or make systematic adjustment to formant frequencies to change the sound of the voice. It uses an ASCII representation of phoneme names which is loosely based on the Usenet system .In the proposed system it is used to convert the text file obtain as the OCR output into audio file for the VIP.

Ultrasonic sensor: Ultrasonic sensors measure distance by using ultrasonic wave and receives the wave reflected back from the target. It measure the time required during the emission and reception of the waves to calculate the distance. The device it self work as emitter and receptor. In proposed system it is used to detect the object or the obstacles face by the VIP.



Fig - 3.4: Ultrasonic Sensor[5]

Buzzer: It is an alert device which give output in the form of beep sound .It is used to alert the user about the object.

4. SYSTEM ARCHITECTURE

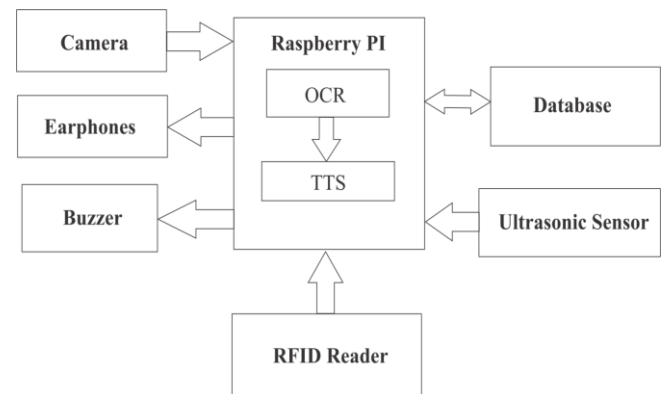


Fig -4.1: System Architecture

Raspberry pi: It is used for processing

Camera: To capture the image

Earphone: As a Output device

Buzzer: Alert device

Ultrasonic sensor: Detect obstacles

RFID Reader: To read the RFID tags

Database: Store the related information about the product

OCR: To convert image file into text file

TTS: To convert text file into audio file

5. DESIGN

Data Flow Diagram (DFD) represent the data flow in the system which include different process such as user will press the buttons to on and off the recognition process then the user will capture the image using camera this image will be then process by OCR .OCR will convert the printed text from image into text and the text will be converted into speech. Sections information will be read from RFID tag and they information will be given to user through earphone.

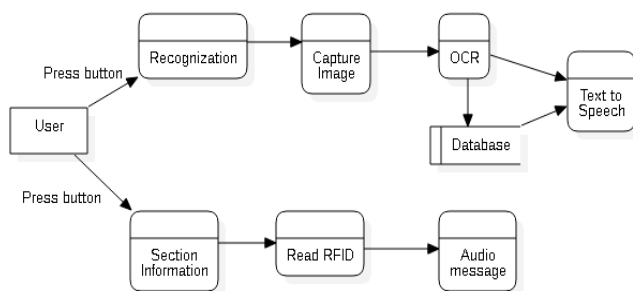


Fig -5: Data Flow Diagram

6. CONCLUSION

The proposed system will enable visually impaired people to shop independently in supermarket. Being specific gadget for product identification, Section Information and obstacle detection can be designed. It makes the use of RFID and raspberry-pi technologies for providing the smart environment for the visually impaired.

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