Advanced Blind Stick with Portable Camera for Label and Text Reading using Raspberry Pi

P.Yamini
Department of Electronics and communication engineering,
Malla reddy engineering college for women,
Maisammaguda, Dhullapally,
Secunderabad, Kompally-500100.
INDIA.

Dr. N. Sreekanth
Head of the department electronics and communication engineering,
Malla reddy engineering college for women,
Maisammaguda, Dhullapally,
Secunderabad, Kompally-500100.
INDIA.

Abstract

The project aims at designing a system for blind persons to recognize the hand held objects or products using camera and also messages reading which are texted from the android mobile through Bluetooth. In this project, we design and develop a system to find products or objects with voice announcements. We can also alert the user through voice alerts whenever he is close to the obstacle or when the stick comes into contact with water on the road. We can track the location of blind person using GPS technology. It also gives voice announcements of the message texted from the Android phone over Bluetooth module. The project consist of panic switch to send the message through GSM about location details .The status will displays on LCD display. The device which is able to perform the task is a **Raspberry Pi** processor.

Keywords: Raspberry pi3, pi camera, Speaker/Head Phones, Hard disk (SD card),Camera. Speaker/ head phone, Ultrasonic sensor, RF module, Water level sensor, GPS,GSM ,LCD display, Buzzer, Battery. Panic switch. Bluetooth.

1. Introduction

The portable system which captures the images and text written which are placed in front of the camera can be read out or announced out using speakers. These details were verified using Raspberry Pi processor for authentication. The Raspberry Pi processor system alerts the blind person through voice messages using speakers or head phones.

SR04 sensor used to detects the obstacle and alert through buzzer whenever the obstacle is detected. We can also alert the user through voice alerts whenever he is close to the obstacle or when the stick comes into contact with water on the road. Using Bluetooth technology to send the text message what we are saying by using android mobile phone. Using RF transmitter and receiver modules **find** the location of their electronic **stick** remotely.

Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. This project makes use of an onboard computer, which is commonly termed as **Raspberry Pi** processor. It acts as heart of the project. This onboard computer can efficiently communicate with the output and input modules which are being used. The **Raspberry Pi** is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation.

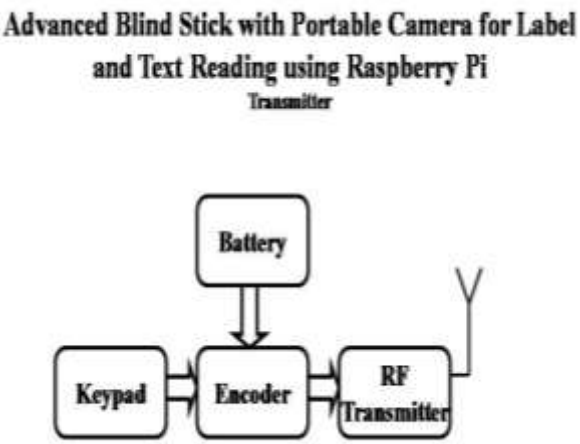
The device which is able to perform the task is a **Raspberry Pi3** processor. When any hand held is placed in front of the Pi camera passes by the system, the text and image is captured using camera. The text details are fed as input to the **Raspberry Pi3** processor. The Processor takes responsibility to check the details and announces using voice messages using speakers or head phones for the blind person. To perform this task, **Raspberry Pi3** processor is programmed using 'Raspbian OS'.

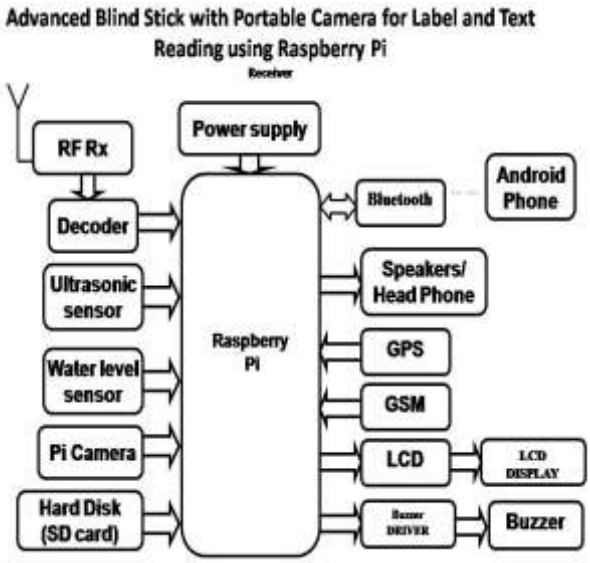
2. LITERATURE SURVEY

Technologies and resources

[1] Used texture flow analysis to perform geometric rectification of the planar and curved documents. Burns et al. performed topic-based partition of document image to distinguish text, white spaces and figures. Banerjee et al.
[2] Employed the consistency of text characters in different sections to restore document images from severe degradation based on the model of a Markov random field. Lu et al.
[3] Proposed a word shape coding scheme through three topological features of characters for text recognition in document image. All of the above algorithms share the same assumption that locations of text characters are approximately predictable, and background interference does not resemble text characters.
[4], [5] with knowledge of text string orientations, we can normalize them to horizontal. Some algorithms of scene text normalization are introduced in [4], [1], and [5]. However, the algorithms described in this paper will focus on text detection.
[6] To extract candidates of text regions, Kasar et al. [6] first assigned a bounding box to the boundary of each candidate character in the edge image and then detected text characters based on the boundary model
[7]. Electronic Stick for Visually Impaired People With buzzer alert, International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-7, Issue-6S5, April 2019, :In this paper, we present and describe an electronic stick with buzzer alert to help visually impaired people when they walk in uncomfortable environments

3. IMPLEMENTATION:





The objectives of the project are:

- Usage of image authentication technology.
- Text message using Bluetooth wireless technology.
- Voice announcements through speakers or head phones.
- Usage of Text to Speech conversion technology from Images and messages.
- Alerts in the form of buzzer when stick approaches obstacle or placed in the water.
- GSM based location intimation.
- GPS based location identification.

To perform this task, **Raspberry Pi** processor is programmed using embedded ‘ Raspbian OS’.

4. RELATED WORK:

This system consists of ARM-11 micro processer which is the main controlling part of the system. The camera will read the text and messages are received from the mobile through Wi-Fi the total instructions are heard through Raspberry pi introduction of different modules used in this project is discussed below:

a. Raspberry pi3 processer (ARM-11):

Figure. Raspberry Pi3 camera

Raspberry Pi 3 Featuring the ARM1176JZF-S Running at 1.2 GHz, with 1 GB of RAM.
The RASPBERRY Pi 3 is a credit card sized computer. The design is based around a Broadcom BCM2837 SoC, which includes an ARM1176JZF-S 1.2 GHz processor, Video Core IV GPU and 1 GB of RAM. The design does not include a built in hard disk or solid state drive, instead relying on a microSD card for booting and long term storage. This board is intended to run Raspbian OS kernel based operating systems.

b. Ultrasonic sensor:

Figure. Ultrasonic sensor

This HC-SR04 ULTRASONIC sensor is a short range obstacle detector with no dead zone. The most widely used **range** is 40 to 70 kHz. The frequency determines **range** and resolution; the lower frequencies produce the greatest **sensing range**. At 58 kHz, a commonly used frequency, the measurement resolution is one centimeter (cm), and **range** is up to 11 meters

c. Pi camera

The Raspberry Pi camera module can be used to take high definition video, as well as stills photographs. The module has a five megapixel fixed-focus camera that supports 1080p30, 720p60 and VGA90 video modes, as well as stills capture. It attaches with a 15cm ribbon cable to the CSI port onto the Raspberry Pi Processor.

Figure. Raspberry Pi camera

d. Head Phones/Speakers

The output of the proposed system is provided with the announcement using head phones or speakers. The Raspberry pi has two audio output modes: HDMI and head phone jack. In the proposed system we are using head phone jack of 3.5mm Audio Output Jack.

Figure.Image of Audio output jack interfacing with Raspberry Pi

e. BUZZER:

Basically, the sound source of a piezoelectric sound component is a piezoelectric diaphragm. A piezoelectric diaphragm consists of a piezoelectric ceramic plate which has electrodes on both sides and a metal plate (brass or stainless steel, etc.). A piezoelectric ceramic plate is attached to a metal plate with adhesives. Applying D.C. voltage between electrodes of a piezoelectric diaphragm causes mechanical distortion due to the piezoelectric effect.

Figure. Buzzer

f. GPS(NEO 6M):

GPS(NEO 6M) has four pins:VCC and GND for power supply of 3v-5v and grounding of the module.TX and RX for transmission and reception of data with respective to GPS NEO 6M and other end connected device.And it's default baud rate is 9600 bps(bits per second).

Figure. GPS Receiver

It is mainly used for finding the location using ht latitude and longitude values we obtain from GPS.Not only the latitude and longitude values would be found using GPS, we could also find location, tracking, timing, mapping, tilt, altitude and navigation.

g. GSM:

GSM is a cellular network, which means that cell phones connect to it by searching for cells in the immediate vicinity. This is a GSM/GPRS-compatible Quad-band cell phone, which works on a frequency of 850/900/1800/1900MHz and which can be used not only to access the Internet, but also for oral communication (provided that it is connected to a microphone and a small loud speaker) and for SMS.

Figure. Buzzer

h.16*2 LCD Display:

Liquid crystal display is very important device in embedded system. It offers high flexibility to user as he can display the required data on it.116*2 means 16 characters per line by 2 lines respectively. The project status will display on LCD.

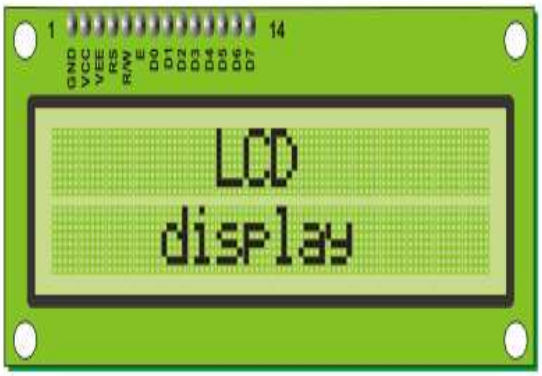


Figure. LCD display

I. Water level sensor:

Water level sensor will be used to find presence of water on the road or soil.

Figure. Water level sensor

j. RF transmitter and RF receiver:

An **RF module** (short for **radio-frequency module**) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. They are of various types and ranges. In this project we are using 434 MHz frequency, 60 m range RF module.

Figure. Tx & Rx RF Radio Module

k. Bluetooth module:

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Using Bluetooth technology to send the text message what we are saying by using android mobile phone.

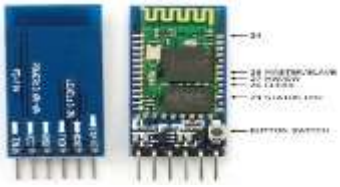


Figure. HC-05 Bluetooth Module

IV CONCLUSION:

The existing model presents an Integrating feature of all the hardware components which has been used and developed in it with Arm-11 Raspberry pi processor. The Presence of each and every module has been reasoned out and placed very carefully. Hence the contributing to the best working unit for an **Advanced Blind Stick with Portable Camera for Label and Text Reading**

using Raspberry Pi has been designed perfectly. Secondly, using highly advanced IC's like ARM1176JZF-S 1.2 GHz processor, Raspbian OS operating system technology with the help of growing technology, the project has been successfully implemented with a unique idea. Thus the project has been successfully designed and tested.

The existed paper presents "**Advanced Blind Stick with Portable Camera for Label and Text Reading using Raspberry Pi** " which was designed such that the system captures the image of any hand held object (product) is placed in front of the Raspberry Pi camera. The captured image or text details are fed as input to the **Raspberry Pi** processor. The Processor takes responsibility to check the details and announces using voice messages using speakers or head phones for the blind person. Obstacle sensor, for providing alerts in case of emergency times obstacle detections, water detection with voice alerts to blind person. To perform this task, Raspberry Pi processor is programmed using 'Raspbian OS'.

This project can be extended by adding sensors like Fire sensor, for providing alerts in case of emergency times like during fire accidents.

5. ACKNOWLEDGEMENT

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REFERENCES:

[1]J.Liang, D.DeMenthon, andD.Doermann, "Geometricrectificationof camera-captured document images," IEEE Trans. Pattern Anal. Mach. Intell., vol. 30, no. 4, pp. 591–605, 2008.

[2] J. Banerjee, A. M. Namboodiri, and C. V. Jawahar, "Contextual restoration of severely degraded document images," in Proc. IEEE Conf. Comput. Vis. Pattern Recognit., 2009, pp. 517–524.

[3] S. Lu and C. L. Tan, "Retrieval of machine-printed Latin documents through Word Shape Coding," Pattern Recognit., vol. 41, no. 5, pp. 1799–1809, May 2008.

[4] X. Chen, J. Yang, J. Zhang, and A. Waibel, "Automatic detection and recognitionofsignsfromnaturalscenes,"IEEETrans.ImageProcess., vol. 13, no. 1, pp. 87–99, Jan. 2004.

[5] G. K. Myers, R. C. Bolles, Q. T. Luong, J. A. Herson, and H. B. Aradhye, "Rectification and recognition of text in 3-D scenes," Int. J. Document Anal. Recognit., pp. 147–158, 2004.

[6] T. Kasar, J. Kumar, and A. G. Ramakrishnan, "Font and background color independent text binarization," in Proc. 2nd Int. Workshop Camera-Based Document Anal. Recognit., 2007, pp. 3–9.

[7]. C.E. Terry et al., "National Disability Policy: A Progress Report," National Council on Disability, Washington DC, USA, Oct 2016.

[8]. "A report on visual impairment and blindness," World Health Organization, Aug 2014.

[9]. K. Li, "Electronic travel aids for blind guidance," An Industry Landscape Study IND ENG 290 Project Report, EECS, UC Berkeley, USA, 2015.

[10]. https://en.wikipedia.org/wiki/white_cane

[11]. I. Ulrich and J. Borenstein, "The guide cane-applying mobile robot technologies to assist the visually impaired," IEEE Transactions on Systems, Man, and Cybernetics-Part A: Systems and Humans, vol. 31, no. 2, pp. 131-136, 2001.

[12]. M.H.A. Wahab, A.A. Talib, et al., "Smart cane: Assistive cane for visually-impaired people," IJCSI International Journal of Computer Science Issues, vol. 8, no. 4, pp. 21-27, 2011.

[13]. S. Adhe, S. Kunthewad, P. Shinde and V.S. Kulkarni, "Ultrasonic smart stick for visually impaired people," IOSR Journal of Electronics and Communication Engineering, pp. 11-15, 2015.

http://assistech.iitd.ernet.in/smartcane.php

[14]. M. Varghese, S.S. Manohar, et al., "The smart guide cane: An enhanced walking cane for assisting the visually challenged," in Proc. of the International Conference on Technologies for Sustainable Development, Mumbai, India, Feb 4-6, 2015.

[15]. A. Bhokare, A. Amberkar, A. Gawde, P. Kale, and A. Pasi, "Ultrasonic blind walking stick," Int. J. on Recent and Innovation Trends in Computing and Comm., vol. 4, no. 1, pp. 62-65, 2016.