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OCR USING VISUALLY IMPAIRED PEOPLE SHOPPING TROLLEY TECHNOLOGY

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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 who faces many difficulties in shopping such as VIP (visually impaired people). They have to depend on others to shop in unfamiliar places. In order 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 consists of different modules such as product reorganization and section information which will process on raspberry pi3 model. Product reorganization includes 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 Bluetooth (HC-05) technology. Ultrasonic sensor will detect the obstacle and alert the user using beep sound.

Keywords: Optical Character recognition, Raspberry Pi, Bluetooth, Ultrasonic Sensor

INTRODUCTION

1. EmbeddedSystems

1.1 Overview of embedded systems

An embedded system is a special-purpose computer system designed to perform one or a few dedicated functions, often with real-time computing constraints. It is usually embedded as part of a complete device including hardware and mechanical parts. In contrast, a general-purpose computer, such as a personal computer, can do many different tasks depending on programming. Embedded systems have become very important today as they control many of the common devices we use.

- Embedded System is a combination of hardware and software used to achieve a single specific task.
- Embedded systems are computer systems that monitor, respond to, or control an external environment.
- Environment connected to systems through sensors, actuators and other I/O interfaces.
- Embedded system must meet timing & other constraints imposed on it by environment.

Since the embedded system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product, or increasing the reliability and performance. Some embedded systems are mass- produced, benefiting from economies of scale.
Physically, embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

1.2 Block diagram of an embedded system

An embedded system usually contains an embedded processor. Many appliances that have a digital interface microwaves, VCRs, cars utilize embedded systems. Some embedded systems include an operating system. Others are very specialized resulting in the entire logic being implemented as a single program. These systems are embedded into some device for some specific purpose other than to provide general purpose computing. A typical embedded system is shown in (Figure1.1)

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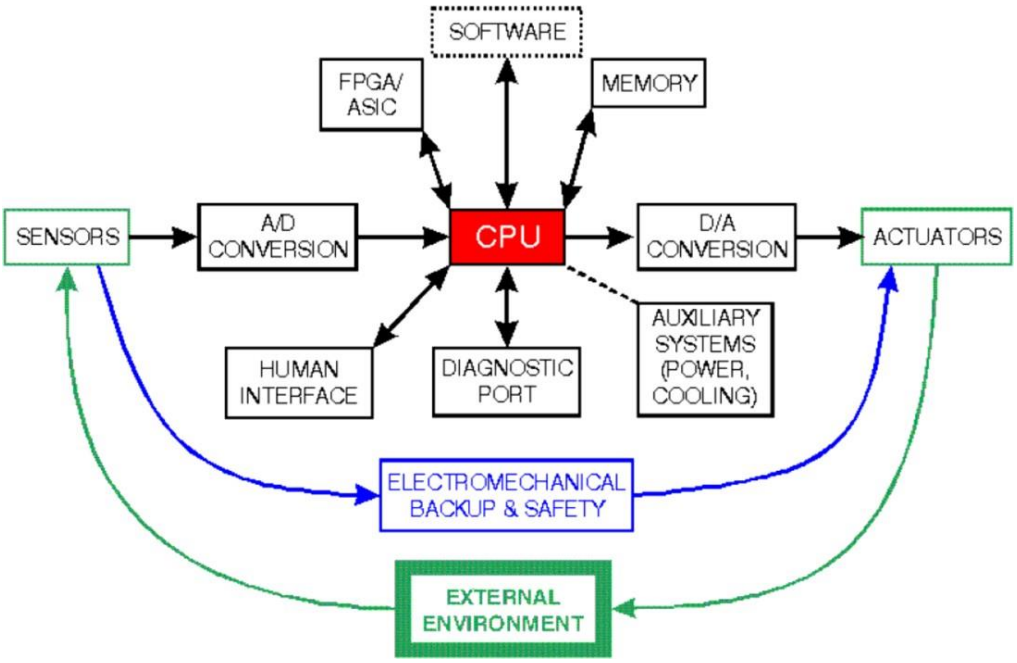

Figure 1.1: Block diagram of a typical embedded system

1.3 Application Specific Systems

Embedded systems are not general-purpose computers. Embedded system designs are optimized for a specific application. Many of the job characteristics are known before the hardware is designed. This allows the designer to focus on the specific design constraints of a well-defined application. As such, there is limited user reprogram ability. Some embedded systems, however, require the flexibility of reprogram ability. Programmable DSPs are common for such applications.

2.1 A Reading aid for the Blind People using OCR and OpenCV

Optical character recognition (OCR) is the identification of printed characters using photoelectric devices and computer software. It coverts images of typed or printed text into machine encoded text are converted into audio output.OCR is used in machine process such as cognitive computing, machine translation, text to speech, key data and text mining.OCR the character code in text files are processed using Raspberry Pi device on which it recognizes character using tesseract algorithm and python programming and audio output is listened.

OCR for pattern recognition to perform Document image analysis (DIA) we use information in grid format in virtual digital library's design and construction. It promotes Python programming as main programming language.

Text to Speech for the Visually Impaired

An assistive content perusing system to help outwardly impeded people to peruse writings from different questions in their day by day lives. Pre- handling incorporates steps like dark scale and binarization, question of intrigue acknowledgment. The utilization of OTSU calculation to change over the dim scale picture into binaries one. The content districts from the caught picture are then separated and perceived by utilizing optical character acknowledgment programming (OCR).

The principle calculation in OCR to be specific MODI is utilized here. This extricated content of different textual styles and sizes then can be perceived independently and afterward consolidated in a word giving its yield as sound utilizing Text-to-discourse utilizing the SAP libraries.

3.1 Existing System

A few systems already exist that help the blind people have access to daily-life hand held objects, but they are largely ineffective with respect to the focus area of the labeling. For example, portable bar-code readers do exist, but it is very difficult for a blind person to locate a bar code and then point the laser beam on that bar code. Also, to enable the blind people to read, Braille system exists. In spite of ignoring the manufacturing cost, the system can be said to be largely ineffective with regard to the processing speed, that is, the speed at which the blind subject can identify the information and then assimilate it is too low.

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3.1.1 Limitations of Existing System

- Braille system is very slow and not very practical.
- Existing OCR systems are not automatic.
- IR sensor issued.
- Pic microcontroller issued.

3.2 Advantages of Proposed System

- Flexible for blind people.
- To convert printed books to digital text.
- Efficient and Effective to handle.
- Text to audio output.

3.3 System Requirements

3.3.1 Hardware System Requirements

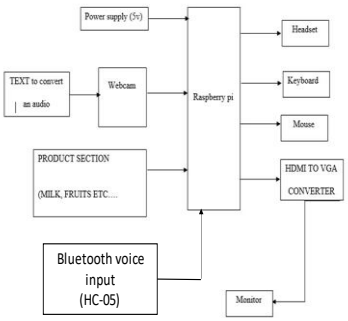
- Processor - Raspberrypi3
- Speed -1.1GHz
- RAM -1Gb(min)
- Hard Disk -1.5

3.3.2 Software System Requirements

- Operating System – Raspbain OS
- Language Used - Python ide

4. SYSTEM DESIGN

4.1 BLOCK DIAGRAM



The system design includes following major modules:

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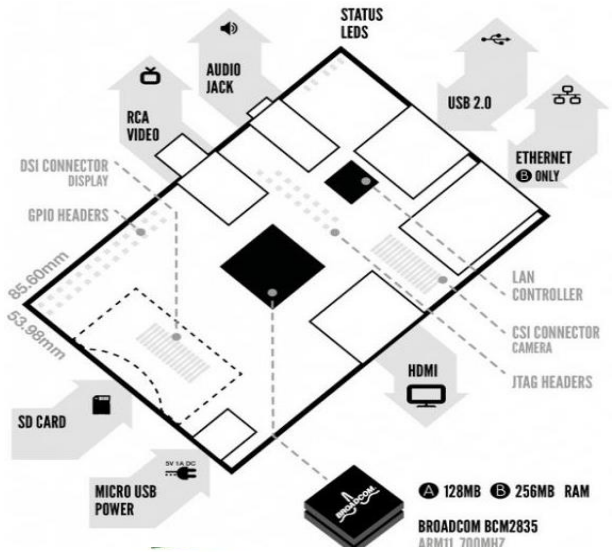
(a) Trolley movement (b)Text Recognition

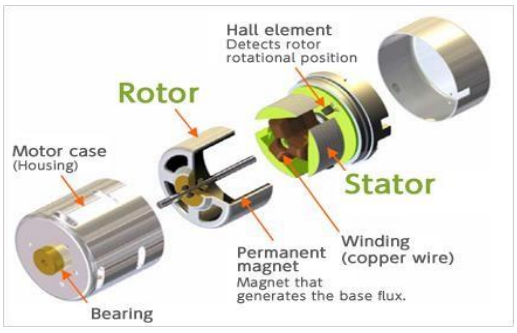
The Trolley movement in mainly by L293D driver which is connected with Raspberry pi. It acts as a current amplifier which is used to drive the trolley based on inputs. The input logic is 00 or 11, the trolley stopped. The input logic is 01 or 10 the trolley moves in forward or backward direction. In text, recognition text is recognized by character recognition method. This method converts the scanned image into text. This text is then converted to speech

4.2 Raspberry pi Port specification



4.3 D.C.Motors

An electric motor converts electrical energy into mechanical energy. Most electric motors operate through interacting magnetic fields and current- carrying conductors to generate force, although electrostatic motors use electrostatic forces. Electric motors are found in applications as diverse as industrial fans, blowers and pumps, machine tools, household appliances, power tools, and disk drives. They may be powered by direct (e.g., a battery powered portable device or motor vehicle), or by alternating current from a central electrical distribution grid. Brushless DC motors use a rotating permanent magnet in the rotor, and stationary electrical magnets on the motor housing (figure 4.6). A motor controller converts DC to AC. This design is simpler than that of brushed motors because it eliminates the complication of transferring power from outside the motor to the spinning rotor. Advantages of brushless motors include long life span, little or no maintenance, and high efficiency. Disadvantages include high initial cost, and more complicated motor speed controllers



Domain	Parameter	Applications
Time	Tile-of-Flight, Velocity	Density, Thickness, Flaw Detection, Anisotropy, Robotics, Remote Sensing etc.
Attenuation	Fluctuations in reflected and Transmitted Signals	Defect characterization, microstructures, interface analysis

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Frequency	Ultrasonic Spectroscopy	Microstructure, grain size, porosity, phase analysis.
Image	Time-of-Flight, velocity, attenuation mapping in Raster C-Scan or SARs	Surface and internal Defect Imaging, density, velocity, 2D and 3Dimaging.

Advantages

- The L293D driver is used to move trolley in all directions .
- The system is low-cost.
- It is used to get the text information from objects.

Disadvantages

- In L293D driver chip, there is 1.5v or more voltage drop.
- Handwritten documents and images in dark are not easily recognized by OCR.

Applications

- This idea is mainly used in shopping, banking healthcare, government agencies where text extraction is needed without assistance.

5. SYSTEM TESTING

5.1 Software Testing

It is an investigation conducted to provide stakeholders with information about the quality of the product or service under test. Software testing can also provide an objective, independent view of the software to allow the business to appreciate and understand the risks of software implementation. Test techniques include, but are not limited to, the process of executing a program or application with the intent of finding software bugs (errors or other defects).

5.2 Functional Testing

Test Cases	Products	Input (Accuracy)	Expected output	Observed Output	Results
TC_001	Biscuits	9	Scan biscuits	Successful scan	Pass
TC_002	Chocolates	5	Scan Chocolates	Very long distance scan failed	Fail
TC_003	Tooth Brush	10	View tooth brush	No obstacle successful scan	Pass
TC_004	Juices	8	Purchase Juice	Found Juice	Pass

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TC_005	Powder	3	View powder	Very long distance scan failed	fail
TC_006	Soaps	9	Purchase soap	Successful scan	pass
TC_007	Pickles	10	Drop pickles into the trolly	Successful drop	pass
TC_008	Chips	6	Purchase chips	Difficult to predict but successful scan	Pass

5.3 Performance Testing

Software Performance testing is type of testing perform to determine the performance of system to major the measure, validate or verify quality attributes of the system like responsiveness, Speed, Scalability, Stability under variety of load conditions. The system is tested under a mixture of load conditions and check the time required responding by the system under varying workloads. Software performance testing involves the testing of application under test to ensure that application is working as expected under variety of load conditions. The goal of performance testing is not only find the bugs in the system but also eliminate the performance bottlenecks from the system.

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. To solve the common aiming problem we have implemented motion-based method to detect the objects of interest. Text extractions are done using stroke orientation and distribution of edge pixels. The text characters are recognized using Optical Character Recognition, the text codes are transformed as speech for blind persons.

7.FUTURE ENHANCEMENT

Our future work will extend the text localization algorithm with further more features and we will address the human interface issues associated with text reading by the blind user.

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