

Talking Smartcap for Visually Impaired Person

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ABSTRACT: The main objective of the project is to smart cap using raspberry Pi for blind person to reading and traffic find without the help of any human power. The people who are having complete blindness or low vision faces many difficulties during their navigation. Blindness can occur due to many reasons including disease, injury or other conditions that limit vision. The main purpose of this project is to develop a navigation aid for the blind and the visually impaired people. In this project, we design and implement a smart cap which helps the blind and the visually impaired people to navigate freely by experiencing their surroundings. The scene around the person will be captured by using a camera and the objects in the scene will be detected. The earphones will give a voice output describing the detected objects. This is achieved by using USB camera through USB port. If traffic signal and object detection is voice alert will be generated by using speaker.

KEYWORDS: Raspberry Pi, Human Power, USB port.

I. INTRODUCTION

The project build an optimized core blind people platform that can work independently and also embedded into all types of arte facts. In practice, this means a small, low-power 'intelligent camera'. Some technological solutions have been introduced recently to help blind persons navigate independently. Many of those solutions rely on embedded technology to identify the position and orientation of the blind person. While such systems are suitable for outdoor navigation, due to the need for line of sight access to voice assistant. Background subtraction is a common computer vision task. We analyze the usual pixel-level approach. We develop an efficient adaptive algorithm using Gaussian mixture probability density. Recursive equations are used to constantly update the parameters and but also to simultaneously select the appropriate number of components for each pixel. A Navigation System for blind people to navigate safely and quickly, in the system obstacle detection and recognition is done through ultrasonic sensors and USB camera. This system detects the obstacles up to 300 cm via ultrasonic sensors and sends feedback in the form of beep sound via earphone to inform the person about the obstacle.

A Wearable Obstacle Avoidance Electronic Travel Aids for Blind that presents a comparative survey among portable/wearable obstacle detection/avoidance systems (a subcategory of ETAs) in an effort to inform the research community and users about the capabilities of these systems and about the progress in assistive technology for visually impaired people. Proposes Automatic detection and recognition of signs from natural scenes we present an approach to automatic detection and recognition of signs from natural scenes and its application to a sign translation task. We have applied the approach in developing a Chinese sign translation system, which can automatically detect and recognize Chinese signs as input from a camera, and translate the recognized text into English but its only work in Chinese language.

II. EXISTING SYSTEM

Existing System Blind people generally use either the typical white cane or the guide dog to travel. The white cane is a widely used mobility aid that helps blind people to navigate in their surroundings. Although the white cap gives a warning about few meters before the obstacle, for a normal walking speed, the time to react is very short. The idea of designing and manufacturing ultrasonic sensor combines the properties of sound monition and that benefit the blind and vibrating alert feature, which benefit from the experience of deafness. Sensor can detect obstacles within the designed range to avoid the blind person through the issuance of distinctive sound or vibration can be issued by the sense of the deaf by putting his finger on the button at the top of the device vibrate when there is a risk. This system involves more manual work and it does not provide better result. The existing system doesn't provide proper navigation and is not much effective.

III. SYSTEM IMPLEMENTATION

RASPBERRY PI

The **Raspberry Pi** is a credit card-sized computer developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools.

The Raspberry Pi is manufactured in three board configurations through licensed manufacturing deals with Newark element14 (Premier Farnell), RS Components and Ego man. These companies sell the Raspberry Pi online. Ego man produces a version for distribution solely in China and Taiwan, which can be distinguished from other Pis by their red coloring and lack of FCC/CE marks. The hardware is the same across all manufacturers.

The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZFS 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded (Model B & Model B+) to 512 MB. It does not include a built-in hard disk or solid-state drive, but it uses an SD card for booting and persistent storage, with the Model B+ using a MicroSD.

The Foundation provides Debian and Arch Linux ARM distributions for download. Tools are available for Python as the main programming language, (via the RISC OS image or the Brandy Basic clone for Linux), C, Java and Perl.

PROCESSOR

The Broadcom SoC used in the Raspberry Pi is equivalent to a chip used in an oldsmartphone (Android or iPhone). While operating at 700 MHz by default, the Raspberry Pi provides a real world performance roughly equivalent to the 0.041 GFLOPS.^{[15][16]} On the CPU level the performance is similar to a 300 MHz Pentium II of 1997-1999, but the GPU, however, provides 1 Gpixel/s, 1.5 Gtexel/s or 24 GFLOPS of general purpose compute and the graphics capabilities of the Raspberry Pi are roughly equivalent to the level of performance of the Xbox of 2001. The Raspberry Pi chip operating at 700 MHz by default, will not become hot enough to need a heatsink or special cooling.

The LINPACK single node compute benchmark results in a mean single precision performance of 0.065 GFLOPS and a mean double precision performance of 0.041 GFLOPS for one Raspberry Pi Model-B board.^[17] A cluster of 64 Raspberry Pi Model-B computers, labeled "Iridis-pi", achieved a LINPACK HPL suite result of 1.14 GFLOPS (n=10240) at 216 watts for c. US\$4,000.^[17]

OVERCLOCKING

Most Raspberry Pi devices can be overclocked to 800 MHz and some even higher to 1000 MHz. In the Raspbian Linux distro the overclocking options on boot can be done by a software command running "sudo raspi-config" without voiding the warranty, see note 9 below. In those cases the PI automatically shuttles the over clocking down in case the chip reaches 85 °C (185 °F), but it is possible to overrule automatic over voltage and over clocking settings (voiding the warranty). In that case one can try putting an appropriately sized heatsink on it to keep the chip from heating up far above 85 °C.

Newer versions of the firmware contain the option to choose between five overclock ("turbo") presets that when turned on try to get the most performance out of the SoC without impairing the lifetime of the Pi. This is done by monitoring the core temperature of the chip, and the CPU load, and dynamically adjusting clock speeds and the core voltage. When the demand is low on the CPU, or it is running too hot, the performance is throttled, but if the CPU has much to do, and the chip's temperature is acceptable, performance is temporarily increased, with clock speeds of up to 1 GHz, depending on the individual board, and on which of the turbo settings is used. The five settings are:

- None; 700 MHz ARM, 250 MHz core, 400 MHz SDRAM, 0 overvolt,
- Modest; 800 MHz ARM, 250 MHz core, 400 MHz SDRAM, 0 overvolt,
- Medium; 900 MHz ARM, 250 MHz core, 450 MHz SDRAM, 2 overvolt,

- High; 950 MHz ARM, 250 MHz core, 450 MHz SDRAM, 6 overvolt,
- Turbo; 1000 MHz ARM, 500 MHz core, 600 MHz SDRAM, 6 overvolt.^{[18][19]}

In the highest (*turbo*) preset the SDRAM clock was originally 500 MHz, but this was later changed to 600 MHz because 500 MHz sometimes causes SD card corruption. Simultaneously in *high* mode the core clock speed was lowered from 450 to 250 MHz, and in *medium* mode from 333 to 250 MHz.

RAM

On the older beta model B boards, 128 MB was allocated by default to the GPU, leaving 128 MB for the CPU.^[20] On the first 256 MB release model B (and Model A), three different splits were possible. The default split was 192 MB (CPU RAM), which should be sufficient for standalone 1080p video decoding, or for simple 3D, but probably not for both together. 224 MB was for Linux only, with just a 1080p framebuffer, and was likely to fail for any video or 3D. 128 MB was for heavy 3D, possibly also with video decoding (e.g. XBMC).^[21] Comparatively the Nokia 701 uses 128 MB for the Broadcom VideoCore IV.^[22] For the new model B with 512 MB RAM initially there were new standard memory split files released(arm256_start.elf, arm384_start.elf, arm496_start.elf) for 256 MB, 384 MB and 496 MB CPU RAM (and 256 MB, 128 MB and 16 MB video RAM). But a week or so later the RPF released a new version of start.elf that could read a new entry in config.txt (gpu_mem=xx) and could dynamically assign an amount of RAM (from 16 to 256 MB in 8 MB steps) to the GPU, so the older method of memory splits became obsolete, and a single start.elf worked the same for 256 and 512 MB Pis.^[23]

Networking

Though the Model A does not have an 8P8C (RJ45) Ethernet port, it can connect to a network by using an external user-supplied USB Ethernet or Wi-Fi adapter. On the model B the Ethernet port is provided by a built-in USB Ethernet adapter.

Peripherals

GenericUSB keyboards and mice are compatible with the Raspberry Pi.

WEB CAMERA



Fig 1 Web Camera

A webcam is a video camera that feeds its images in real time to a computer or computer network, often via USB, ethernet, or Wi-Fi.

Their most popular use is the establishment of video links, permitting computers to act as videophones or videoconference stations. The common use as a video camera for the World Wide Web gave the webcam its name. Other popular uses include security surveillance, computer vision, video broadcasting, and for recording social videos .

Webcams are known for their low manufacturing cost and flexibility,^[1] making them the lowest cost form of videotelephony. They have also become a source of security and privacy issues, as some built-in webcams can be remotely activated via spyware.

Early development

First developed in 1991, a webcam was pointed at the Trojan Room coffee pot in the Cambridge University Computer Science Department. The camera was finally switched off on August 22, 2001. The final image captured by the camera can still be viewed at its homepage.^{[2][3]} The oldest webcam still operating is FogCam at San Francisco State University, which has been running continuously since 1994.^[4]

Connectix QuickCam

The first commercial webcam, the black-and-white QuickCam, entered the marketplace in 1994, created by the U.S. computer company Connectix (which sold its product line to Logitech in 1998). QuickCam was available in August 1994 for the Apple Macintosh, connecting via a serial port, at a cost of \$100. Jon Garber, the designer of the device, had wanted to call it the "Mac-camera", but was overruled by Connectix's marketing department; a version with a PC-compatible serial port and software for Microsoft Windows was launched in October 1995. The original QuickCam provided 320x240-pixel resolution with a grayscale depth of 16 shades at 60 frames per second, or 256 shades at 15 frames per second. Videoconferencing via computers already existed, and at the time client-server based videoconferencing software such as CU-SeeMe had started to become popular.

Later developments

One of the most widely reported-on webcam sites was JenniCam, created in 1996, which allowed Internet users to observe the life of its namesake constantly, in the same vein as the reality TV series *Big Brother*, launched four years later.^[7] More recently, the website Justin.tv has shown a continuous video and audio stream from a mobile camera mounted on the head of the site's star. Other cameras are mounted overlooking bridges, public squares, and other public places, their output made available on a public web page in accordance with the original concept of a "webcam". Aggregator websites have also been created, providing thousands of live video streams or up-to-date still pictures, allowing users to find live video streams based on location or other criteria.

Around the turn of the 21st century, computer hardware manufacturers began building webcams directly into laptop and desktop screens, thus eliminating the need to use an external USB or Firewire camera. Gradually webcams came to be used more for telecommunication, or videotelephony, between two people, or among a few people, than for offering a view on a Web page to an unknown public

IV. PROPOSED SYSTEM

This project aims in the detection of object of the person. The captured frames are processed by the processor for the detection of axis variation. When the axis variation is more than a certain threshold value the processor then gives the voice through the voice output.

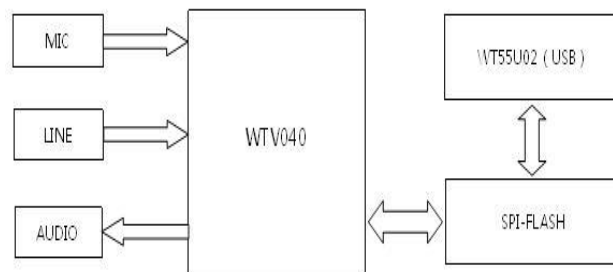


Fig 2 Proposed System Block Diagram

V. RESULTS AND DISCUSSIONS

A **loudspeaker** (or "speaker") is an electroacoustic transducer that converts an electrical signal into sound. The speaker moves in accordance with the variations of an electrical signal and causes sound waves to propagate through a medium such as air or water.

Terminology

The term "loudspeaker" may refer to individual transducers (known as "drivers") or to complete speaker systems consisting of an enclosure including one or more drivers. To adequately reproduce a wide range of frequencies, most loudspeaker systems employ more than one driver, particularly for higher sound pressure level or maximum accuracy. Individual drivers are used to reproduce different frequency ranges. The drivers are named subwoofers (for very low frequencies); woofers (low frequencies); mid-range speakers (middle frequencies); tweeters (high frequencies); and sometimes *supertweeters*, optimized for the highest audible frequencies. The terms for different speaker drivers differ, depending on the application Home stereos use the designation "tweeter" for the high frequency driver, while professional concert systems may designate them as "HF" or "highs". When multiple drivers are used in a system, a "filter network", called a crossover, separates the incoming signal into different frequency ranges and routes them to the appropriate driver.

Driver design

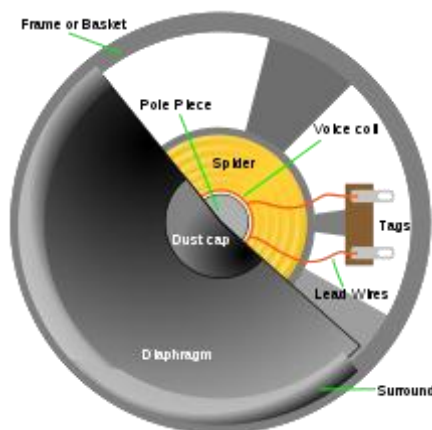


Fig 3 Cutaway view of a dynamic loudspeaker.

A stamped steel loudspeaker basket frame is clearly visible (here, blue-grey).

The most common type of driver uses a lightweight diaphragm, or *cone*, connected to a rigid *basket*, or *frame*, via a flexible suspension that constrains a coil of fine wire to move axially through a cylindrical magnetic gap. When an electrical signal is applied to the voice coil, a magnetic field is created by the electric current in the voice coil, making it a variable electromagnet. The coil and the driver's magnetic system interact, generating a mechanical force that causes the coil (and thus, the attached cone) to move back and forth, thereby reproducing sound under the control of the applied electrical signal coming from the amplifier. The following is a description of the individual components of this type of loudspeaker.

The chassis, frame, or basket, is designed to be rigid, avoiding deformation which would change critical alignments with the magnet gap, perhaps causing the voice coil to rub against the sides of the gap. Chassis are typically cast from aluminum alloy, or stamped from thin steel sheet, although molded plastic and damped plastic compound baskets are becoming common, especially for inexpensive, low-mass drivers. Metallic chassis can play an important role in conducting heat away from the voice coil; heating during operation changes resistance, causing physical dimensional changes, and if extreme, may even demagnetize permanent magnets.

The suspension system keeps the coil centered in the gap and provides a restoring (centering) force that returns the cone to a neutral position after moving. A typical suspension system consists of two parts: the "spider", which connects the diaphragm or voice coil to the frame and provides the majority of the restoring force, and the "surround", which helps center the coil/cone assembly and allows free piston-like motion aligned with the magnetic gap. The spider is usually made of a corrugated fabric disk, impregnated with a stiffening resin. The name comes from the shape of early suspensions, which were two concentric rings of Bakelite material, joined by six or eight curved "legs". Variations of this topology included the addition of a felt disc to provide a barrier to particles that might otherwise cause the voice coil to rub. The German firm Rulik still offers drivers with uncommon spiders made of wood.

The cone surround can be rubber or polyester foam, or a ring of corrugated, resin coated fabric; it is attached to both the outer diaphragm circumference and to the frame. These different surround materials, their shape and treatment can dramatically affect the acoustic output of a driver; each class and implementation having advantages and disadvantages. Polyester foam, for example, is lightweight and economical, but is degraded by exposure to ozone, UV light, humidity and elevated temperatures, limiting its useful life to about 15 years.

The size and type of magnet and details of the magnetic circuit differ, depending on design goals. For instance, the shape of the pole piece affects the magnetic interaction between the voice coil and the magnetic field, and is sometimes used to modify a driver's behavior. A "shorting ring", or Faraday loop, may be included as a thin copper cap fitted over the pole tip or as a heavy ring situated within the magnet-pole cavity. The benefits of this complication is reduced impedance at high frequencies, providing extended treble output, reduced harmonic distortion, and a reduction in the inductance modulation that typically accompanies large voice coil excursions. On the other hand, the copper cap requires a wider voice-coil gap, with increased magnetic reluctance; this reduces available flux, requiring a larger magnet for equivalent performance.

Driver design—including the particular way two or more drivers are combined in an enclosure to make a speaker system—is both an art and science.^{[12][13][14]} Adjusting a design to improve performance is done using some combination of magnetic, acoustic, mechanical, electrical, and material science theory; high precision measurements, generally with the observations of experienced listeners. A few of the issues speaker and driver designers must confront

are distortion, lobing, phase effects, off-axis response, and crossover complications. Designers can use an anechoic chamber to ensure the speaker can be measured independently of room effects, or any of several electronic techniques which can, to some extent, replace such chambers. Some developers eschew anechoic chambers in favor of specific standardized room setups intended to simulate real-life listening conditions.

The fabrication of finished loudspeaker systems has become segmented, depending largely on price, shipping costs, and weight limitations. High-end speaker systems, which are typically heavier (and often larger) than economic shipping allows outside local regions, are usually made in their target market region and can cost \$140,000 or more per pair.^[15] The lowest-priced speaker systems and most drivers are manufactured in China or other low-cost manufacturing locations.

- Accuracy of the project is very high.
- Automated system reduces the human error; since control is completely automatic.
- Low cost to assemble the project.

VI. CONCLUSION

This paper presented the architecture and implementation of a system that assists a blind person to navigate inside an enclosed environment such as the outdoor communication. This device offers innovative solutions in order to replace the conventional methods of guiding visually impaired person. In addition, it can be easily applied anywhere where it can handle places like traffic area. This system will allow the visually impaired to wander freely and independently. The system described in the project is at the prototype stage and hence there are many options for improvements.

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