Vision Capable Smart Glass With Voice Recognition

E.Mohan[1], M.Sakthivel[2], R.Felbin[3], Dr.Geetha T.S[4]
[1, 2, 3, 4] Department of ECE
[1, 2, 3] Sriram Engineering College Perumalpattu-Thiruvallur.
[4] Asso.Prof, Sriram Engineering College Perumalpattu-Thiruvallur.

Abstract- *Vision Capable Smart Glass with Voice Recognition Facility to help Visually Impaired People that Identifies and tells them about Obstacles, Traffic Signals and also acts as Personal Security Camera and Music Player. Smart-Glass is a wearable smart camera device built with a powerful microcontroller that has the ability to see what we, normal people, are seeing, understands the user voice requests and supplies the relevant information using auditory feedback through an earphone. The device aims to improve the quality of life for the blind and visually impaired people and makes them understand their surroundings in a clear way as close as to a normal person at an affordable cost. Camera sensor is being widely used in all the latest and greatest gadgets. The smartphone revolution has brought down most of the semiconductor component cost significantly and the camera sensor is not an exception. By combining a digital camera sensor with latest generation vision processors and complex image processing software, a solution closest to a real human eye is now possible.*

Keywords- Embedded Technology, Wearable input device, Audio output device.

I. INTRODUCTION

This paper gives the overview of despite over a decade of intensive research and development, the problem of delivering an effective outdoor navigation system to blind or vision impaired persons remains largely unsolved [1]. It also gives the safe information for the person [2]. The visually challenged people are depended on someone to help them get transportation [3].Wearable technology is an important developing associated to the field of computing and development of computers [4]. Creation of wearable device which can be embedded in the user's body [5]. The device aims to improve the quality of life for the blind and visually impaired people and makes them understand their surroundings in a clear way as close as to a normal person at an affordable [6]. Student-GLASS is a wearable smart camera device built with a powerful microcontroller that has the ability to see what we, normal people, are seeing, understands the user voice requests and supplies the relevant information using auditory feedback through an earphone [7].

II. EXISTING SYSTEM

In the existing system, the visually challenged people are depended on someone to help them get transportation [1]. So they have to wait till somebody gives them a helping hand. Also, all instructions like obstacle detection, place of travel are not provided to them throughout their journey [2]. Bus detection and traffic signal identification is so much difficult to the blind people and more difficult to reach the correct destination [3].

III. PROPOSED SYSTEM

In this proposed system, facilities like detection of any obstacles, reading the text, whether the detected obstacle is a stationary or a moving object [1]. Arrival of any bus, the traffic signal indication are provided to the visually challenged people continuously using a Audio play back module [2]. With the help of this, they can travel with ease and safer to their destinations without depending on anyone for help [3]. This system is user friendly which is reliable and efficient and it will be useful for visually impaired people [4]. An ultrasonic sensor which normally generates the sound waves is used to obstacles identification to the users [5]. The camera sensor are used to detect the obstacles, human sources, vehicles, traffic signal system and also identified bus the numbers [6].

BLOCK DIAGRAM

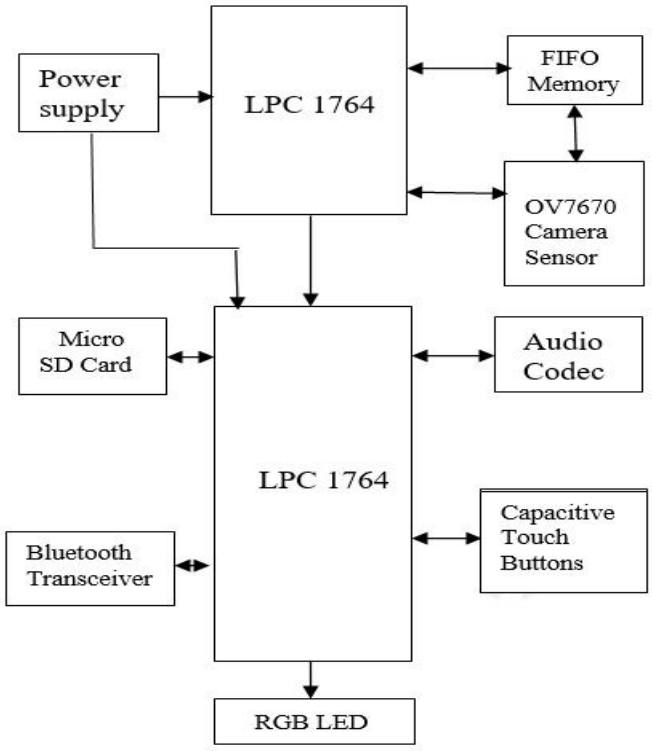

Fig.1 General Block diagram

IV. HARDWARE DESCRIPTION

ARM cortex-M3

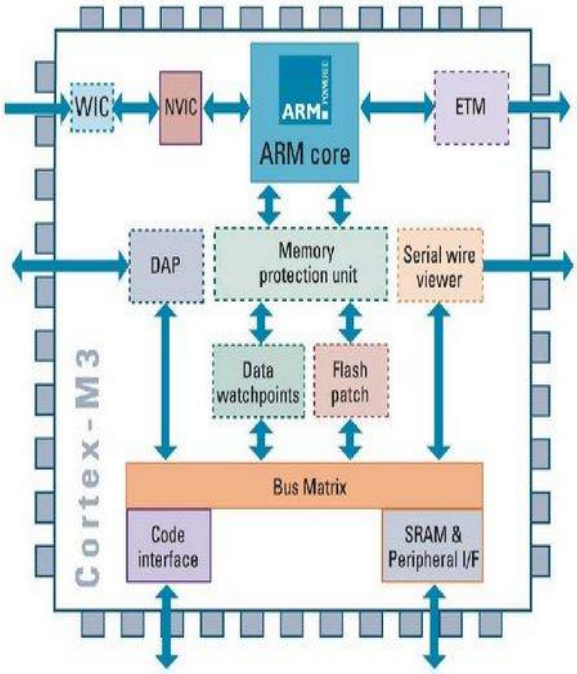

Fig.2 Block diagram of ARM processor

Next Generation 32-bit ARM Processor for Embedded Applications based on ARMv7-M Architecture. Harvard architecture consists of Separate I & D buses allow parallel instruction fetching & data storage and 3-stage pipeline with branch speculation is known as Fetch, Decode & Execute. The basic component of ARM cortex is integrated bus matrix.

LPC 1764

ARM Cortex-M3 processor, running at frequencies of up to 100 MHz and a Memory Protection Unit (MPU) supporting eight regions is included [1]. ARM Cortex-M3 has a built-in Nested Vectored Interrupt Controller (NVIC) and 128 KB on-chip flash program memory with In-System Programming (ISP) and In-Application Programming (IAP) capabilities [2]. A 32 KB of SRAM on the CPU with local code / data bus for high-performance CPU access [3]. Eight channel General Purpose DMA controller USB 2.0 full-speed controller did can be as configured for Either device, host or OTG operational with an on-chip PHY for device and Host functions [4]. Clock output function that can reflect the main oscillator clock and CPU clock [5].

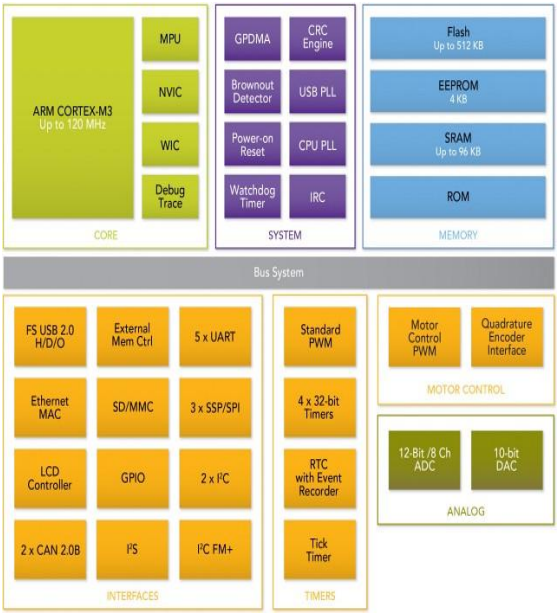

Fig.3 Block of LPC1700

Four UARTs with fractional baud rate generation, internal FIFO, IrDA, and DMA, one with modem I / O and RS485 [5]. It consists four general purpose timers / counters, with a total of eight capture inputs and ten compare outputs [6]. An on-chip PLL Allows CPU operational up to the maximum CPU rate without the need for a high-frequency crystal [7]. Standard JTAG test / debug interface as well as Serial Wire Debug and Serial Wire Trace Port options [8]. On-chip crystal oscillator with on operating range of 1 MHz to 25 MHz [9].

BLUETOOTH

It Supports Android Smartphone/Tablet/PC Communication and Bluetooth SPP (Serial Port Protocol) [1]. The Bluetooth Version is 2.0 and it consists EDR (Enhanced Data Rate) [2]. A 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband Typical -80dBm sensitivity Up to +4dBm RF transmit power [3]. The Low Power 1.8V Operation 1.8 to 3.6V I/O and UART interface with programmable baud rate [4]. It consists of Default Baud rate: 9600 and Pairing Status indication using LEDs with integrated antenna and edge connector [5]. Bluetooth is used to connect the processor and mobile module and it is also used for transfer the files between the processor and transceiver [6].

Fig.4 Bluetooth

CAMERA

It is a VGA/OVGA Resolution camera and the frame rate is 30 frames/sec [1]. This type of camera is a DSP based image processing camera [2]. It consists of Standard SCCB Interface for Control and Configuration [3]. It has 8-pin parallel interface for data and low voltage low power CMOS technology [4]. It consists a high speed FIFO for data buffering and 3Mbit FIFO size (384 kb) [5].This product has an image array capable of operating at up to 30 frames per second in complete user control over image quality formatting and output data transfer [6].

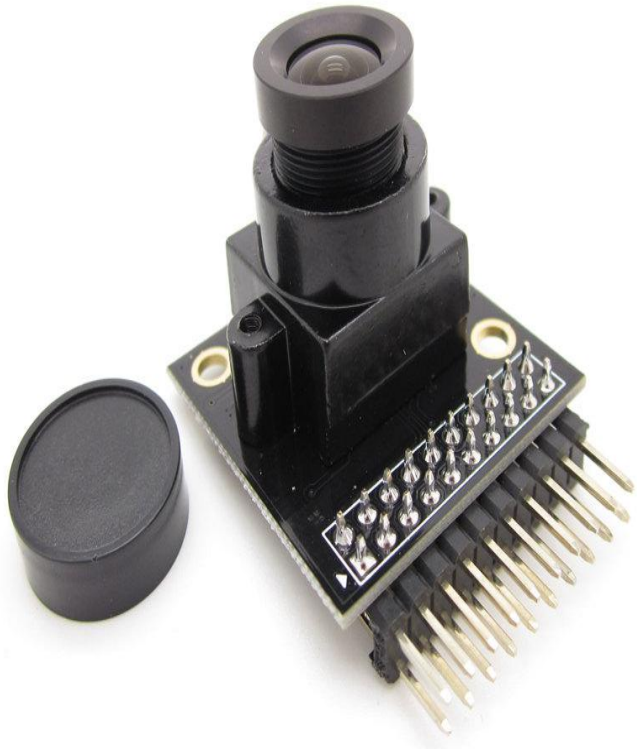

Fig.5 OV7670 Camera

AUDIO DECODER

The audio decoder consists of SPI protocol_interface and Ear Speaker Spatial Processing [1]. Volume, bass and treble controls are the basic functions of audio decoder and it contain Low-power operation [2]. The features of audio decoder is high quality on chip stereo DAC, Zero cross finding for smooth volume change, Stereo earphone driver capable of lashing a 30 ohm load, Quiet power on and power off and 16.5 KB on chip RAM for user code and data [3]. In this audio decoder chip that will containing the basic operation of when the output signal generated into the processor and they can be transmitted into the audio decoder [4].

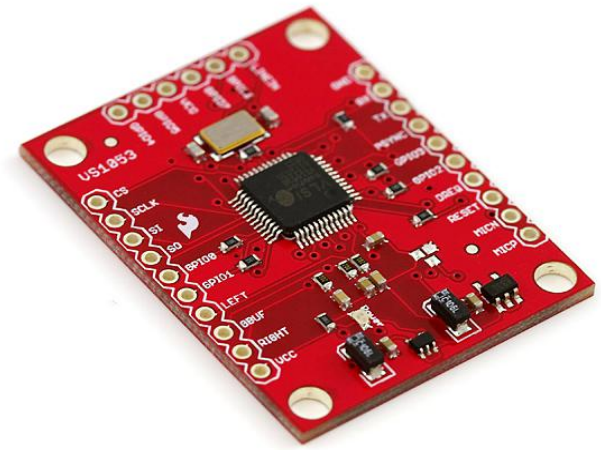

Fig.6 Audio Decoder

CAPACITIVE TOUCH BUTTONS

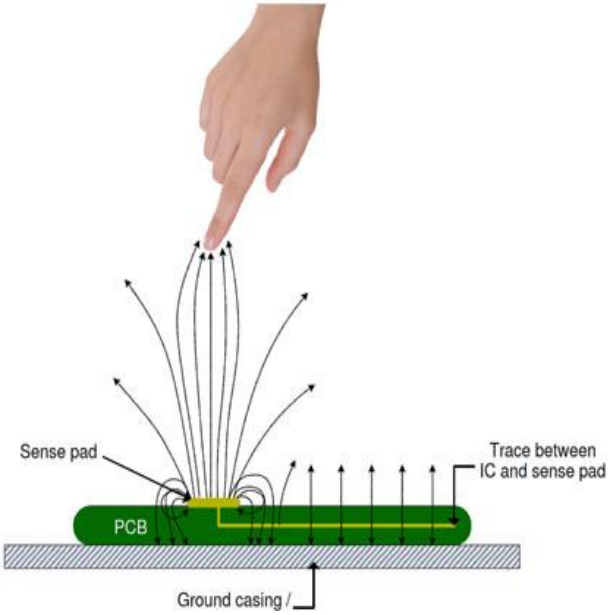

Fig.7 Capacitive Touch Buttons

It uses MPR121 Capacitive Touch Controller and it supports up to 12 electrodes [1]. A I2C interface, with optional IRQ output to advise electrode status changes and Continuous independent auto-calibration for each electrode input [2]. A separate touch and release trip thresholds for each electrode, providing hysteresis and electrode independence and 3 mm x 3 mm x 0.65 mm 20 lead QFN package [3]. A LED driver functionality with maximum of 8 LEDs and then the trace between the IC and sense pad of the capacitive touch buttons [4].

MICRO SD CARD

Fig.8 Micro SD Card

It is small form factor and Nonvolatile Flash Memory [1]. It can be Interfaced via SPI Protocol and Maximum data rate is 25Mbps [2]. It supports capacity up to 2GB and allows FAT-32 formatting for easy file management [3]. It is used as mass storage device in portable embedded system and developed by SD Card Association [4].

V. SOFTWARE PROGRAM

Testing:

The software program is written LPCXpresso is a complete toolchain for LPC1000 series of Cortex-M microcontrollers [1]. This software is Eclipse based IDE and it is support LPC-Link programmer and Debugger [2]. This software is developed by NxP semiconductors and Code Red technologies [3]. This software consists of GNU compiler, Linker and Libraries [4].

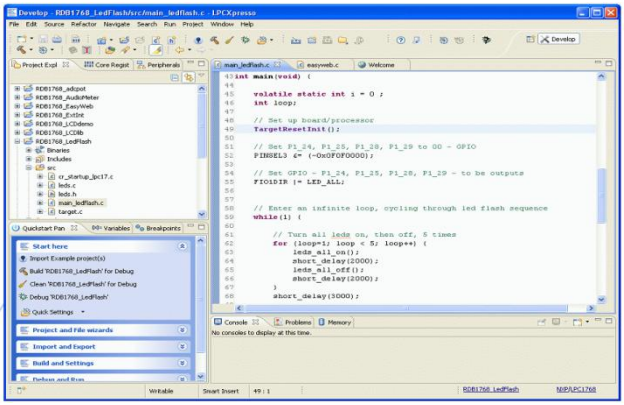

Fig.9 Model of LPCXpresso software

ADVANTAGES

Recognize obstacles and Identify traffic signal lights [1]. Find vehicle and people movement while crossing roads and Identify currency notes [2]. This is used for recognize objects and recognize alphabets [3]. It is also act as night time security camera [4]. To improve the quality of blind and visually impaired people [5].

VI. CONCLUSION

This system is used for blind people to identify the obstacles, traffic signal system and to find the automobiles and public movement while crossing the roads. Then the facilities like detection of any obstacles, reading the text, whether the detected obstacle is a stationary or a moving object. Using this system blind people can be reached the correct destination and also identifying the currency value. It uses the security camera for night time and identify the bus number.

REFERENCES

[1] S. Teng et al., "A device for human ultrasonic echolocation," IEEE Work- shop on Multimodal and Alternative Perception for Visually Impaired People, ICME, 2013.

[2] Suresh Kumar C, and Anitha lulian."Wearable Solution for Visually Impaired Person (2014)" Proceedings of 2014 IEEE International Conference on Innovations in Engineering and Technology. pp 609-612.

[3] E. Ackerman. (2014, Jan.), "Innovega delivers the wearable displays that science fiction promised." IEEE wearable displays that science fiction promised [May 1, 2014]

[4] S. Rosenblatt. "Google Glass now framed for prescriptions." [May 6, 2014].

[5] G. Chapman. "Google nixes face-recognition features in Glass eyewear." Phys.org , June 2, 2013 [May 4, 2014]

[6] (2013, June). "Or Cam device gives the vision impaired a new way to read." The Carroll Center for the Blind gives the vision impaired a new way to read [May 1, 2014].