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Auditory Guidance for Blind People to Recognize the Clothing Patterns

Bharath B. S. R[1], Mr. Shreekanth T[2]

Student, Electronics and Communication Engineering, SJCE, Mysuru, India[1]

Asst. Professor, Electronics and Communication Engineering, SJCE, Mysuru, India[2]

Abstract: Picking clothes with complex patterns and colors is a challenging task for blind people. Due to rotation, scaling, huge intraclass pattern variations, automatic clothing pattern recognition is a challenging research problem. We have matured a camera-based model system that notice clothing patterns in four categories (horizontal, irregular, vertical and patternless) and identifies 11 clothing colors. The auditory guidance system integrates a microphone, camera, friendly ARM mini2440 and headphones for audio details of clothing colors and patterns. A camera is used to capture clothes patterns and colors. The clothing colors and patterns are described to blind users spoken. To notice clothing patterns, we propose an API (Appilcation Program Interface) to capture the image from camera and using this API we store to image. In this project we are using OpenCV library for capture the images. Thought such a system would support more independence in blind person's daily life.

Keywords: Auditory guidance, API, blind people, friendly ARM mini2440, OpenCV.

I.INTRODUCTION

Visual impairment leads to loss of livelihood for otherwise productive adults causing difficulty not only to themselves but to the families they support. Most blind children don't have access to extra special teaching aids they need to learn. Based on data from the World Health Organization (WHO), there are more than 37 million people across the globe who are blind, over 15 million are in India [2]. Picking clothes with suitable patterns and colors is a challenging task for blind people. They take care of choosing clothes with the help from family members or clothes assistance, or by wearing clothes with a uniform color or without any patterns.

Automatically recognizing clothing colors and patterns improves blind people's life style and quality. Here, we introduce an auditory guidance system to help blind people to notice clothing colors and patterns. The auditory guidance system contains three major components : 1) inputs including a camera for capturing clothing designs, speakers (earphone) for audio output and a microphone; 2) processing section to notice clothing design and color identification by using friendly ARM; 3) output section there to provide audio of clothing designs and colors, through earphones .

Our system can handle clothes with complex designs and notice clothing patterns into four categories (horizontal, irregular, vertical and patternless). Our system is able to identify 11 colors: red, orange, yellow, green, cyan, blue, purple, pink, black, grey, and white. For the large intraclass variations, we propose an API to capture the image from cam to notice clothing design.

II. DESCRIPTION OF THE SYSTEM

A. METHODOLOGY

In this document, "clothing design and color recognize" implies that the automatic system is capable of noticing the clothing design and colors by using API.The camera captures the image of clothes which as different design and colors. The color of 255x255x255 like red, blue, green is stored in friendly ARM mini2440. The capture image is processed in Friendly ARM mini2440.Flow of colors recognizes and patterns are as shown in figure (1). Then ARM provides audio output according to captured image.

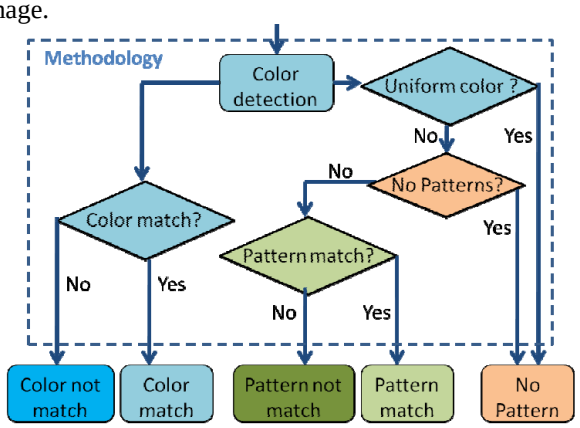

Figure 1: Flow chat of recognize clothing patterns and colors

The programming for noticing clothes design will be written in "C" and "C++" targeting Friendly ARM.

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B. IMPLEMENTATION PROPOSAL

This project is divided into two parts; hardware and software. It consists of the input, processor and the output as show in Figure (2). The system will receive captured clothing image and processed in Friendly ARM then send output to speaker. It is planned to improve the life style of blind people and it provides more independence and privacy.

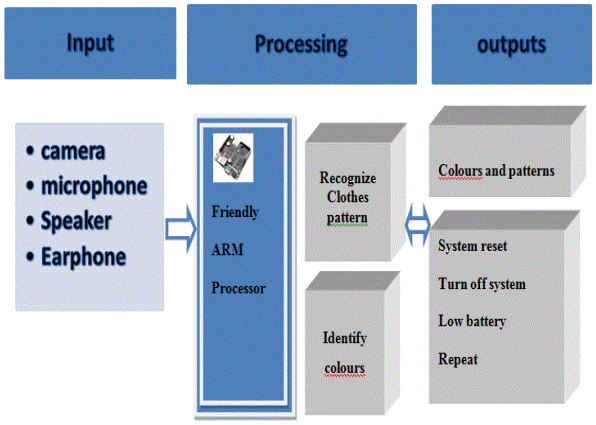

Figure 2: Block diagram of system design.

Friendly ARM mini2440:

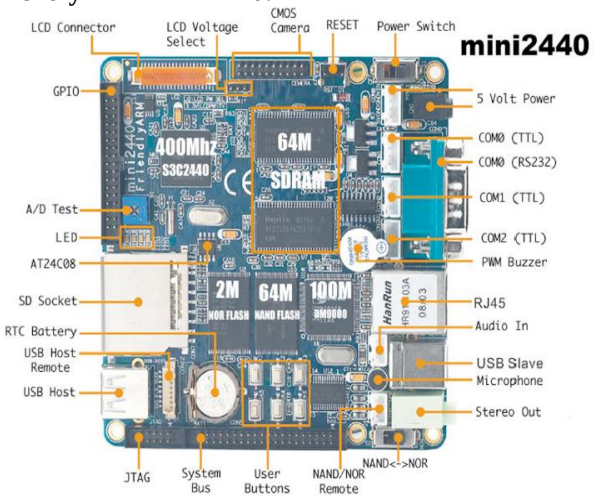

Figure 3**:** Components in Friendly ARM mini2440

The mini2440 is a practical low-cost ARM9 Single Board Computer (SBC) with a very high performance/cost ratio.

With the Samsung S3C2440, the use of quality peripheral chips and professional layout, it is very robust. The Mini2440 uses a 4-layer board design with high quality equal-length bus routing in timing critical areas, and has gold immersion processing.

The quality control and production environment are the same as those of modern high-speed motherboards.

Audio Interface:

The S3C2440's built in I2S bus interface is directly linked to an external 8/16 bit stereo CODEC. The circuit with the UDA1341 audio decoder chip is taken directly from a Samsung reference design using the CPU's GPB4, GPB3, GPB2 port analog implementation of the L3-Bus specification L3DATA, L3CLOCK, L3MODE, their initialization.

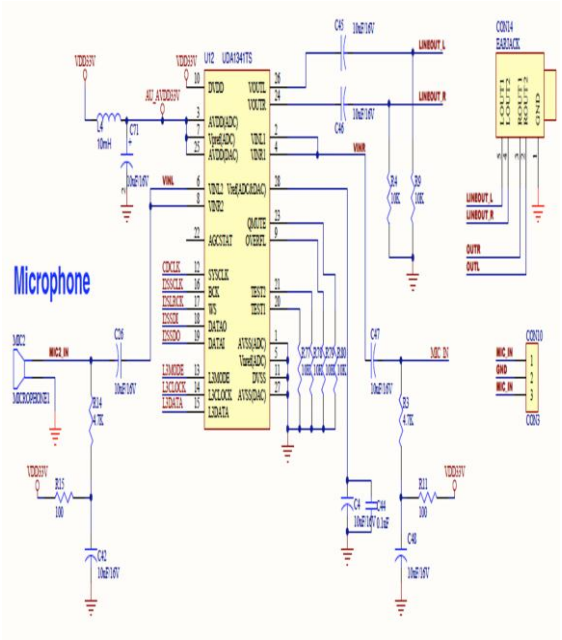

Figure 4: Audio Interface in Friendly ARM mini2440

CMOS CAMERA Interface:

The Mini2440 S3C2440 CMOS camera interface uses a 20 pin 2.0mm pitch pin header that precisely accepts our CAM130 camera module. There are no electronic parts in CAM130 PCB. CAM130 simply relays the signal to a ZT130G2 camera module.

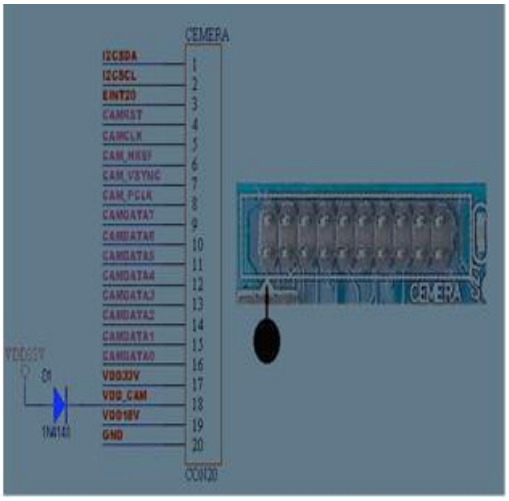

Figure 5: CMOS CAMERA Interface in Friendly ARM mini2440

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The CAMERA interface is set by the appropriate General Purpose Input / Output (GPIO) registers and is a multiplexed port.

The following table is a list of General Purpose Input / Output pins.

Pin#	CAMERA	Alternate	Pin#	CAMERA	Alternate
1	I2CSDA	GPE15	2	I2CSCL	GPE14
3	EINT20	GPG12	4	CAMRST	GPJ12
5	CAMCLK	GPJ11	6	CAM_HREF	GPJ10
7	CAM_VSYNC	GPJ9	8	CAM_PCLK	GPJ8
9	CAMDATA7	GPJ7	10	CAMDATA6	GPJ6
11	CAMDATA5	GPJ5	12	CAMDATA4	GPJ4
13	CAMDATA3	GPJ3	14	CAMDATA2	GPJ2
15	CAMDATA1	GPJ1	16	CAMDATA0	GPJ0
17	VDD33V 3.3V		18	VDD_CAM	
19	VDD18V 1.8V		20	GND	

Table 1: list of the corresponding GPIO pins.

III.FEATURES

In computer programming, an API (Appilcation programming interface) is a tool for building software application and it is a set of protocols, routines. Software component in terms of input, output and its operations are expresses by an API. Functionalities of an API are independent of their respective implementation. Providing all building blocks with good an API we can develop a program easily. A programmer then brings the blocks together. In addition to have computer hardware or databases, such as video card or HDD (hard disk drives), an API can comfort the work of programming GUI components. For example, an API can promote integration of new features into existing applications (a so called "plug-in API").

An API can also guide otherwise distinct applications with sharing data, which can aid to integrate and enhance the functionalities of the applications. APIs usually come in the form of a library that carry specifications for data structures, routines, variables, object classes. In different cases, notably SOAP and REST services, an API is easily a specification of remote calls solved to the API consumers [3].

An API specification can take too many forms, like POSIX, the libraries of a programming language, vendor documentation, e.g., the Standard Template Library in C++ like OpenCV. An API different from an application binary interface (ABI) in that an API is source code based while an ABI is a binary interface. For instance the Linux Standard Base provides an ABI, while POSIX is an API. [4] [5]

A. API in procedural languages

In most procedural languages, an API specifies a set of functions or routines that accomplish a specific task or are allowed to interact with a specific software component.

For example, the math API on UNIX systems is a specification on how to use the image capture functions included in the opencv library. Among these functions there is a function, named *cvCaptureFromCAM(),* that can be used to compute the capture the image of a given cloth.

CvCapture* capture = cvCaptureFromCAM(CV_CAP_ANY)

B. System and interface design

The camera-based clothing recognition aid prototype for blind people integrates a camera, a microphone, friendly ARM mini2440, and a Bluetooth headset for audio description of clothing colors and patterns.

A camera mounted upon sunglasses which are used by blind persons is used to capture clothing images. The clothing colors and patterns are described to blind users with minimal noise to hearing.

In order to help blind and visually impaired people to interact, speech commands input from a microphone are used to provide system control and function selection. As shown in Figure 6, the design of interface includes *high priority commands and basic functions*.

Basic block: A blind and visually impaired people can verbally request the function he/she wants the clothing recognition help to perform. The detected results will be presented to the blind and visually impaired people as audio outputs including *not detected*, *detected*, and *start a new function*. As for the *detected* function, the next level functions include *pattern/colors* to announce the recognized clothing dominant colors and patterns; *repeat results* to repeat the recognized result; and *save result* to save the clothing image with associated color and pattern information in the computer.

High priority block: A blind and visually impaired people can set the system configuration by several high priority speech commands such as *stop function* (i.e., abort current task), *turn-off system*, *system restart*, low battery. At any time these high priority commands can be used . The battery level will also be analyzed and an audio warning is provided to blind user if the battery level is low.

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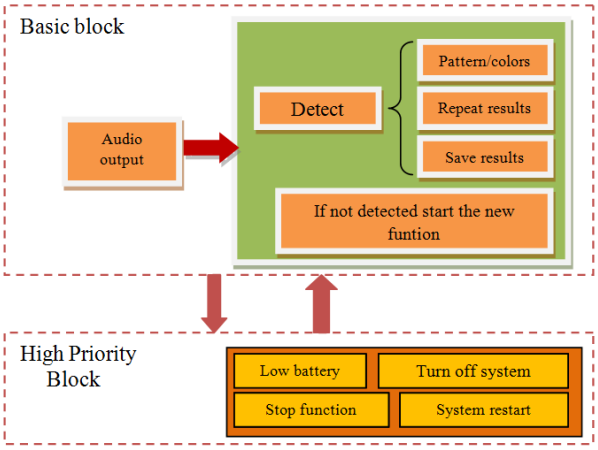


Figure 6: System interface design for the auditory guidance for blind person to recognize the clothing colors and patterns.

IV. RESULTS AND DISCUSSIONS

In our project, we evaluated the proposed method for pattern recognition (i.e. to determine if the captured clothing image has patterns or patternless), pattern matching, and color matching. The results are outline in Table 1.

The expected clothes matching algorithm can handle complex patterns and multiple colors. The color detection and matching functions may also advantage for some people with color deficiencies. This paper has the following impact: (1) It develop the study of pattern matching, and leads to significant upgrade over existing methods that is texture analysis[6][7][8][9] and Radon signature method [1] in handling images with complex patterns with different directions and lighting changes ; (2) for visually impaired and blind people the method developed in this paper improves their quality of life ; and (3) other importance of this project includes object detection and etc. The proposed system is very capable and takes about 0.35 seconds to detect the clothes patterns and colors. There is no large memory needed by the algorithm. The proposed algorithm can be tested to off-the-shelf smart camera phones. The computer in a mobile phone has less computational power when compared to a standard PC.

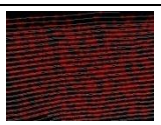
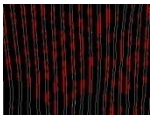
Clothes	Detected lines in clothes	Audio Output (Patterns/colors)
		Horizontal/(Red and white)
		Vertical/(white and black)
		Patternless/Red
		Irregular/(red, blue and white)

Table 1: Patterns and colors detected by our system.

However, on smart phones the computational power is rapidly increasing. With optimized code in Simian C++ or Android JAVA, which is the most efficient language currently available for the mobile phone, there is no difficulty to transferring this paper technology to a smart phone.

V. CONCLUSIONS

We have presented an efficient computer auditory system to recognize clothes with complex patterns and multiple colors to assist blind and visually impaired people by distinguishing both pattern and color information. To handle complex patterns and lighting changes, we combine techniques using the API by using OpenCV for pattern matching. The matching outputs are provided to the user in audio (speech or sound).

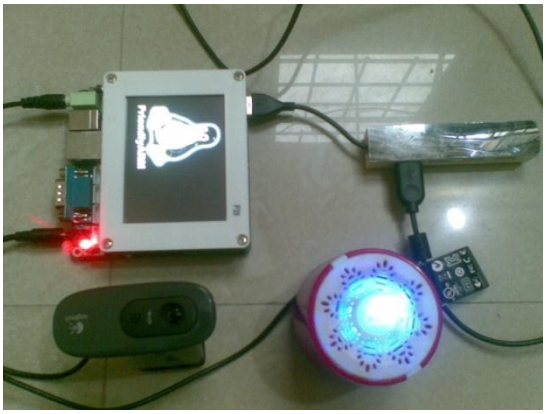


Figure 7: Hardware components of entire setup.

REFERENCES

[1] YANG *et al.*: *"assistive clothing pattern recognition for visually impaired people"*.

[2] I. Kocur, R. Parajasegaram, and G. Pokharel, "*Global data on visual impairment in the year 2002*," *Bulletin World Health Org.*, 2004.

[3] "*Customer Information Manager (CIM)*" (http://www.authorize.net/support/CIM_SOAP_guide.pdf) (PDF). *SOAP API Documentation*. Authorize.Net. July 2013. Retrieved 20130927.

[4]"*LSBIntroduction*"(http://www.linuxfoundation.org/collaborate/workgroups/lsb/lsbintroduction)(HTML). Linux Foundation. 21 June 2012. Retrieved 20150327.

[5] Stoughton, Nick (April 2005). "*Update on Standards*" (https://db.usenix.org/publications/login/200504/openpdfs/standards2004.pdf)(PDF).USENIX.Retrieved20090604.

[6] D. Dakopoulos and N. G. Bourbakis, "*Wearable obstacle avoidance electronic travel aids for the blind: A survey*," *IEEE Trans. Syst.,Man, Cybern. C*, vol. 40, no. 1, pp. 25–35, Jan. 2010.

[7] L. Davis, S. Johns, and J. Aggarwal, "*Texture analysis using generalized co-occurrence matrices*," *IEEE Trans. Pattern Anal. Mach. Intell.*, vol. PAMI-1, no. 3, pp. 251–259, Jul. 1979.

[8] R. Haralick, "*Statistical and structural approaches to texture*," *Proc. IEEE*, vol. 67, no. 5, pp. 786–804, May 1979.

[9] Y. Xu, H. Ji, and C. Fermuller, "*Viewpoint invariant texture description using fractal analysis*," *Int. J. Comput. Vis.*, vol. 83, no. 1, pp. 85–100, 2009.