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Smart Android Application for Blind People Based on Object Detection

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ABSTRACT: Application for detecting an object using the mobile video camera and giving voice instructions about the current location of the blind user by using GPS and to give the direction of an object to the blind person. User will need to train the system first regarding the object information. System extracts the features to search objects in the camera view to know the direction of object, where it is placed using angle extraction feature. This Android application gives warning of the obstacles in the way to the user. In this system we are using the updated ORB & BLOB algorithm for object detection and for key matching as these algorithms give the more accuracy than SIRF. Also the proposed system converts the text into audio for giving the instructions about the directions to the blind person and for such conversion the Speech synthesizer technique gets used. The camera of the phone is enough for this purpose and no special hardware is required, ensuring that it requires minimal effort from the user to use the application during everyday life. System gets used in social approach where the object in place or in path everyday life and with the help of this system blind person easily travel or visit common places such as school, college, hospital, shopping mall and travel on roads.

KEYWORDS: Image processing, Object detection, Speech synthesizer, GPS.

I. INTRODUCTION

The Current system in android there is not any mechanism for voice command on android events like phone Call, Message reading, Unlock System. Current users are use the Services for looking the Phones features So the Motivation is that to implement the android system for blind people who cannot handle the android phone effectively. The Blind people wants to allow the android phones services like calling, reading messages using voice commands. Object detection is a wide area of development.

Detecting objects using image processing can be used in multiple industrial as well as social application. This project is proposing to use object detection for blind people and give them audio/ vocal information of object and current location of blind user. We are detecting an object using the mobile camera and giving voice instructions about the direction of an object. User must have to train the system first about the object information. We are then doing feature extraction to search for objects in the camera view. We are taking help of angle where object is placed to give direction about the object.

II. RELATED WORK

In [1] authors describes main features of software modules developed for Android Smartphone that we are using for blind users which can recognize and match scanned objects to a database of objects. Further two modules are capable of i) detecting major colors and locate direction of the maximum ii) brightness regions in the captured scenes. In [2] authors start by selecting a set of interest points extracted from an image grid and tracked using the multiscale Lucas - Kanade algorithm. Then, they estimated the camera and background motion through a set of homographic transforms. Other types of movements are identified using an agglomerative clustering technique. In [3] authors used HSV model for more accurate processing of image. For training and recognizing image ANN algorithm is used. To separate foreground and background from image sobel edge detection is used. In [4] authors also provide an idea to implement ORB algorithm on FPGA to increase the execution speed by utilizing the reconfigurable nature and pipelining of the FPGA. ORB algorithm builds on the well-known FAST key point detector and the recently developed BRIEF descriptor. In [5] authors propose a framework for achieving these tasks in a non-overlapping multiple camera network.

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A new object detection algorithm using mean shift (MS) segmentation is introduced, and occluded objects are further separated with the help of depth information derived from stereo vision. The detected objects are then tracked by a new object tracking algorithm using a novel Bayesian Kalman filter with simplified Gaussian mixture (BKF-SGM).

III. PROPOSED ALGORITHM

A. *Design Considerations:*

- Generate the video.
- Creating the number of image frames
- Conversion of RGB to Gray Scale
- Image Enhancement.
- Edge detection by using Blob algorithm
- Using ORB algorithm for key matching
- Converting result text to speech by using speech synthesizer

B. *Description of the Proposed Algorithm:*

Aim of the proposed algorithm is to detect the object in frames of a video effectively. And match those objects with the database images to confirm the obstacle that comes in way. The proposed algorithm is consists of three main steps.

Step 1: FAST Detector:

We start by detecting FAST points in the image. FAST takes one parameter, the intensity threshold between the centre pixel and those in a circular ring about the centre. We use FAST-9 (circular radius of 9), which has good performance.

Step 2: Orientation by Intensity Centroid:

Our approach uses a simple but effective measure of corner orientation, the intensity centroid. The intensity centroid assumes that a corner's intensity is offset from its center, and this vector may be used to impute an orientation. Rosin defines the moments of a patch as:

$$m_{pq} = \sum_{x,y} x^p y^q I(x,y), \qquad (1)$$

and with these moments we may find the centroid:

$$C = \left(\frac{m_{10}}{m_{00}}, \frac{m_{01}}{m_{00}} \right) \qquad (2)$$

We can construct a vector from the corner's center, O, to the centroid, O~C. The orientation of the patch then simply is:

$$\theta = \text{atan2}(m_{01}, m_{10}), \qquad (3)$$

Where atan2 is the quadrant-aware version of arc tan. Rosin mentions taking into account whether the corner is dark or Light; however, for our purposes we may ignore this as the angle measures are consistent regardless of the corner type.

Step 3: rBRIEF: Rotation-Aware Brief:

In this section, we first introduce a steered BRIEF descriptor, show how to compute it efficiently and demonstrate Why it actually performs poorly with rotation. We then introduce a learning step to find less correlated binary

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Tests leading to the better descriptor rBRIEF, for which we offer comparisons to SIFT and SURF.

C. *Application Architecture:*

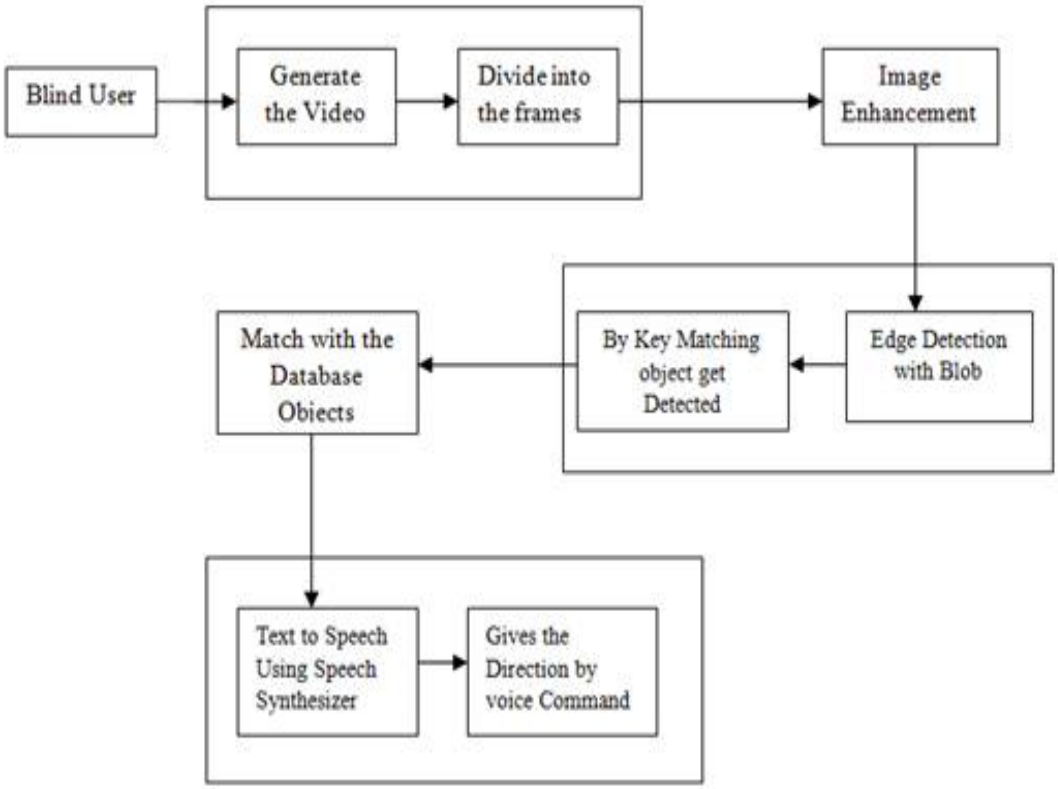

Fig 1. System Architecture

- This figure specifies the design that is used to solve the problem of product. We are detecting an object using the mobile camera and giving voice instructions about the direction of an object. We need to train the system first about the object information. We are then doing feature extraction to search for objects in the camera view.
- Blind user generate the video which will be divided into frames then image enhancement that is edge detection will be done after that key matching will be processed with the database then text to speech conversion using speech synthesizer which gives the direction of command.

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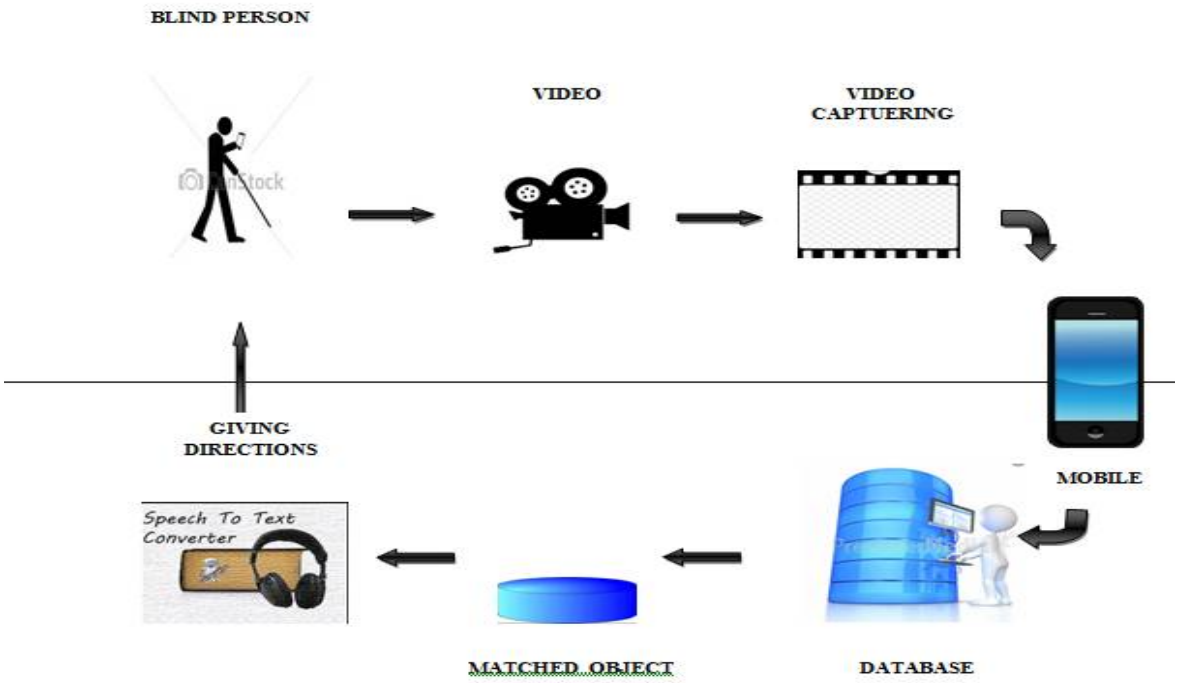

Fig 2. Client-server overview

- Client side:

➢ The user that is blind person will use smart android phone to locate the directions and the main component that is after starting the android application it will give current location of blind person and android phone camera will capture the live surroundings and it will get divided into several frames. The exact object captured which is acting as obstacle in blind person path will get send to the server side.

➢ On the other hand that is on server side the object which is sent by the client present in server will match with the object present in database and where as database is collection of already stored object. If object match successful speech to text conversion will take place.

IV. PSEUDO CODE

Step 1: Generate the video.
Step 2: Number of frames get generated from video.
Step 3: Convert Image into RGB to Gray scale.
Step 4: Check the object edges detected by the blob algorithm.
Step 5: By using ORB algorithm Setting we will set the key points for object then matches the object with the database object.
If (object=database)
then
make the text to speech conversion
else
go to step 5
Step 6: with the Speech synthesizer blind user will get the voice command
Step 7: go to step 4.
Step 8: End.

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V. SIMULATION RESULTS

The simulation studies involve the working of android blind people application which contains different modules .In this current location of the blind user will be detected first then camera will be on and it will capture video which will be divided into the frames that the frame will be consider as image .From the image system is going to detect the object using blob detection algorithm. Once the objects are detected, edge detection algorithm is applied to it which will decide the object by bounding box.

Those objects are detected and key points are set by using ORB. Those selected objects are set with the key points and those key points are matched with the database images and if match found that object will be confirmed and system will give notification to the user or blind people. The notification will be given in voice by using voice synthesizer. This is how the application will help user to navigate from one location to another.

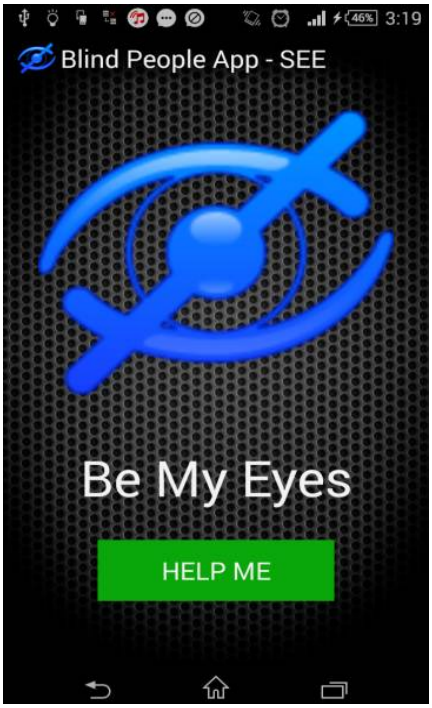

Fig 3. Application window

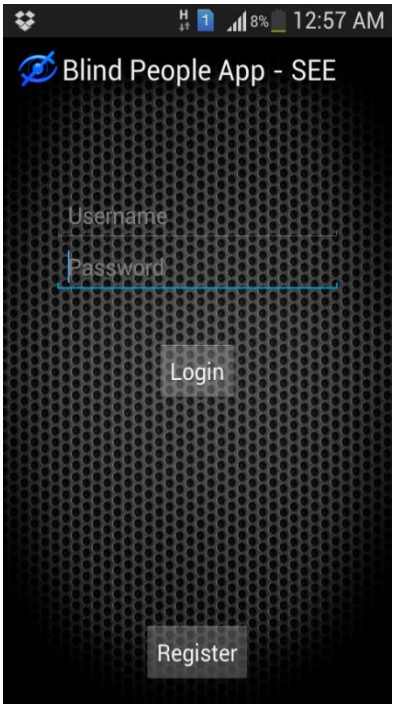

Fig 4. Login page

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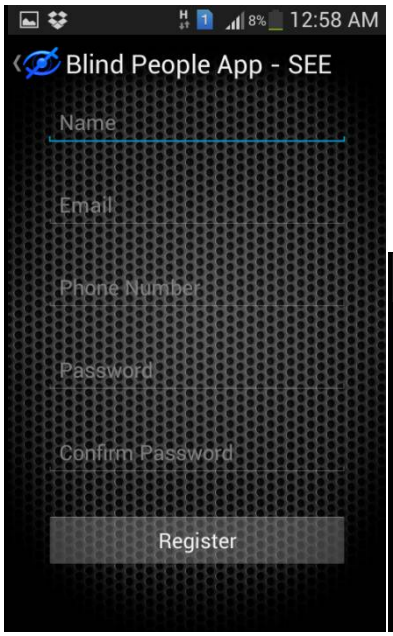

Fig 4. Register page

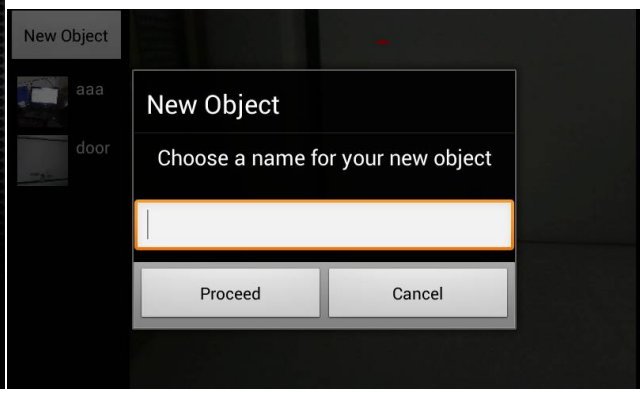

Fig 5.Creating new object

Fig 6. Detecting object and giving instructions.

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VI. CONCLUSION AND FUTURE WORK

Here we have successfully modeled the Object Detection using ORB algorithm. The tests will went smoothly and had no problems. This report introduced two environmentally-friendly designs for a blind people. We presented information about the Blind people application. This application will be more effective for blind people. It is important to develop this application for the future.The system is used by Blind peoples but the normal people also can use. In future we are going to detect the potholes which are coming across the camera video. System will also detect the depth of potholes and guide blind user to get directed. As well if water on the floor will also be get detected and inform to users.

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BIOGRAPHY

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