International Journal of Innovative Research in Advanced Engineering (IJIRAE) ISSN: 2349-2163
Issue 2, Volume 2 (February 2015) www.ijirae.com

AUTONOMOUS ANDROID CONTROLLED ROBOT DESIGN USING WIRELESS ENERGY

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Abstract—Mankind has always strived to give life like qualities to its artifacts in an attempt to find substitutes for himself to carry out his orders and also to work in a hostile environment. The popular concept of a robot is of a machine that looks and works like a human being. The industry is moving from current state of automation to Robotization, to increase productivity and to deliver uniform quality. One type of robot commonly used in industry is a robotic manipulator or simply a robotic arm known as pick and place robot. It is an open or closed kinematic chain of rigid links interconnected by movable joints. In this paper pick and place robot is been designed which performs its operation by using android via object detection application and PIC microcontroller. This application is been programmed in java language. In transmitter part the voice input is given by using HM2007 to microcontroller by using RF module. In receiver section the RF receiver will receive this voice input and it will be given to the microcontroller. Simultaneously the object to be picked will be done by using android application where the camera of the android mobile will capture the objects. The output from the mobile will be send through Bluetooth to the microcontroller and that will allow the motor to move in order to pick the object. In this paper the robotic arm has flexible gripper.

Keywords— Robotics, Pick and place robots, Android object detection application, Hm2007, Flexible gripper

I. INTRODUCTION

Robotics is the branch of engineering science and Technology related to robots, and their design, manufacture, application, and structural disposition. Robotics is related to electronics, mechanics, and software. Robotics research today is focused on developing systems that exhibit modularity, flexibility, redundancy, fault-tolerance, a general and extensible software environment and seamless connectivity to other machines, some researchers focus on completely automating a manufacturing process or a task, by providing sensor based intelligence to the robot arm, while others try to solidify the analytical foundations on which many of the basic concepts in robotics are built.

In this highly developing society time and man power are critical constrains for completion of task in large scales. The automation is playing important role to save human efforts in most of the regular and frequently carried works. One of the major and most commonly performed works is picking and placing from source to destination. Present day industry is increasingly turning towards computer-based automation mainly due to the need for increased productivity and delivery of end products with uniform quality. The inflexibility and generally high cost of hard-automation systems, which have been used for automated manufacturing tasks in the past, have led to a broad based interest in the use of robots capable of performing a variety of manufacturing functions in a flexible environment and at lower costs. The pick and place robot is a microcontroller based mechatronic system that detects the object, picks that object from source location and places at desired location. For detection of object, android object detection application is been developed by using java language. Pick and place robots are robots that can be programmed to literally pick an object up and place it somewhere. These robots are popular among business owners who require speedy and precise automation applications and material handling systems.

II. PROPOSED METHOD

In proposed system a humanoid robot is been implemented which performs the task initiated by the user without human assistance by voice input using HM2007. The pick and place robot which is been implemented eliminates the need of sensors which is used to detect object. In this approach android object detection application is been developed which is used to detect object and send the image of object to PIC microcontroller by using Bluetooth.

III. SYSTEM OVERVIEW

The voice input is given to PIC micro controller using HM2007 voice kit and it is been sent to receiver through RF transmitter as shown in fig 1.A. In receiver section the RF receiver will receive this voice input and it will be given to the microcontroller. Simultaneously the object to be picked is done by using android application where the camera of the android mobile will detect and capture the image of the object. The output from the android mobile will be send through Bluetooth to the microcontroller and that will allow the motor to move in order to pick the object by using motor drive as shown in fig 1.b

WORKING OF HM2007

Speech is an ideal method for robotic control and communication. Speech capture device known as microphone picks up the signal of the speech to be recognized and converts it into an electrical signal. A modern speech

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recognition system also requires that the electrical signal be represented digitally by means of an analog-to-digital (A/D) conversion process. This speech signal is then analyzed and compared to trained words. The circuit we are building operates in the manual mode. The manual mode allows one to build a standalone speech recognition board that doesn't require a host computer.signal Processor known as signal processor storage is used to extract exact information .The output of signal processor device and reference speech patterns is been compared and output is given to microcontroller by using RF.

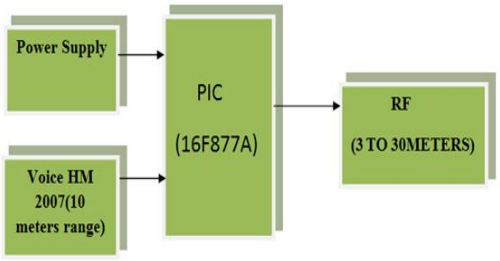

Fig 1.A transmitter section

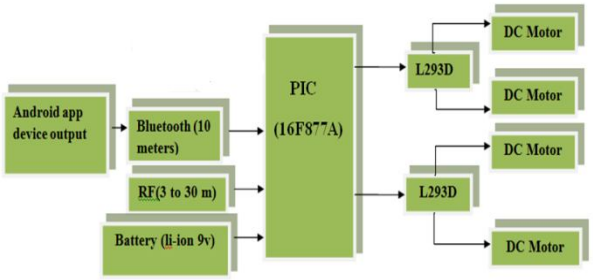

Fig 1.B receiver section

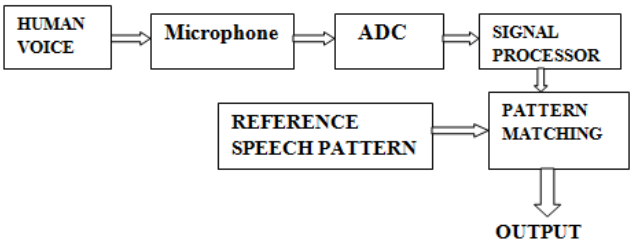

Fig.2 Hm2007 working

IV. OBJECT DETECTION APPLICATION DEVELOPMENT

A. DEVELOPMENT OF OBJECT DETECTION APP This object detection android application is been done by using ECLIPSE (JUNO) software. Android applications are usually developed in the Java language using the Android Software Development Kit. Framework aims to automatically extract foreground objects of interest without any user interaction or the use of any training data (i.e., not limited to any particular type of object). To separate foreground and background regions within and across video frames, the proposed method utilizes visual and motion saliency information extracted from the input video.

B. DESIGN FLOW OF ANDROID APPLICATION

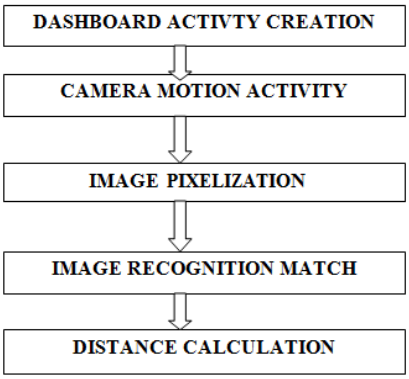

Fig.3 Flow chart of android application

C.DASHBOARD ACTIVITY CREATION: It creates a dashboard screen layout via application screen such as webpage where the user can interact with the screen. This screen has to be enabled and this is done by using handle touch.

D.CAMERA MOTION ACTIVITY CREATION: The Android framework includes support for various cameras and camera features available on devices, allowing you to capture pictures and videos in your applications.

DETECTING CAMERA HARDWARE: If your application does not specifically require a camera using a manifest declaration, you should check to see if a camera is available at runtime. To perform this check, use the PackageManager.hasSystemFeature() method, as shown in the example code below:

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```
/** Check if this device has a camera */
 private Boolean checkCameraHardware(Context context)
if   (context.getPackageManager().hasSystemFeature(PackageManager.FEATURE_CAMERA)){
// this device has a camera
return true;
} else {
// no camera on this device
return false;}}
```

E.IMAGE PIXELIZATION: Pixelazation is caused by displaying a bitmap or a section of a bitmap at such a large size that individual pixels, small single-colored square display elements that comprise the bitmap, are visible. Such an image is said to be pixilated. It is been classified as:

Test images: images that are been captured lively by android camera and stored in SD card.
Train images: images that are been stored already in SD card via preprogrammed.

STEPS INVOLVED IN IMAGE PIXELIZATION

1. Set train image in SD card: In this step the objects are been pre-programmed and it is stored in SD card.
2. Get process file (test images): In this step the objects which are been captured lively are been stored in SD card.
3. Get image bitmap: get bitmap of the test image. Convert to grey image: convert the images into grey level images by the process of normalization
4. Compare bitmap: compare bit map of the both test and train images.

F. IMAGE RECOGNITION MATCH: In this process the two objects such as train and test objects are been compared. Test objects are those that are been stored in SD card during camera processing i.e. when camera is active. Train objects are those that are been preprogrammed and stored in SD card.

G.CALCULATION OF MINIMUM DISTANCE:

Calculation of distance is the process of getting the distance of the object. This is been done because at times there will be two objects which are of same size and colour. At the time the robot doesn't know of to which object it has to be picked hence distance calculation is been done for the robot to pick the object which is nearer to it. This will reduce the timing and hence increase the performance.

Steps1: First we have to get the object array list. This consists of list of objects that are been captured by android camera.all these objects are been stored in Iterator.

Step2: In this step the iterator will display all the elements.

Step3: distance calculation: train value - test distance. This formula will give the distance of the object.

V. RESULTS AND DISCUSSION

A. OUTPUT FROM EMULATOR

Output from emulator shows the conversion of YUV image (black and white images) into RGB images. This is because the android camera which is been developed usually possess only two types of format namely: yuv and NV21. Thus a conversion is required.

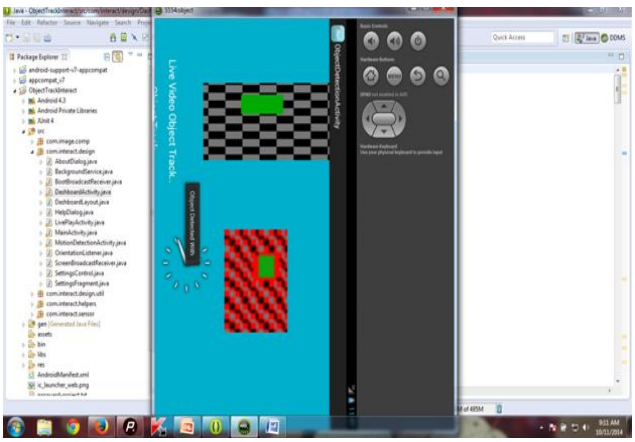

Fig.4 output of emulator

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B.OUTPUT OF ANDROID MOBILE VIA OBJECT DETECTION APPLICATION

The below screenshot is the output of the created android application which shows that motion is been detected and object matching between test and train objects. This application also allows us to get the distance calculation of the object.

Fig.5 Motion detected with matched object

CONCLUSION AND FUTURE WORK

Thus implementation of pick and place robot is been done by using android application via object detection application which is used to work in all environments and it overcomes the drawbacks of sensors which is used to detect object. In future the pick and place robot must be designed in such a way that it is not restricted to particular objects and android application must be designed in such a way that it is capable to capture more articulated objects and complex background.

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