



Design and implementation of Dustbot Using Neural Networks

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Abstract:

This paper introduces a vision based object tracking robot which is driven by wheels and controlled by a computer along with software. The objective of this paper is to design a robot which is automatically controlled by computer to track and follow the object. Emphasis is given on precision vision based robotic applications. Image acquisition by the robotics achieved by using a PC-based wireless camera, it send frame by frame image to image processing software for further processing. The overall paper describes a visual sensor system used in the field of robotics for identification and tracking of the object. In this paper the dustbot is used to collect the waste material in the house or public places. Dustbot is the mobile robot which has arm for picking the waste material and camera for identifying the waste material. It identifies the waste material through the digital image processing techniques performed by MATLAB. Thus the robot and arm movement is based on the embedded C programming.

Keywords: Dustbot, Mobile robot, Object detection, Obstacle avoidance.

I. INTRODUCTION

The robot is managed by a wireless connection, its purpose of this research work is to design a wireless robot that navigates to collect wastages automatically & manually that would be capable of reaching close to the objects through matlab implementation. These tasks can be solved automatically and the real scenario can be observed by an autonomous robot. But, complete autonomous robot through camera. Our objective is to keep the environment which can perform varieties of task is still under clean without the need of peoples. The main objective of development. Therefore researchers all over the world this paper presents the design and development of vision work towards the design and development of such robots, based autonomous dustbot for cleaning purpose in hospital to simplify works in various fields. This can be considered and industries. The traditional cleaning method and the as a first step in using robotics in the everyday life of a vacuum cleaner is mainly operated by human. Our scope real town for providing a real service. Thus an initiative is to improve the cleaning process through automatic robot taken by us for making an autonomous robot. The main efficiently. It can handle many type of waste material. function of this wireless robotic system is to collect the There will be space for storing waste material. It is used in information about the dust particle & waste material. The hospital, bus stand and many public places. where waste



material are thrown. Dustbot moves automatically to the desired location and detect the object through wireless camera and the further object detection, segmentation and identification are done by image processing. This paper propose a new robot to detect the waste material which is in the form of irregular objects, which can be detected through image processing technique. It can control the dustbot by using ZigBee wireless technology.

Autonomous object detection can be made with the help of wireless camera and through the image processing. The robot automatically moves towards the object by sensing the path image through which it can reach to the object and control the robot manually too. Ultrasonic sensor is used to detect & avoid the obstacles. Finally the Dustbot collect the waste material through its robotic arm.

II. VISION BASED CONTROL

This paper implemented by vision based technique, image is captured by wireless camera. It records in the video format and the video is converted into frame by frame image for further processing. Image is converted to binary image and then object and background are separated. The object is detected and the control of robot is by neural networks

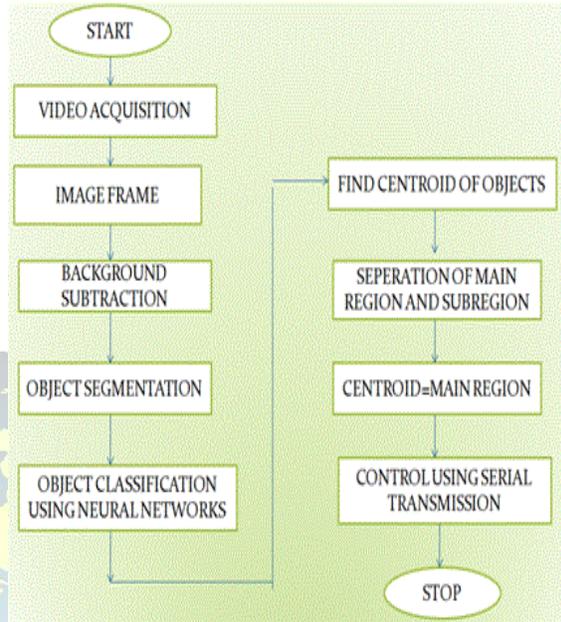


Fig1 Flow chart of vision based control

III. ROBOT CONTROL

A. Robot unit

The robot Unit consists of Microcontroller, wireless camera, driver circuit, DC Motor, zigbee, RS232. The camera is used to capture the images continuously. It is connected in the robot. This camera images are transferred to the pc system for image processing which is used to detect the waste material in irregular shape.

Robot movement is proceed by two methods one is manual and another one is automatic. The manual method is operated by human who transfers the control signals to the robot by ZigBee wireless technology. In the automatic mode this control signal given by the system which means that the mat lab process takes the controls. Thus the control processing will be made in the PIC16F877A controller & its controls the motor movements by the driver circuit.



B. System control unit:

The PC is the main control section. In that mat lab program, ZigBee, wireless camera receiver and its software are installed. In this section we can decide the automatic or manual mode. The manual mode controls are given by this control section.

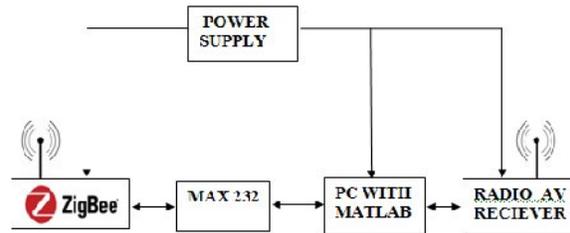


Fig 2 Block Diagram of control section

Object detection is a fundamental basis of artificial intelligence and robotic vision system. Object detection methods are used in various fields like science, engineering, medical applications. It is necessary for surveillance applications, guidance of autonomous vehicles, smart tracking of moving objects etc. This project deals with only object detection in robotics.

Designing mechanical model and writing program for robots are difficult as the scale and applications of robots continue to grow. This paper describes our attempt to wards designing Most of the robots made previously are expensive and complex but this robot is very much cost effective and light weight.

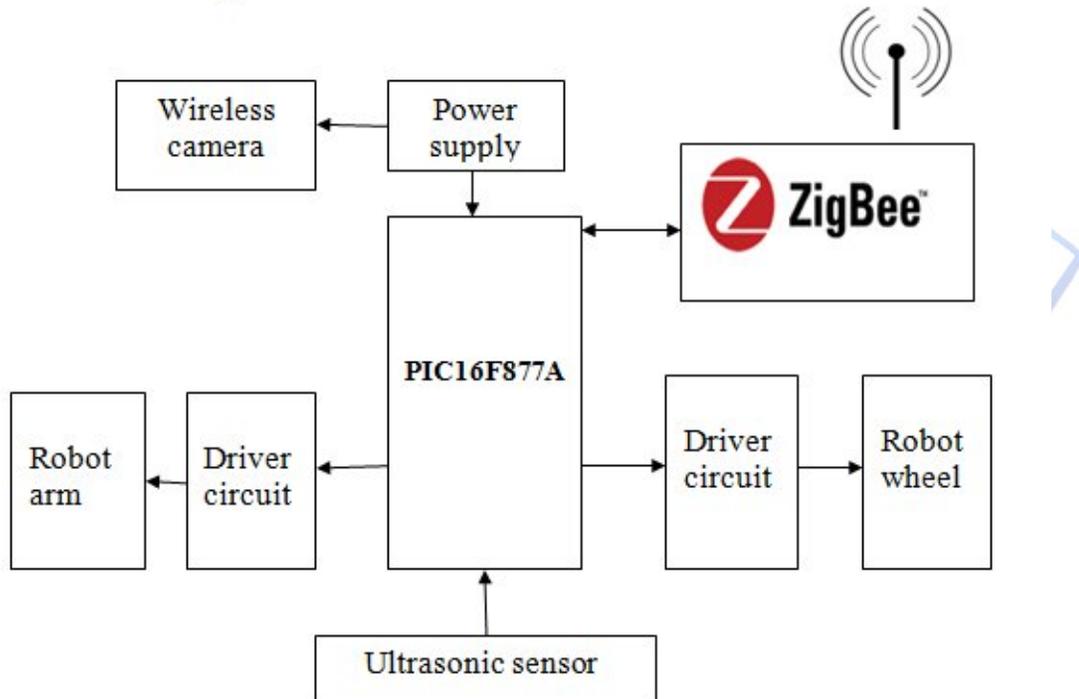




Fig 3. Block Diagram of robot unit

IV. DESIGN OF ROBOT

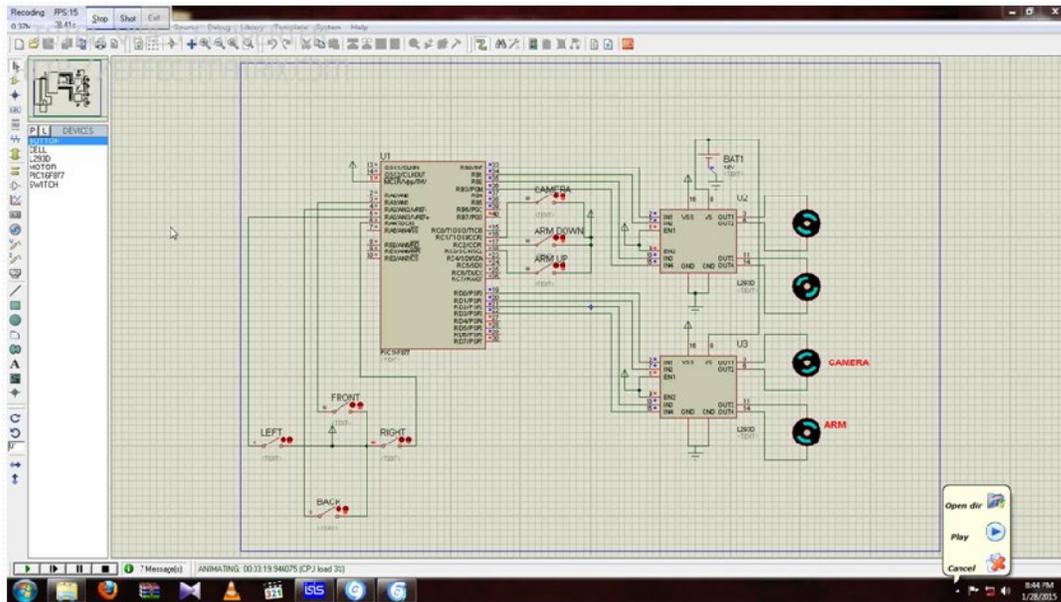


Fig.4 Software Design Of Robot Movement

In this robot it contains three wheels, two wheels are connected to D.C motors. The front wheel is a free wheel which is for free movement. PIC16F877 microcontroller is used. Arm movement is controlled by another D.C motor and a camera is placed in front of the robot and an ultrasonic sensor is placed near to the camera for obstacle avoidance.



Fig 5 :waste material image

V. RESULT

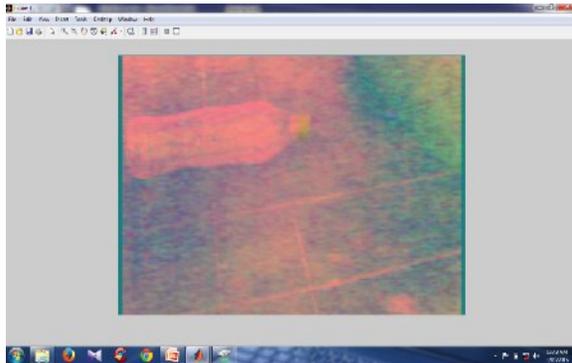


Fig 6:matlab captured image

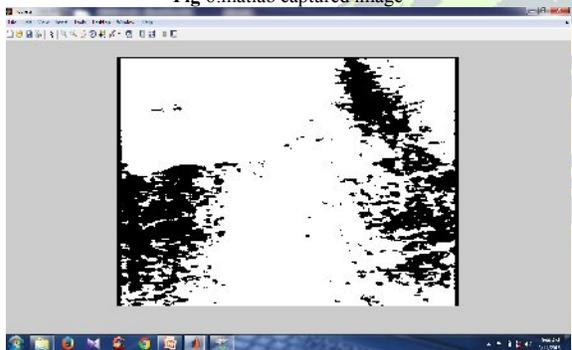


Fig 7: Binary conversion

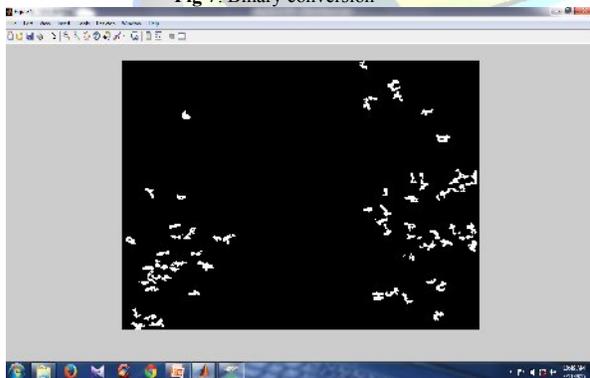


Fig 8:Object Detection

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