Research Paper Engineering

Coloured Object Tracking Robot Using Image Processing

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ABSTRACT

The slight change in axis of object which is being tracked generate control signal which is send to the microcontroller through wireless medium. The captured images of the object are processed using MATLAB. Depending on the variation in position of object, controlling commands are given to the robot to track moving colour object. This project is in aimed to design and develop a mobile robot which can track a moving object. Here, we use the USB camera to take image of the object and these frames are further processed to track the object. In our project we use the colour information of the object to track it. Better performance of the robot can be obtained if multiple features are monitored. The movement of the robot is controlled by Arduino microcontroller based on the signals received directly

KEYWORDS

INTRODUCTION

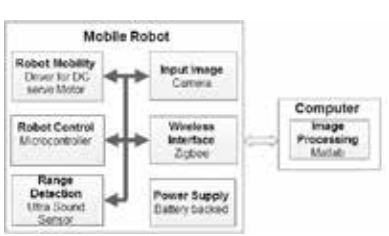
The problem in surveillance rests on situation where human operators are needed, who usually keeps eye on a large number of inputs from surveillance cameras. As these operators could be diverted due to boredom, fatigue, many unseen offence could be happen which are avoidable if proper surveillance is done. To overcome this problem, a moving robot could be used. A robot would be able to move throughout the regions to be monitored autonomously and continuously and identifying for unwanted behaviours or activities, and respond accordingly such as generating alarms. As, cameras are fixed in particular position using mechanical support they provide only 360 degree movement to camera which limits the area of monitoring . Object tracking can be done by identifying and tracking some specific feature of the moving object such as colour that belongs to the object. Object tracking using computer vision is a crucial component in achieving robotic surveillance. The main aim of the object tracking is to track the object based on the information obtained from video sequences.

In our project, we determine the region on interest (ROI) of the moving target which is followed adaptive colour filter to extract the colour information and thus the object is tracked..

PROPOSED SYSTEM

For proposed robot include both hardware and software part. Hardware part includes

a) Wireless module (wireless communication between robot and computer)
b) Arduino Microcontroller
c) Motor driver
d) DC servo motors.



The software part includes MATLAB for image processing and MPLAB for embedded software development. It is used to acquire colour 640X480 images.

Detection of the Object

The object detection process includes four major stages: extracting frames, extracting colour components, RGB to grey scale conversion.

The different stages are,

➢ *Extracting frames* : From the video alternate frames are extracted and are further processed. The camera used here is capable of taking 30 frames per second.

➢ *Extracting colour components*: Each frame contains three basic colour matrices Red ,Green and depending on the colour of the object which is being tracked , we are extracting one colour matrices or a combination of matrices.

➢ RGB to grey scale conversion: Each frame is converted to grey scale. It will reduce memory usage and increases the processing speed.

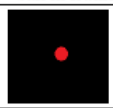
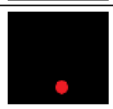
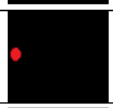
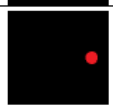
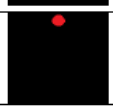
➢ *Elimination of small objects*: This is to remove object below a certain pixel size which may otherwise cause malfunction. MATLAB provides special function for this operation.

➢ *Subtracting background*: The grey scale matrices obtained in step RGB to grey scale conversion is subtracted from colour component matrices.

After performing the above operations, the position of the object will be appeared in white colour and background is in black colour. Thereby the object or ball is to be tracked is identified by the MATLAB.

Object Tracking

Once the object is identified next stage is the tracking. The identified object is assigned with a bounding box in MATLAB. Bounding box is a built in function in MATLAB which will return regional information of the specifiedregion (here the object).

Si No	Position on ball in frame	Robot Motion	Centroid
1		No Motion	X=200-380 Y=200-300
2		Move Backward	X=200-380 Y=0-220
3		Move Left	X=0-200 Y=200-300
4		Move Right	X=380-640 Y=200-300
5		Move Withward	X=200-380 Y=300-480

RESULTS AND DISCUSSION

Problems solved:

a) Reflection from smooth ground plane can lead to false object identification. It is rectified by using any non-reflective surface

b). Reflecting surface of the tracked object which is avoided by eliminating plastic surface on tracked object

c) Variation on surrounding illumination which is tackled by providing constant illumination level.

Problem unsolved:

a) Colour changing objects cannot be tracked.

b) Malfunction occurs while tracking objects having same colour and size.

REFERENCES

| 1. Scott Y harmon, "For Ground Surveillance Robot (GSR): An Autonomous Vehicle Designed to Transit Unknown Terrain", IEEE Journal On Robotics And Automation, VOL. RA-3, NO. 3, JUNE 1987. | 2. Alasdiar mc Andrew "An Introduction to Digital image processing with MATLAB". | 3. IJIRCCE journal on "ball tracking robot using image processing and range detection. Vol. 2, Issue 3, March 2014 | 4. ARK Techno solution sixth sense robotics workshop.