NCRISET-2017 e-ISSN: 2456-3463
International Journal of Innovations in Engineering and Science, Vol. 2, No.6, 2017
www.ijies.net

Design of Camera Based Object Tracking in 3D Space

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Abstract*- Camera based object tracking is to find a target object within different images. The system consists of a two motor pan-tilt camera driving mechanism It uses image processing techniques to identify and locate the object in 3D scene and motion control algorithms to direct the camera towards the object.Object tracking in image sequence has various application ranging from human-computer interaction, security and surveillance, video communication to augmented reality. The object tracking system is used to find out the motion performed by the user and calculate the actual co-ordinates and then control the hardware activities as per the user instruction.*
Keyword: -kinect,object tracking

I. INTRODUCTION

Camera based object tracking was always a most demanding area of research in different experiments.The camera based object tracking is to find a target object within different images, either with or without explicit usage of temporal correlations.This problem is especially challenging when the object is fast moving and partially or totally occluded in a couple of images. The major problem with any camera view is that, it works on frontal view and it gives result as 2D image only. Using 3D camera image can be viewed 3D visually but not actual co-ordinates of each object can be tracked. Hence proposed system is to find out the all 3 co-ordinates details of an object in 3D space, Once the system is ready with software processing next approach is to create human computer interaction in order to control the hardware based robotic and in 3D co-ordinates.

Gesture recognition is a topic in computer science and language technology with the goal of interpreting human gestures via mathematical algorithms. Gestures can originate from any bodily motion or state but commonly originate from the face or hand. Current focuses in the field include emotion recognition from face and hand gesture recognition. Many approaches have been made using cameras and computer vision algorithms to interpret sign language. However, the identification and recognition of posture, gait, proxemics, and human behavior's is also the subject of gesture recognition techniques. Gesture recognition can be seen as a way for computers to begin to understand human body language, thus building a richer bridge between machines and humans than primitive text user interfaces or even GUIs (graphical user interfaces), which still limit the majority of input to keyboard and mouse. Using the concept of gesture recognition, it is possible to point a finger at the computer screen so that the cursor will move accordingly. This could potentially make conventional input devices such as mouse, keyboards and even touch-screens redundant.

II. LITERATURE SURVEY

Nazim Mir Nasiri[6], This paper presented image processingtechniques to identify and locate the object in 3Dscene and motion control algorithms to direct the camera towards the object. Thus the objective of the project is to develop a vision system and control algorithms which can be locked on the moving object within the field of its view.

Karl Pauwels,Vladimir Ivan,Eduardo Ros and Sethu Vijayakumar [2], this paper presented a real-time system for joint multi-object and manipulator detection and tracking in complex, dynamic scenarios involving imprecise calibration. The method achieves a high degree of accuracy and reliability by constantly updating a detailed 3D scene representation on the basis of large amounts of dense visual data.

Youngmin Park, Vincent Lepetit,Woontack Woo[7], This paper presented a method for tracking simultaneously multiple 3D objects using a monocular camera. From the experiments, it is shown that multiple objects are successfully considered in a reasonable frame rate.

III. OBJECTIVE

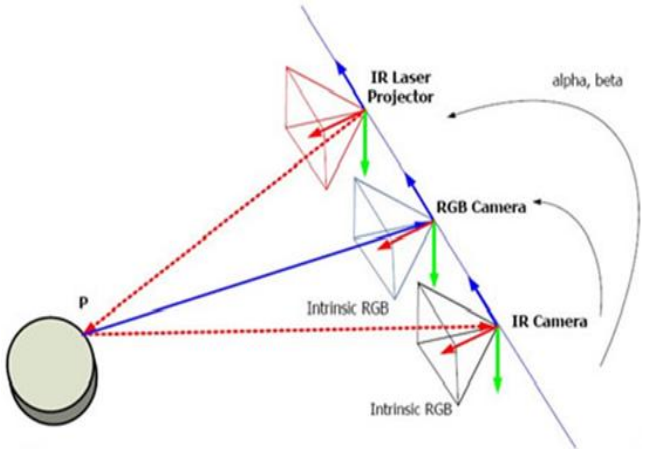
It is mainly design to identify the user action in 3D space and calculate the 3D co-ordinate detail and control the robotic arm hardware as per,
[1] To design and implement a system to track motion or the object in 3D space.
[2] To calculate the Z co-ordinate of the object from front view.
[3] Plotting a graph to get the location of object in all 3 co-ordinates.
[4] Controlling robotic arm actions in 3 dimensions.

IV. PROPOSED METHODOLOGY

Proposed system will be implemented using,

- Specially designed infrared based 3D camera sensor
- Software based 3D wireframe plotting technology

Kinect uses an RGB camera with depth sensor and infrared projector with a monochrome CMOS sensor which sees the environment not as a flat image, but as dots arranged in a 3D environment. This technology was developed by Prime Sense, an Israeli company, which was later taken over by Microsoft.

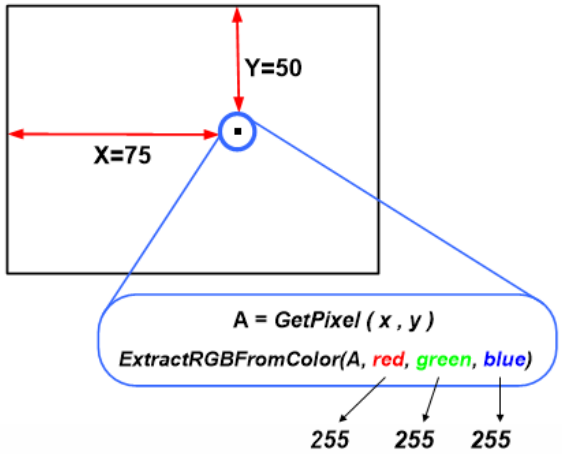


These are steps involved in color detection or video image processing:-

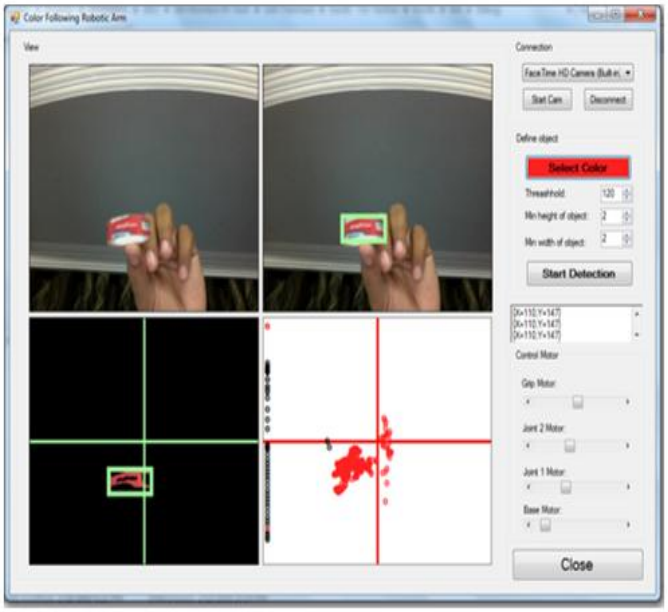
1] Video capturing-Getting video from connected web camera for this we use camera classes.

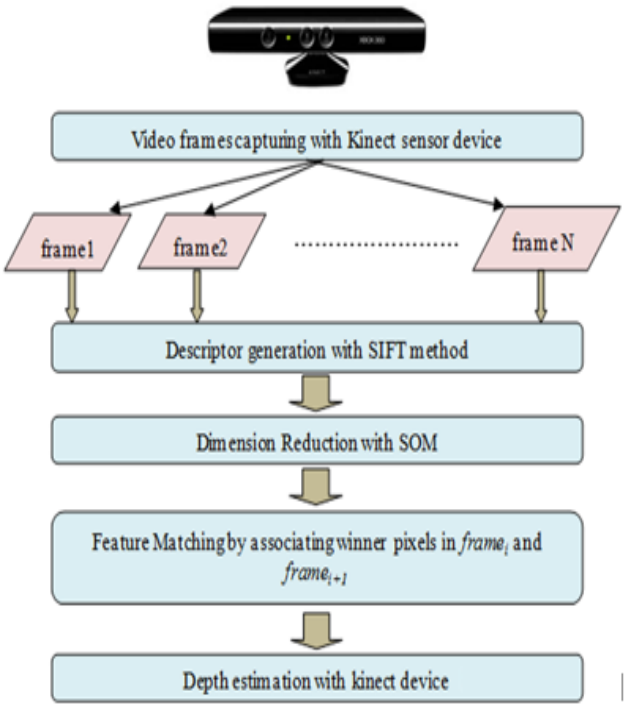
2] Image processing-Where extracting frames from video for processing as a video is a array of frames.

3] Pixel extraction and color detection-Where the process every pixel from above phase frame.



As per shown in image we will give co-ordinate of pixel and first get the pixel color value.After this we will extract individual RGB values. By compairing this values we can get the color value of Red is 255,0,0.





The 3D model of an object can be reconstructed using depth image registration. The two main types of 3D reconstruction with the depth images consist of patch-based and voxel-based 3D reconstruction of an object. The patch based reconstruction method is based on the distance metric using depth data while the image based approaches uses object visual features. The iterative closest point (ICP) algorithm detailed in is the most common technique to register the depth images The point correspondences require high computation to obtain the closest point in iterative closest point (ICP) algorithm. A patch based 3D reconstruction algorithm has been proposed in for the RGB-D SLAM to map the large indoor environment. This algorithm reconstructs the 3D model using visual and shape information gathered with RGB-D camera.

The scale invariant feature transform (SIFT) features are used as the initial point pairs for ICP algorithm. In, a sparse feature matching approach is presented for both appearance and shape matching via an ICP algorithm. A graph pose optimization is incorporated by using RGB feature correspondences.The scale invariant feature transform (SIFT) step for feature extraction and description in is implemented with FAST feature descriptor and SURF descriptor to reduce the computation complexity of the algorithms.

V. CONCLUSION

Camera based object tracking system can identify the object in 3D space, track its location within the field of view, and turn the camera with two motors right towards the object. The system will simulate the human eye behavior to staring on the objects of interest before deciding to manipulate with it. The developed system uniquely integrates vision and image processing techniques for object recognition and perception with camera actuation system through the designed computer control programs. The advantage of this system is that it does not require camera calibration and manipulates will all measurable parameters only in pixel values.

VI. REFERENCES

[1] Wenjun Zhu, Peng Wang, Fudong Li, Jianhua Su and Hong Qiao, "Real-time 3D Model-based Tracking of Work-piece with Monocular Camera", 2015 IEEE/SICE International Symposium on System Integration (SII) December 11-13, 2015. Meijo University, Nagoya, Japan.

[2] Karl Pauwels, Vladimir Ivan, Eduardo Ros and Sethu Vijayakumar, "Real-time Object Pose Recognition and Tracking with an Imprecisely Calibrated Moving RGB-D Camera",In: Proc. IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS 2014), Chicago (2014).

[3] Yu xiang, chang kyu song,roozben mottaghi and silvio savarese, "Monocular multiview object tracking with 3D aspect parts", 2014, Computer science dept. stanford university.

[4] Shahram izadi, David Kim, Otmar Hilliges, David Molyneaux, Richard Newcombe, Pushmeet Kohli, Jamie Shotton, "Real time 3D Reconstruction and interaction using moving depth camera", 2011, Microsoft research cambridge, uk, Imperial College London, UK, Newcastle University, uk, University of Toronto, Canada.

[5] Giorgio Panin, Alois Knoll, "Fully automatic real-time 3D object tracking Using active contour and appearance models",2006.

[6] Nazim Mir Nasiri, "Camera based 3D tracking system", proc.of IEEE region 10:Tencon'05 conference, Melbourne Australia 2005

[7] Youngmin Park GIST, U-VR Lab Vincent Lepetit EPFL, CVLab Woontack Woo GIST, U-VR Lab "Multiple 3D Object Tracking for Augmented Reality**".**

[8] R. S. Stephens "Real-Time 3D Object Tracking" Computing Devices Co. Ltd,Kings Drive, Eastbourne.

[9] Takashi Okuma, Takeshi Kurata, Katsuhiko Sakaue,"A Natural Feature-Based 3D Object Tracking Method for Wearable Augmented Reality", Columbia University / AIST, Columbia University / AIST, AIST.

[10] "Robust Statistics for 3D Object Tracking" Peter Preisig Institute of Robotics and Intelligent Systems (IRIS) Swiss Federal Institute of Technology, ETH Zurich, Switzerland