IMAGE STITCHING FOR UNDER VEHICLE SURVEILLANCE SYSTEM

Amit Warpe[1], Prashank Kumar[2], Hrishikesh Kadam[3], and Prof.Swati Khawate[4]
[123] Students, Dept. Of EnTC, DYPSOE, Maharashtra, India
[4]Asst. Professor, Dept. Of EnTC, DYPSOE, Maharashtra, India
amitwarpe49@gmail.com[1], prashankkumar1002@gmail.com[2]

ABSTRACT

At parking zones of public places, government offices, malls, etc. cars were checked by the guard for security purpose with the help of metal rod along with mirror pan. Using this method under vehicle surveillance is not possible properly. Another way to carry out this inspection by using three to four cameras fixed under the hard steel and when the vehicle will pass over this arrangement at a particular limited speed, so that underneath of the vehicle can be inspected. But this will be costly. So, came up with this project. This project consists of wireless robotic vehicle wireless camera mounted on it whose video output is viewed on the computer. The wireless robotic vehicle on which wireless camera is mounted can be controlled from the computer using graphical user interface application. This robotic vehicle can be moved under the vehicle and thus the inspection of the underside of that vehicle can be taken place. This project can be implemented for security purposes in government offices, parking lots, etc.

KEYWORDS: *Under Vehicle Surveillance system (UVSS), Graphical User Interface (GUI), Image stitching, Harris detectors, Linear blending. etc*

INTRODUCTION

With national security raised to a major problem in our lives, the research on under vehicle inspection has drawn more attention than before. Underside of the vehicles was checked by guard using mirror pan. But proper surveillance is not possible with this method. Another way to carry our this inspection by using three to four cameras fixed under the hard steel and when the vehicle will pass over this arrangement at a particular limited speed, so that underneath of the vehicle can be inspected. But this will be costly. So here we come with our project. This Consists of a robotic vehicle, on which a camera is mounted, which can be operated from remote location. So this vehicle would go under the vehicle of which inspection to be done and the underside of that vehicle can be viewed on the screen of the computer. As robotic vehicle move underneath the vehicle it will allow us to see area which is hard to view. Thus the inspection can be done properly. This project can be decomposed into three main parts as building a robotic vehicle, developing a GUI on the computer screen from which this vehicle can be operated and the communication between the vehicle and the computer.

Here, both the serial and wireless communication are used. Serial communication is used for the transmission data between GUI and RF transmitter whereas wireless communication is used between robotic vehicle and RF transmitter. A robotic vehicle can be built on chassis on which a camera can be mounted which can also be moved in certain directions like the vehicle to get the better view.

This project will help to improve the security at the places such as public places, shopping malls, government offices, border crossings, airports etc. The remainder of this paper is organized as follows. Section II gives the idea about related previous work. Section III gives the system description in which introduction to the major requirements of this project are specified. Section IV gives the design steps for developing the system while working of the project is given in section V. In section VI we draw some conclusion.

I. PREVIOUS WORK

The steps we used in the implementation of panorama image stitching includes: 1. Images acquisition, .2.Features detection based on Harris detector method, 3.RANSAC and 4.Image blending which can be described as. Figure 1. More details of each step will discussed. The entire process of panorama image stitching.

Images acquisition

The first stage of any vision system is the image acquisition stage. After the image has been obtained, various methods of processing can be applied to the image to perform the many different vision tasks required today. However, if the image has not been acquired satisfactorily then the intended tasks may not be achievable, even with the aid of some form of image enhancement ,The captured images are assumed to have enough overlap with each other, the camera parameters are known and the focal length is to be a fix value. The shooting process of the image sequences is designed using orientation sensor information, so that the user only needs to move the camera spatially and the pictures will be captured automatically with sufficient overlaps.

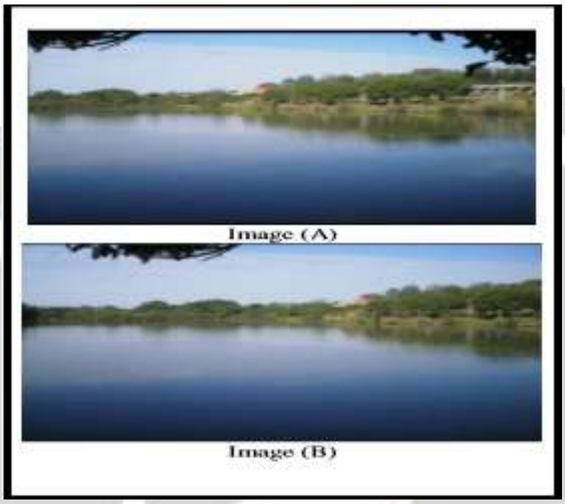

Image (A) and Image (B) represent Image acquisition in same scene with different angle

Feature Detection Finding

The correct feature points is fundamental to perform a right stitching. It's crucial to choose the correct detector of this point, In order to create our image stitching, the general idea will consist in identifying common points between the two images and then projecting one of the images on top of the other in an effort to match those points. Harris corner detector (Chris &Mike Stephens 1988) is a popular interest point detector due to its strong invariance to: rotation, scale, illumination variation and image noise. Harris corner detection algorithm is realized by calculating each pixel's gradient If the absolute gradient values in two directions are both great, then judge the pixel as a corner. This operator was invented by Chris Harris and Mike Stephens's in1988, it was only a processing phase to analyze a robot's environment represented by images. The general steps that are required to implement the Harris corner detection are:

Feature Matching

After our interest points have been detected, we need to match points by correlate them. A maximum correlation rule is used in order to determine matches between our two images. The cross-correlation works by analyzing a window of pixels around every point in the first image and correlating them with a window of pixels around every other point in the second image. Points which have maximum bidirectional correlation will be taken as corresponding pairs, some of these correspondences are not true in reality. The RANSAC algorithm applied later will be used to eliminate these mismatches

Image Blending

The final step to stitch two images is to blend these images together. To do so, we will be using a linear gradient alpha blending from the Centre of one image to the other. The gradient blending (Valadon Rancor 2005) works by change in one image's alpha channel over the line which connects the centers of the two images. The image gradients from each source image are copied in a second pass, an image that best matches these gradients is reconstructed [69]. Gradient blending is simple but effective algorithm. Gradient blending assigns the weight values (i.e.) to the pixels of the overlapping area. For =0.5, we get simple averaging, where both the overlapped areas will contribute equally to create stitched image. The value of ranges from 0 to 1, if =0, then the pixel has no effect in composite region while =1 implies the pixel is copied there. Suppose, composite image I is created from horizontally aligned images I1 (left) and I2 (right).

II. SYSTEM MODEL

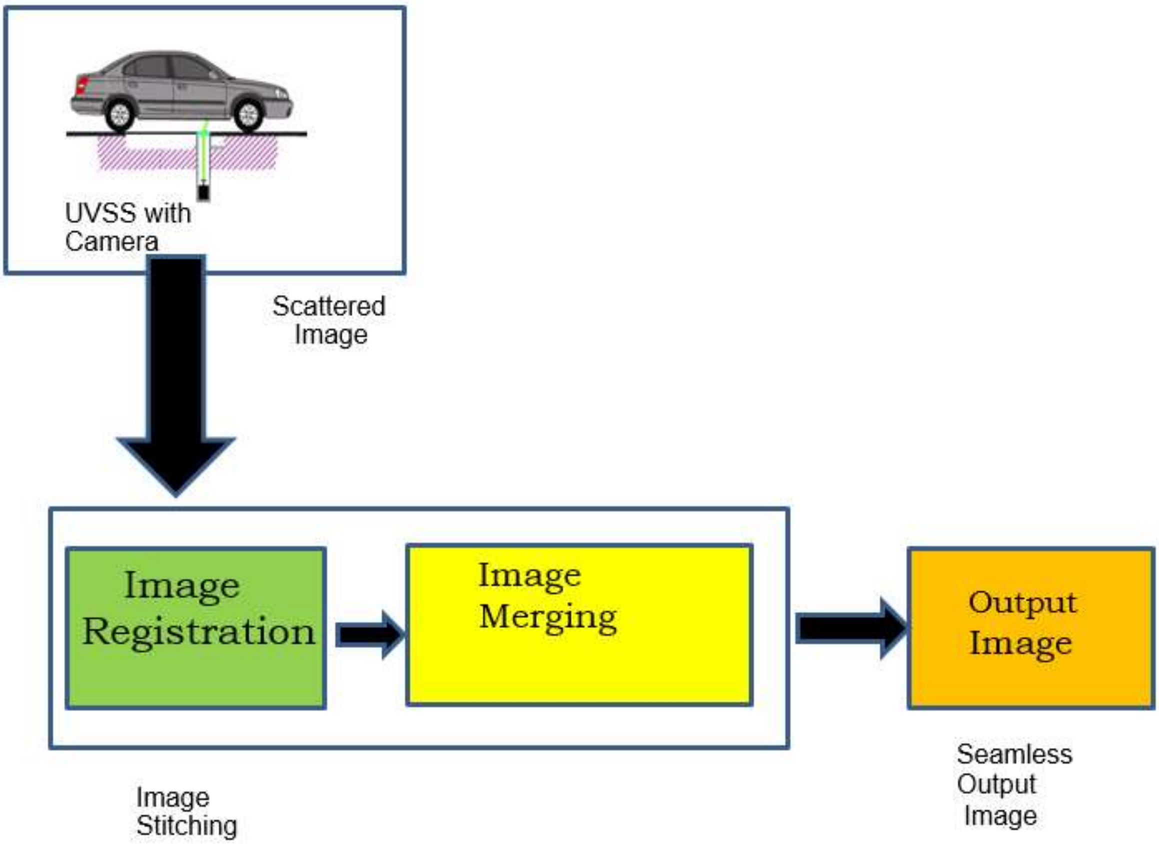

Figure 1. Block Diagram of Image stitching for uvss

BLOCK DIAGRAM DISCRIPTION

Computer-based UVSS consist of a road surface camera mounted which captures images of the vehicle underside.

The camera technology which is used for capturing the images is a video camera.

These offer a complete view of the underside of the vehicle, but they create multiple images which must be stitched together

III. METHODOLOGY

When a vehicle enters UVVS area, gate opens which are controlled by IR sensors. The vehicle passes through ramp mounted assembly and the camera turns on and capture video of underneath of a vehicle. The vehicle passes out through next gate. After preprocessing of capture video, it is send image registration which is used for alignment of two or more overlapping images. Then the image obtained from them are send for image merging where the value of pixels in two registered images are adjusted. Thus we get output as a seamless stitched image.

Detailed working:

(1) The first step in the generating of a stitched image is to select the passion and acquisition if images. In this step, a decision needs to be made on the type of resultant stitched image. According to the required stitched images, different image acquisition methods are used to acquire the series of images.

(2)After the images have been acquired, some processing might need to be applied to the images before they can be stitched. For example, the images might need to be projected onto a surface, which can be a mathematical surface such as a cylindrical, spherical, or planar surface. Distortion caused by the camera lenses also need to be corrected before the images are processed further.

(3)In this work, the process of image stitching has been divided into two steps, image registration and image merging. During image registration, portions of adjacent images are compared to find the translation which align the images. Once the overlapping images have been registered, they need to be merged together to form a single image .the process of image merging is performed to make the transition between adjacent images visually undetectable.

(4)A output image is generated after the images have been stitched. By generating output images with image stitching, the images can be acquired using a relatively inexpensive camera and the angle of view covered by the stitched image can be determined by the user. The stitched image can be of higher resolutions than a scattered images acquire by a camera.

(5)Our objective is to provide a detailed understanding of the generation of panoramic images and the steps involved in implementing an image stitcher. To achieve this goal, the three main procedure required in the generation of stitched images, i.e., image acquisition, image registration and image merging, are discussed in detail below.

IV. CONCLUSIONS

We have reviewed different approaches used by different researchers for image stitching. The comparative study of reviewed work is presented in the summarized form. In this review paper we have discussed the three main steps of image stitching, which consist of calibration, registration and blending. We have also discussed two main approaches of image stitching namely, direct techniques and feature-based techniques. Furthermore, we have discussed general panoramic image stitching model. The image stitching model consists of image acquisition, feature detection and matching, image matching, global alignment and finally blending and composition. The literature review of image stitching shows that there is a space for improving the stitching process by using multiple constraints corner mapping algorithm.

V. FUTURE SCOPE

Finally this approach is developed which perform image stitching with the help user intervention. Its efficiency and correctness is largely dependent upon the user while selecting the control points. This approach has steps like selecting control points, image writing and blending. It facilitates the user to have a very wide range of image without using any expensive wide angle camera. This feature can be utilized for the better interpretation of the scene in the fields like media imagery etc. where angle of image capturing is constrained by other real life limitation. A good and efficient methodology is used for image stitching but still further improvement can be done in the specialized sub part. Some of the sub-part like image blending, image registration or interpolation can be more optimized and can be made efficient. Further addition can be done to this work by adding fully automatic image stitching in which there is no need for user to give the control points, is that case algorithm should be good enough to solve the problem. These all aspects of image stitching can extended.

VI. REFERENCES

[1] Ridhi Arora & Dr.Parvindar Singh," **Optimizing Image Stitching for Panoramic view"** International Journal of Engineering Research &Technology (IJERT) ISSN: 2278-0181 Vol.5 Issue 07, July 2016.

[2] Pranoti Kale & K.R Singh, **"Technical Analysis Of Image Stitching Algorithm** "International Journal of computer Science and Information Technologies, Vol.06 (1). ISSN: 284-288, 2015.

[3] Russel Abdelfattah, Dr.Haitham Omar, **"Automatic Seamless of Image Stitching"**, Computer Engineering and Intelligent System www.iiste.org ISSN 2222-1719 (paper) ISSN: 2222-2863 (Online) Vol.4, No .11, 2013.

[4] Manjusha P. Deshmukh & Udhav Bhosle, **"A Survey Of Image Registration",** International Journal Of Image Processing (IJIP), Vol. (5), Issue (3), 2011.

[5] Jiaya Jia, Member IEEE, and Chikeung Tang, **"Image Stitching Using Structure Deformation",** IEEE Transaction on Pattern Analysis And Machine Intelligence, Vol (7), No.2, 2007.

[6] Sudarshan B Divekar, **"Under Vehicle Surveillance System",** International .J .Computer Technology& Applications, Vol5 (2), 756-758, ISSN: 2229-6093, 2014.

[7] G.R. Licu ET. Al. … E. Sybingco, **"Image Stitching of Dissimilar Images",** 8th IEEE International Conference Humanoid, Nanotechnology, Information Technology, IEEE 9-12 December 2015 Water Front Hotel, Cebu, Philippines.

[8] A. Ebtsam, E. Mohammed, E. Hazem, **"Image Stitching based on Feature** Extraction Techniques", International Journal of Computer Applications (0975 – 8887) Volume 99– No.6, August 2014
.

[9] Vladan Rankov, Rosalind J. Locke, Richard J. Edens, Paul R. Barber, and Borivoj Voinovich**. "An algorithm for image stitching and blending".** In Proceedings of SPIE, pages 190 -199, 2005.