



IMPLEMENTATION OF IMAGE STITCHING PROCESS ON ANGLE ORIENTATION USING RASPBERRY PI

¹Dr. S.SYED AMEER ABBAS, ²S.ANUPRIYADHARSINI, ³P.DEEPANAYAKI
¹Associate Professor, ^{2,3}IV B.E (ECE), Mepco Schlenk Engineering College
Email: ¹abbas_mepco@yahoo.com, ²anusudandiram15@gmail.com

Abstract--This paper describes a technique to capture images of an object in 360 degree rotation and to stitch the obtained images and controlling it using an analog potentiometer with the help of ADC-IC 16F877A. With some modifications it can be used for detection purpose. Two images are captured at different intervals of the same object, with an overlap region viewed in both images. The image should be stitched to generate a mosaic image. The paper aims to produce a visually realistic mosaic images using stitching algorithm.

Keywords—acquisition of images, Fast Fourier Transform, image stitching, Potentiometer, Raspberry pi B+.

I INTRODUCTION

A series of pictures with overlapping regions are given and the output is one large image with all the pictures merged as accurately as possible. These stitched images increase the visual aesthetics of a scene. This stitching will be performed using point correspondences between the two images. This is performed using the shift property of the Fast Fourier Transform (FFT) for the rapid computation of correlations. Then the stitched images are moved using an analog potentiometer. A good image stitching will be overcoming both photometric inconsistencies and geometric misalignments between the stitched images

II SYSTEM MODEL

The system model used in this project is given in fig.1. The system model will explain the works applied in this project.

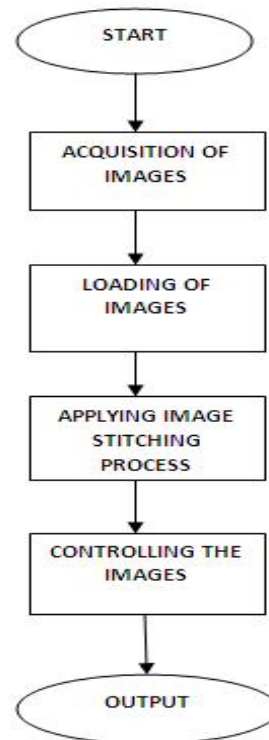


Fig.1.system model

There are four works applied such as acquiring the images, loading them in to Raspberry pi B+ kit through USB port, stitching together with the help of FFT. After getting the output, the images are controlled and moved with the help of an analog potentiometer.

III FIVE BASIC COMPONENTS

There are five basic components required to build image processing embedded system. They are Raspberry pi B+, OS, Analog potentiometer, Python and Image processing

IV RASPBERRY PI B+

There are several operating systems options like Linux (e.g. Raspbian), RISC OS, Free BSD, Net BSD, Plan9, Inferno and so on. The preferred one is Raspbian OS. Raspberry pi B+ is the advanced model board. It is of credit card size with Broadcom BCM2835 processor. It has 40 GPIO pins, 4 USB ports, SD card and a memory size of 512 MB. The fig.2 shows the kit model.



Fig.2 Raspberry pi B+ kit

V OPERATING SYSTEM

Operating system is the heart of the embedded system. Many dependencies that are required to run software are supported by the OS, the interface between hardware and the software. Here the chosen one is Raspbian OS.

VI ANALOG POTENTIOMETER

It is used to control the images. When the knob is rotated the images will be moving one by one. To control it the program is written using python.

VII PYTHON

Python is a general purpose high level programming language. It comprises of C and Java. Python emphasizes code reliability and accurate efficiency. Moreover it is easy to control Raspberry Pi using Python language

VIII IMAGE PROCESSING

Image processing is the important step in this project. For that selection of position and image acquisition method is the basic process. Acquiring the images of an object is the second step. After acquiring the images, they are loaded

into Raspberry pi through USB port. Then they are loaded using the *loadimage* function (The full path to the file that is needed), and the command "*showimage*" is used to display the image in the window passing in it the name of the window and the image variable. Then the RGB image is converted into a gray scale image. RGB colour model has 3 components red, green and blue. Gray scale has only one component that varies from 0-255. In this 0 represents black, 255 depicts white. The command *rgb2gray* converts an image from *rgb2gray* gray scale that is essential for image detection. The fig. 3 will show the processing method.

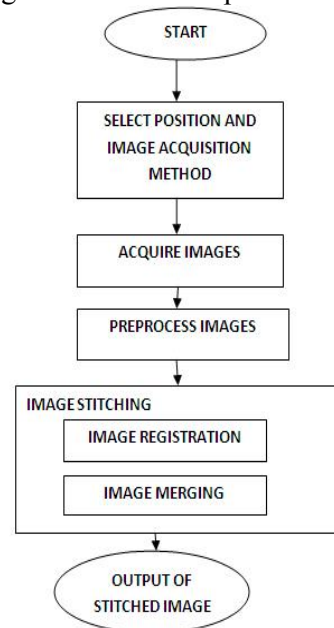


Fig3 Block diagram of stitching method

IX IMAGE REGISTRATION:

The goal of image registration is removal of image distortion according to some prior information. The spatial transformations constitute a basic mathematical tool for mapping and receiving distorted image into a correct system. The prior information about proper positions of pixels is often given by another picture of the same object taken from a different point of view. The curves describing the system need not to be linear. It is obvious that the shapes of the areas inside one image are different from the shapes of the same areas in the second one.

The result of application of spatial transformation to a distorted image $I(x, y)$ is a new image $J(\bar{x}, \bar{y})$, where every pixel (\bar{x}, \bar{y}) is evaluated by spatial transformation equations

$$\bar{x} = f(x, y) \quad (1)$$

$$\bar{y} = g(x, y) \quad (2)$$

Forms of functions, are given by the selected type of transformation. The function parameters are estimated from the selected set of points for which we know the position in the new image. This information is taken from comparison with the base image in the case of image registration

X IMAGE STITCHING - ALGORITHM STEPS

Import input images into python environment using command registration of the first image according to second image. The set of control points are selected using command *cpselect* for estimation of the parameters. These manually selected points are corrected using correlation analysis (command *cpcorr*). The vertical line has been selected in one image. The corresponding second image is found by means of correlation of lines colour profile. Then the final step is to join the selected parts of both the images into one

XI HARDWARE CONTROL

The kit is connected to a display using HDMI to VGA converter .The analog potentiometer is connected to the ADC IC 16F877A and the output from the IC is given to the kit. The program is written in LX terminal. The fig.4 depicts the opening page in which the Login and password are to be type



Fig.4 opening page of Raspberry pi

The command-*sudo nano filename.py* is to open the respective file. Then the program to control the potentiometer is written in it. The command-*sudo fbi-image* is used to display the particular image, where fbi is frame buffer image viewing. The controlling action is written inside a loop. GPIO pins are selected in the kit depending upon the number of images. Then the command *sudo python filename* is used to execute the required file. The following fig. 5 shows images controlled using a Potentiometer. The final aim is to create a time-lapse video, simply configure the Raspberry Pi with camera interface to take a picture at a regular interval or every minute then by using an application to stitch the pictures into video.



Fig.5 loaded images controlled by potentiometer
XII CONCLUSION

This paper explains the image processing embedded system using Raspberry pi B+kit which includes controlling the image processing output by a hardware. Further this project work can be extended for detecting an intruder in criminal case and in future it could find application in stitching of satellite images

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