Academic Writing

I did months of research for generating a depth video using a stereo-vision method using a Raspberry Pi module as my goal is to make a cheaper hardware which is less than 120 Euros for end users. I worked on three types of cameras Raspberry Pi, Fisheye and USB cameras.

I have some great findings during my research which has been stated below for each and every cameras: -

Cameras	Depth Image	Video Dimension	Frame Rates Per Second
Pi cameras	Better depth video then Fisheye Cameras	640x480	Four
Fisheye cameras	Poor results when compare it to both fisheye cameras as well as USB cameras	640x480	Less than one frame rates per second.
USB camera	Better depth video then both fisheye camera as well as Pi cameras	768x432	Two

Table No.1

As it can be seen from the above table frames per second achieved in each and every camera is not more than four frames per second it is due to Raspberry Pi is not powerful.

USB camera has two fps but the quality of depth video is far much better than other camera which is shown in Image.1.
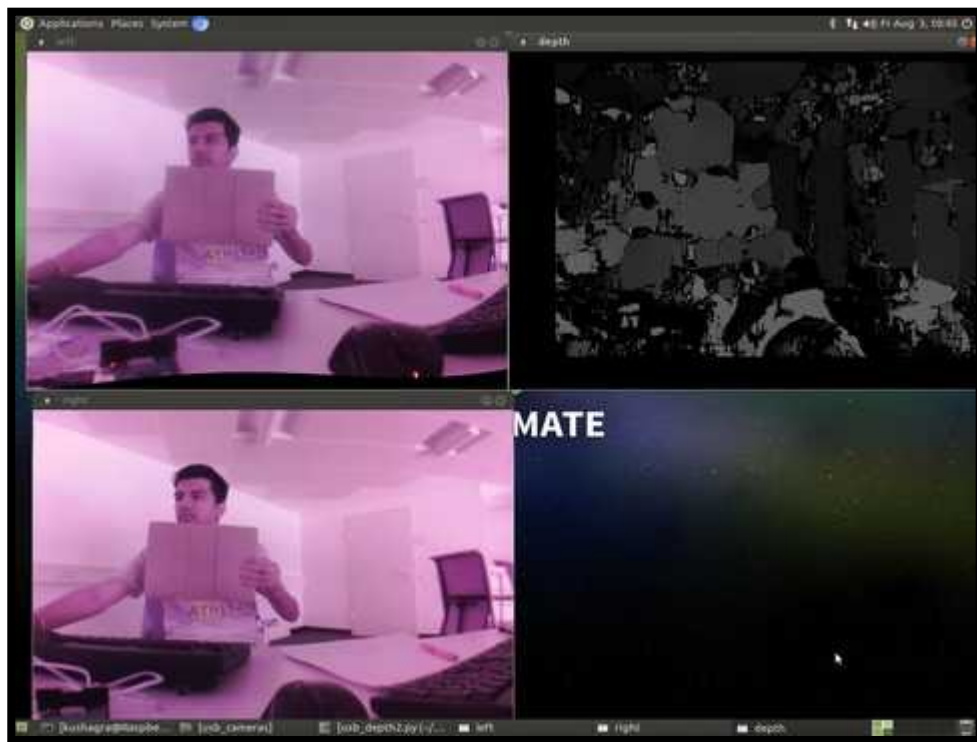

Image.1 Depth Image using USB cameras by using stereo-vision method

As it can be seen from the image1. object nearer to the camera is brighter than the object which is not.

Image2. Depth image using Raspberry Pi cameras

Image 2. shows the result achieved from Raspberry Pi camera as the quality of depth video is not good as USB camera as it has noises in depth videos but pretty good result has been achieved with raspberry pi cameras by looking at the cost to quality of the cameras.

Three different cameras have been tried. Raspberry Pi camera (Rpi camera module V2), Fisheye cameras (Waveshare Rpi H) & USB cameras (Delock USB camera) with Raspberry Pi 3B+ and Raspberry Pi compute module 3 lite. The best result is given by USB cameras with Raspberry Pi because it provides better depth video then remaining cameras like Fisheye cameras as well as Pi cameras and video dimension is also very large after camera calibration as compared to other options which is 768×432 which is the standard dimension to get a good field of view of the **surroundings but only two frame rates per second** is achieved. Although, good depth image ensures a high level of detail could be captured by this camera. As this project is being developed in Python & OpenCV it ensures that it could be possible to make a cheap hardware platform for fall detection system with a fine performance as the whole system cost around less than 120 Euros.

Hence, by this research it is proved that a good depth video can be generated with cheaper hardware by using stereo-vision method and to increase the efficiency and to increase the number of frames we need a powerful processor.