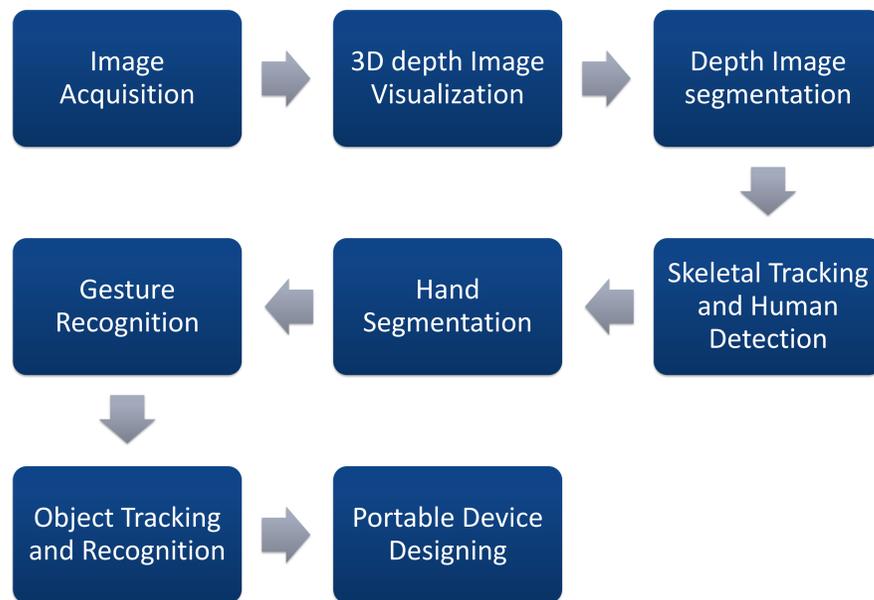


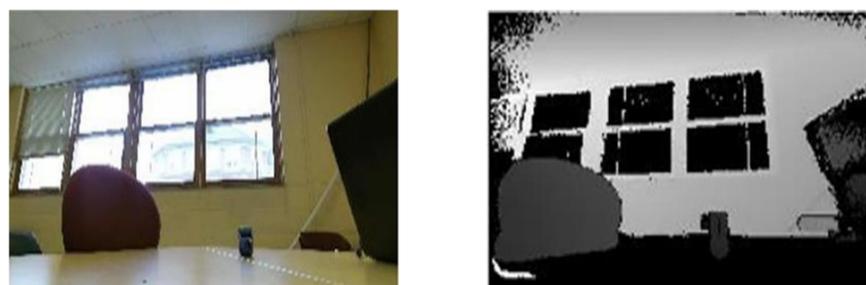
Introduction

- The widespread emergence of human interactive systems has led to the development of portable 3D depth perception cameras.
- In the current work, we aim to design a system which would prove invaluable to autonomous surveillance applications, where persons carrying any forbidden and dangerous objects are detected in real-time.

System Architecture



Input Data Acquisition

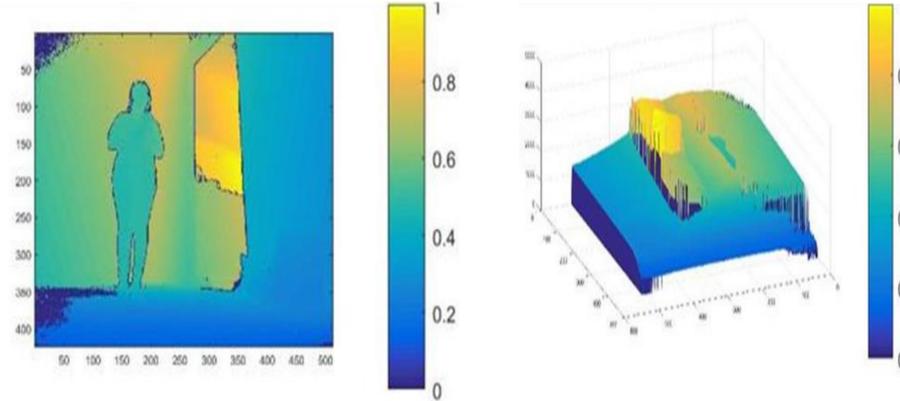


1(a)

1(b)

Figure 1: 1(a) RGB image and 1(b) Depth image

Image Segmentation And Analysis



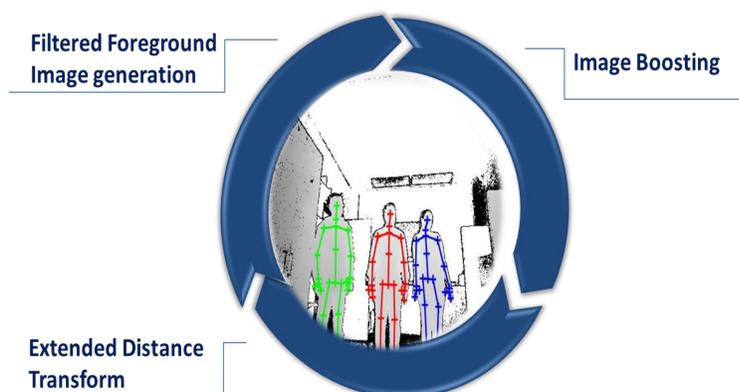
2(a)

2(b)

Figure 2: 2(a) 2D depth visualization and 2(b) 3D depth visualization

- A depth image is generated in this system for every 100 frames.
- It is segmented into various colors based on the minimum and maximum depth values.

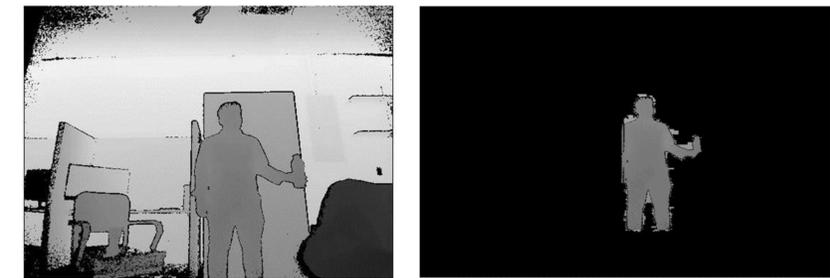
Skeletal Tracking Process



- The depth image is passed through a threshold to extract its foreground
- The skeleton outline of a human is represented by 25 joint points
- Later for the detection of the hand the centroid coordinate of hand is obtained from the skeletal model.

Object Recognition Framework

- The object in the human hand is recognized based on the extraction of feature points and the depth gradients.
- For evaluating the surveillance capability, various test objects are placed in the database.



3(a)

3(b)

Figure 3: 3(a) Initial depth image with object and 3(b) Extracted output image

Experimental Results

- This portable system is capable of providing autonomous surveillance in indoor real-world environments. It can be further extended for autonomous navigation of the humanoid robots, drones and self driving cars.



Figure 4: Output image with detected objects

Acknowledgements

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