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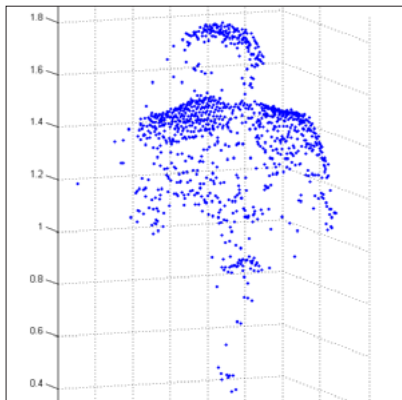


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People Tracking System

People Tracking using two Time-of-Flight cameras

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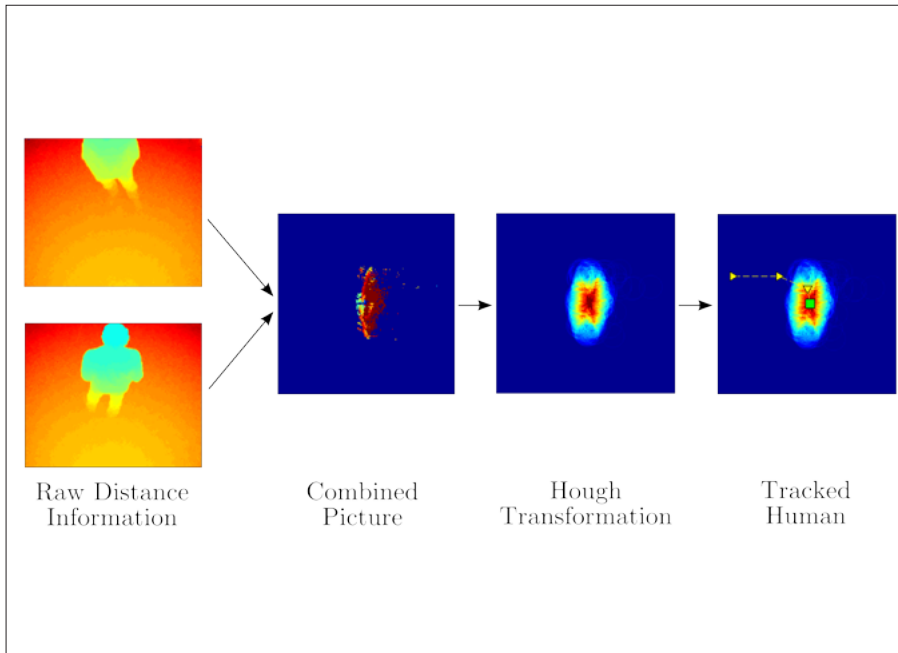
Human as 3D representation

Time-of-Flight (ToF) based cameras allow a three dimensional (3D) representation of the field of view to be reproduced. For each pixel in the ToF image the camera provides information on the distance between the camera and the object. According to this information it is possible to identify objects by their shape.

The purpose of this work was to identify objects as humans, track their movement in the field of view and count them according their track.

The main steps to achieve this where the following:

- Separating moving objects from the static background. This involves an infinite impulse response (IIR) filter to adapt changes of the background.
- Merge the two separate pictures into one to obtain a 3D representation.
- Search and identify objects as humans. The foreground objects are transformed using Hough-Circle-Transformation. Hence each object is compared with a circle. A located circle should represent a human's head. In addition, for each



The main steps to track a person

located “head” the shoulders are searched for. The goal of this part is to estimate the human's centre point.

- Due to the fact that human motions are limited by physical laws, the centre points were tracked using a physical model. This gives the opportunity to separate them spatial and temporally. Thus they can be tracked frame by frame.
- Finally the people are counted according to their entry and leaving point in the field of view.

This thesis has shown that identifying objects can be simplified by using currently available Time-of-Flight cameras. Tracking is easy with reliable object detection and people were counted when they passed the experimental setup.

The setup includes two SR4000 Time-of-Flight cameras from Mesa Imaging and software, implemented in Matlab.