

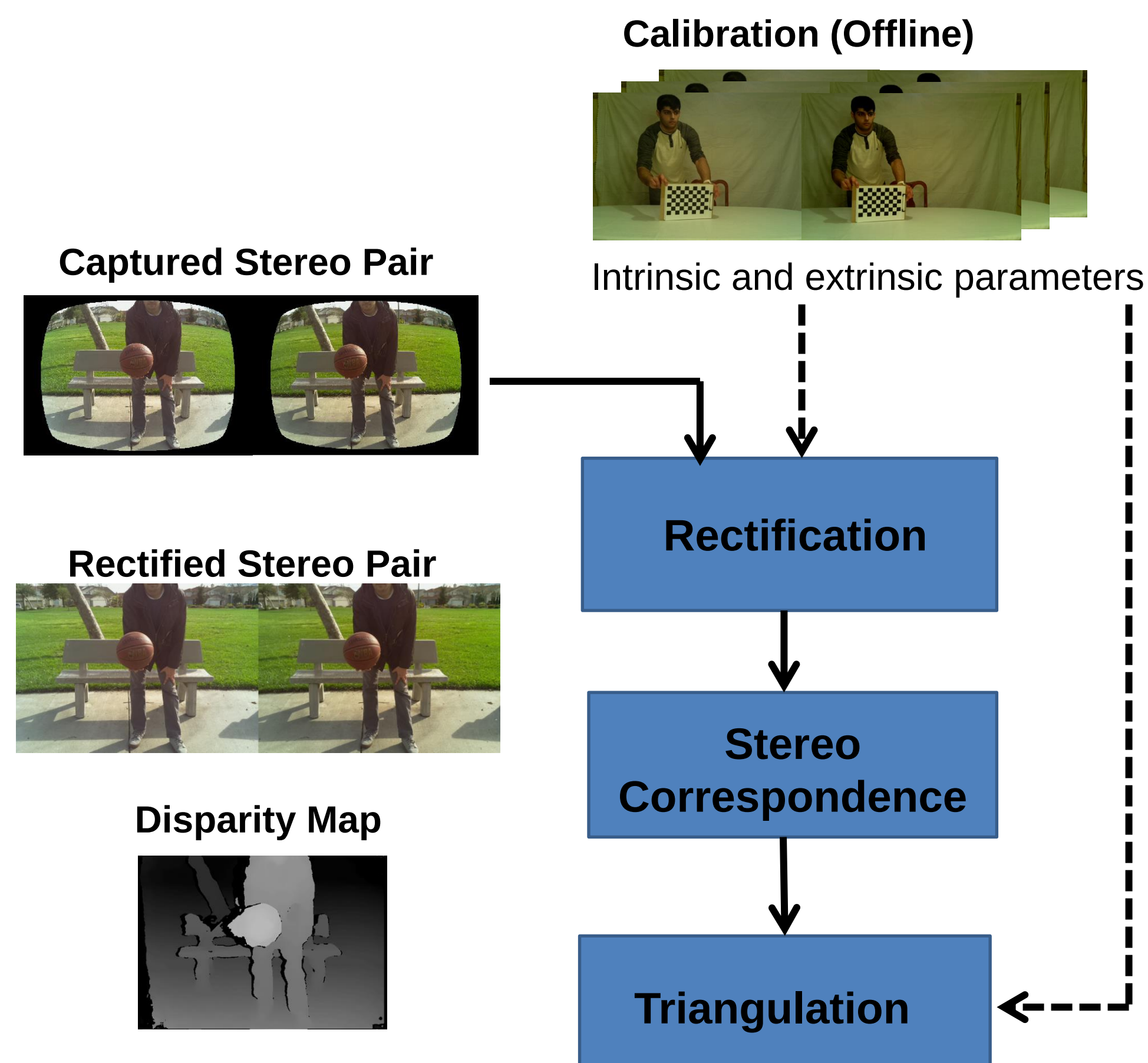
Stereo Pi : Portable Digital Stereo Camera

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Motivation

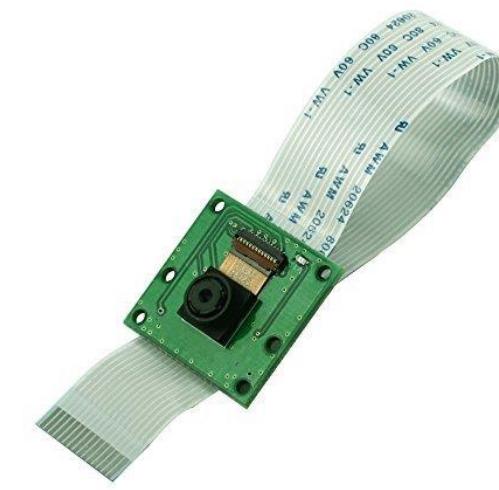
Depth imaging has become an increasingly popular field in research and consumer electronics over the past decade. Consumer products such as the Microsoft Kinect and Oculus Rift have made the capture and display of three dimensional information available for applications such as robotics, gaming, and surveillance. One such depth imaging method, stereoscopy, has existed as early as the 1950s. Although stereo cameras have existed for many years using film, there are few digital stereo cameras available. This project aims to build a portable, digital stereo camera using commercial, off the shelf electronics.

Processing Steps



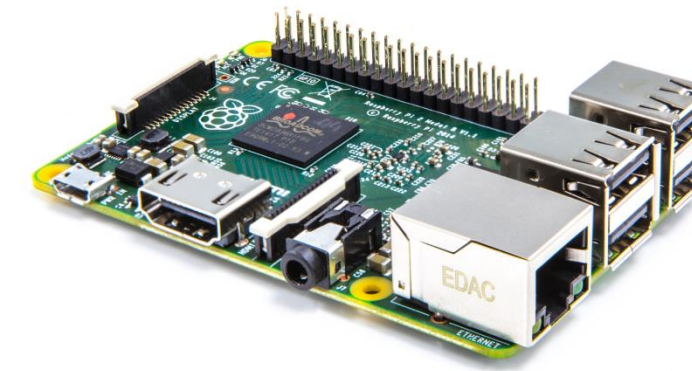
Hardware Components

OmniVision OV5647



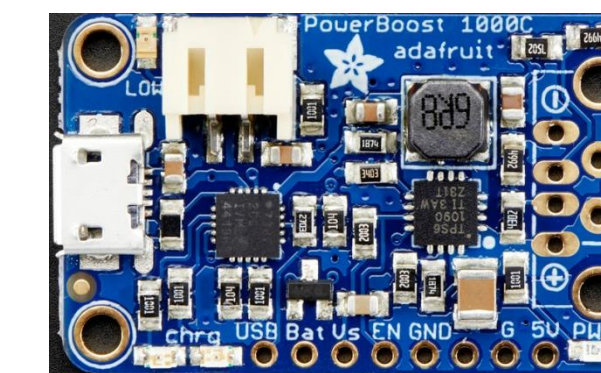
- 5 MP sensor, 1.4 μ m pixel size with onboard fixed focus lens
- 2592 x 1944 max picture resolution, 1080p 30fps max video resolution
- Connected to Raspberry Pi via CSI interface

Raspberry Pi 2

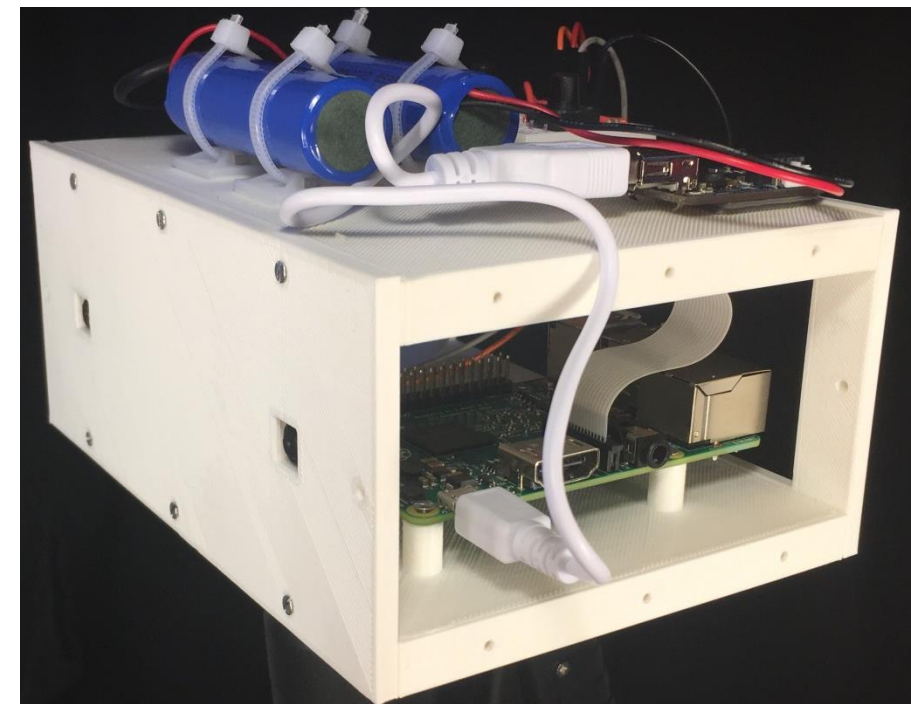


- 900MHz quad-core ARM Cortex –A7 CPU running Debian Linux
- 1 GB RAM
- 40 GPIO pins, CSI camera interface, and Ethernet port for data transfer

Adafruit PowerBoost 1000C

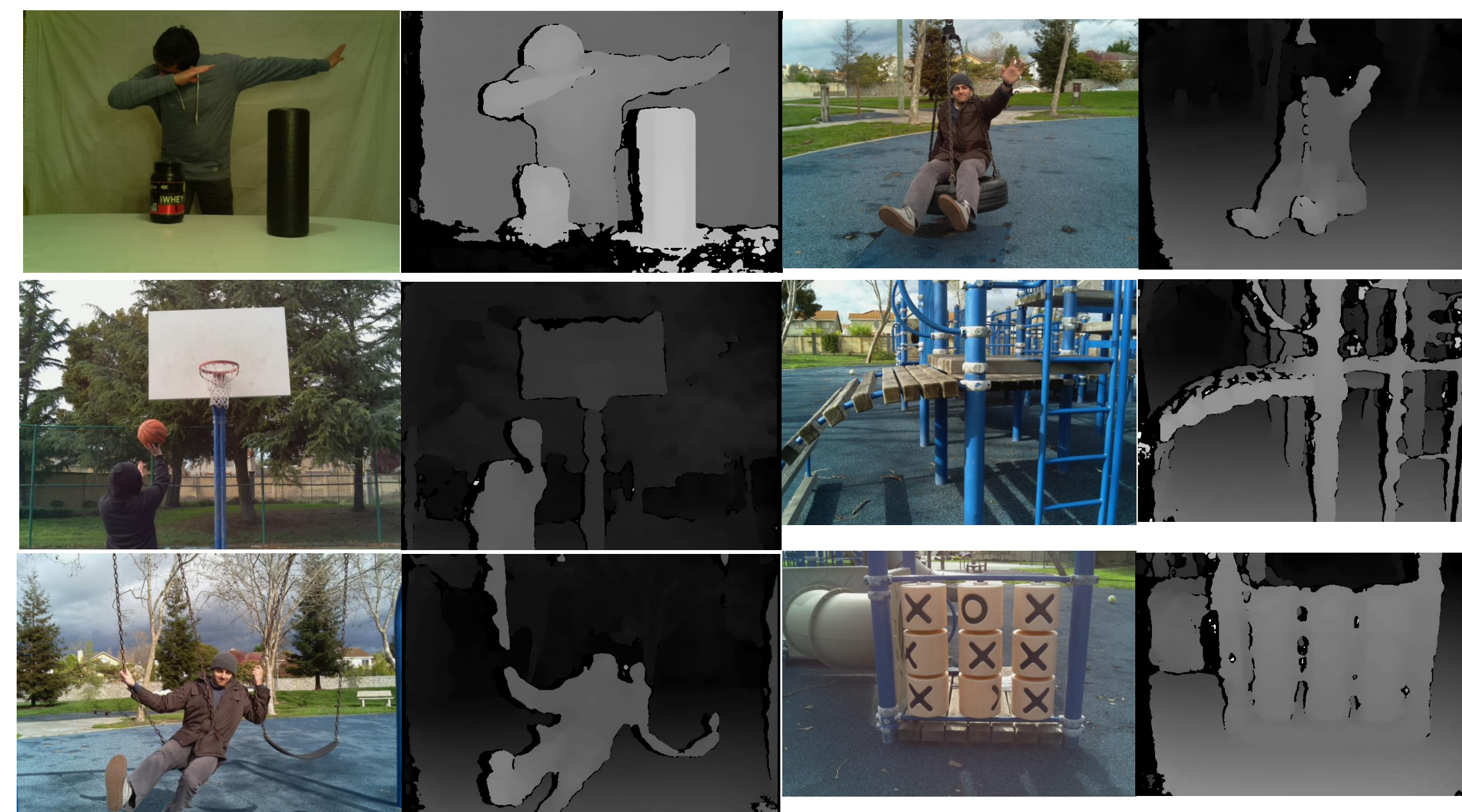


- DC/DC boost converter with 3.7V input and 5V output
- External ON/OFF switch and USB plug added
- 3.7V 2200 mAh Lithium-ion battery powers each Raspberry Pi



- Camera baseline = 10 cm
- Enclosure 3D printed with PLA filament using MakerBot Replicator 2

Experimental Results



- Viola Jones face detection algorithm used to detect person in image
- Pixel coordinates converted to real world coordinates to determine physical distance from camera

