# Hyperspectral 3D Photogrammetry

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## BACKGROUND

Photogrammetry is the technology of extracting 3D information from photographs of objects and the environment. [1] In medicine, photogrammetry is mainly used for measuring the human body for the planning and monitoring of treatment, but most relative devices occupy a large space and are complex to operate.
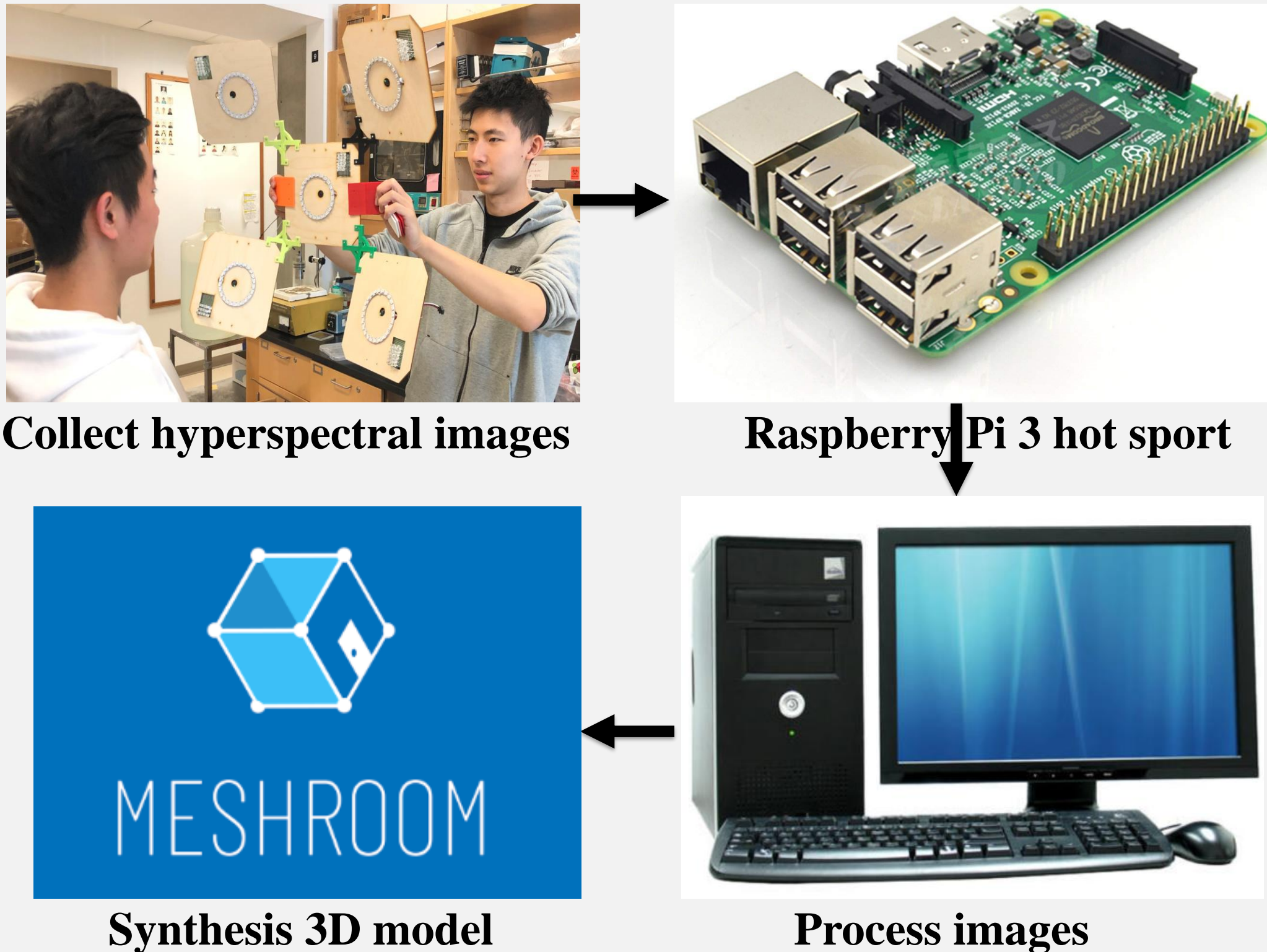
[2] Photogrammetry device

## GOAL

Our project is a portable and rotatable device that takes photos of human faces from different perspectives under different wavelengths of light, and then synthesizes all photos to reconstruct the 3D models. The final goal is to detect patients' physiological states such as blood pressure from the 3D models to judge the user's healthy degree.

## MATERIALS

- **Five Pi 0s**
- **Five Cameras**
- **Five Wooden Boards**
- **Five PCB Boards**
- **Five LED**
- **Five Infrared Lights**
- **Pi 3**
- **Motor**
- **Handle**
- **3D Printed Hinges**
- **3D Printed Interconnecting Pieces**

## DIGRAM



Collect hyperspectral images

Raspberry Pi 3 hot sport

Synthesis 3D model

Process images

**Step 1:** Pi 0 cameras collect hyperspectral image data from human faces.

**Step 2:** Pi 3 creates hotspot for Pi 0s to transfer image data.

**Step 3:** Image data is transfer from Pi 0s to PC

**Step 4:** PC uses Meshroom to build 3D model

## REFERENCE

[1] Whole30 Success Story, "Janet W. and Chronic Urticaria (Hives)" https://whole30.com/whole30-success-story-hives/
[2] Pixellighteffects, "How it works", https://pixellighteffects.com/why-use-photogrammetry/

## MILESTONE

| Week | Task |
| --- | --- |
| 1-2 | Design smaller camera boards and new hinges |
| 3-4 | Assemble cameras, PCB IR, and LEDs Design motor supporting pieces |
| 5-6 | Image and data transfer, test Windows Meshroom |
| 7-8 | Set up motor, refine device potability and rotatability |
| 9-10 | General device test, compare 3D model quality |

## CHALLENGES & FUTURE WORK

**Challenges:**
- Coordinate 9 pi0s with one pi3
- Auto-connect pi0s with pi3
- Make the device portable and rotatable

**Future Work:**
- Design and 3D print motor supporting and interconnecting piece.
- Combine codes in one module.