

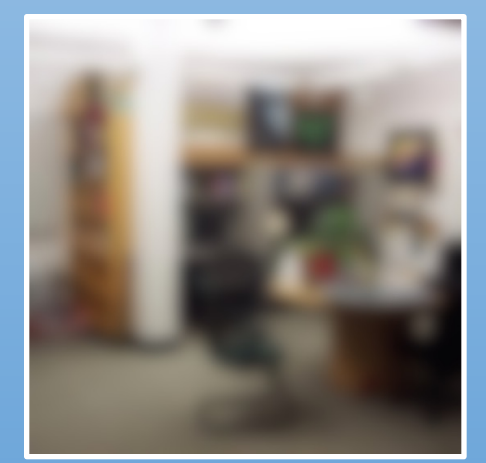
# Counting Faces: Computer Vision and Privacy Application for Visually Impaired Persons

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## People with Visual Impairment



How would you **protect** your **privacy**, if you could only see this **clearly**?

- In the United States alone, **over 8 million** people are **visually impaired**
- Does not need to be **blind**
- May suffer from **low-vision**
- May suffer from **limited range** of vision

They have the **same privacy concerns** as you and I

## Addressing Privacy Concern

All these **privacy concerns** share a **common issue: Visually Impaired Persons** are often ignorant of the number of people surrounding them.



This project addresses this issue, and the goal is to build a system that is:

- Low-power
- Inexpensive
- Supports open software tools and applications
- Direct access to input/output pins which allow you to interface with electronic components, modules, and USB devices

## BeagleBone Project Flow Chart

**IR Sensor**  
Detect Motion

Trigger HD Camera

**HD Camera**  
Takes Image

**Image Processing**

Determine Number of Faces

## Code Output

```
Camera opening...
Image has been captured!
Image has been written as imagetest.jpg
Image before processing...
processing image: /root/Desktop/imagetest.jpg
Number of faces detected: 2
Calling LedIndicator Function...
Process completed!
```

Sample code output when two faces are detected

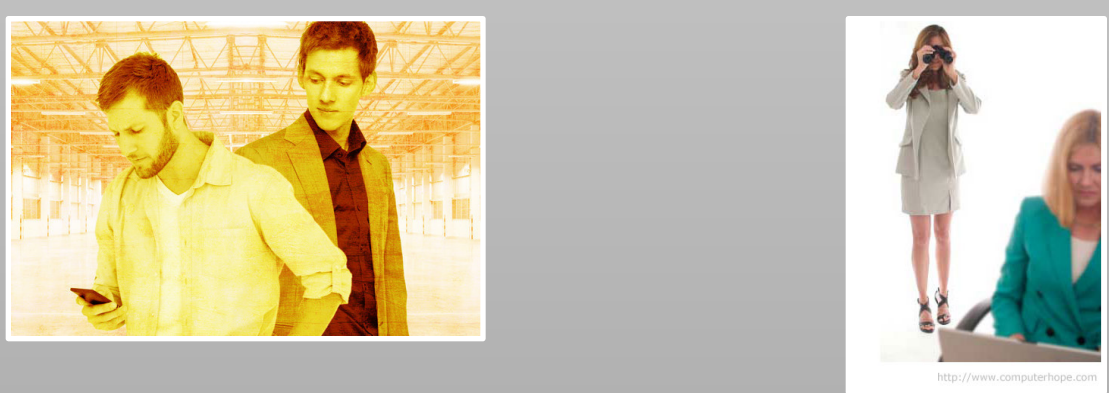
## Future Work

Evaluation

Determine if someone in image captured is "known" or a stranger

## Privacy Concerns

Shoulder Surfing



Device Security



Eavesdropping



## Hardware System



BeagleBone Black



Panasonic GridEYE IR Sensor



Logitech C920 Webcam

We developed a system that will inform a **visually impaired person** how many people are around them, utilizing a **BeagleBone Black**. Our system uses an **infrared camera** to **detect** the presence of an individual based on **body temperature** and an **HD camera** to **capture** an image. The image is then processed and the number of faces in the captured image is specified.

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