Cost Effective People Counting Infrastructure

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MOTIVATION

The COVID-19 pandemic identified a lack of autonomous footfall tracking solutions which include these key features:

- Cost-effective and scalable
- Flexible
- Open Source

SOLUTION OVERVIEW

PEOPLE COUNTING DEVICE

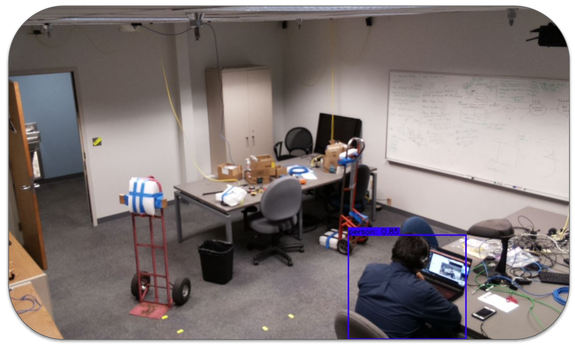
A real time object recognition model (YOLOv4) is used to count the number of people in the images taken by the device. These counts are then formatted and sent to our web application .

WEB APPLICATION

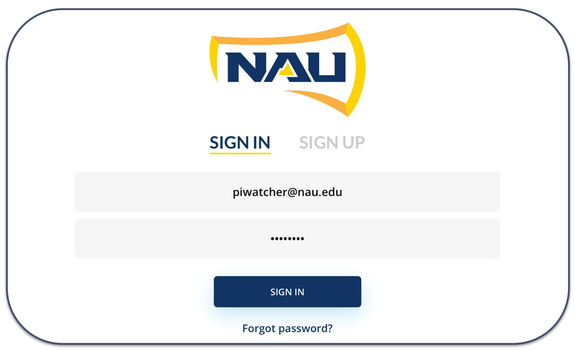
A full stack web application is used to display the recorded counts and their timestamps in real time. A user management system dictates viewable data according to assigned roles and their permissions.

ARCHITECTURE

Raspberry Pi - Image capturing and processing



Server - Web Application and Data storage



KEY FEATURES

- Autonomous people detection capabilities
- Full-stack analytics dashboard
- User management system

OUTCOMES

- Provides NAU with useful business metrics
- Inexpensive people counting infrastructure
- Interactive graphs to view and download metrics provided

TECHNOLOGIES

- Tensorflow - Image recognition software
- OpenCV - Computer Vision Library
- Python - Core coding language
- React - Server for the web application
- Flask - Application programming interface
- MongoDB - JSON Data Storage
- Raspberry Pi - IoT Device for counting people

FUTURE WORK

- Integration of central authentication service (CAS)
- Leverage Raspberry Pi devices to train a model for more accurate counts
- Expand current role management system