WEEK 10

ROBOTIC IOT SMARTSPACE TESTBED

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How do we create scene inferences from sensor data?
What is an IoT?

- IoT - Internet of Things
  - Network composed of multiple devices which communicate with each other
Project Overview

Goal: Create an **IoT Testbed** from sensors

Train neural network about human actions

1. Recognize **predetermined set of activities** in office
2. Communicate using **zero-shot/few-shot** recognition
3. Create **narrative** about space

Create a website with sensor data & robot access
Hardware

MAESTROS

Custom multi-modal sensor
- Temperature, RGB value, audio, etc.

Raspberry Pi
Model 3B + & Raspberry Pi OS Lite (Legacy)

Camera
Data used to label human actions & speech
- Email sender
- Appointment form compatibility for robot
- Interactive grid
  - Name, online status, real-time sensor data
Database Architecture

1. Server: **Ambisense**, User: “**lambda**”

2. Contains **smartbox** database where MAESTROs’ send information

3. Data accessed with **Jupyter Notebook**, visualized on web page
● Protocol that synchronize clocks throughout computer network
● Connected sensor data to the camera input
● Sent to database within nanosecond scale
Coordinate System

- Upgraded version of coordinate system on website
- MAESTROs placed based on:
  - Predetermined activities
  - Outlets
Unity/Robotics

1. Avatar that mirrors webcam feed
2. VR Pick-up demo
3. First-Person Point Cloud Navigator
Facial recognition

Distance to camera

1.77ft 1.75ft 1.41ft

# of faces: 22
Neural Networks
Future Work

1. Hardware for PTP:
   ○ TimeCard mini Platinum Edition from OCP-TAP
2. Set up Maestros/Cameras in coordinate grid
   ● Data collection/labelling
   ● LIDAR Robot ?
3. Automatic labelling: Label activity using natural language descriptions of video data
4. Bridge gap between sensor-to-text