



Andrew Braun, Binu Nair, Chen Cui, Paheding Sidike, Solomon Duning, Theus Aspiras, Yakov Diskin

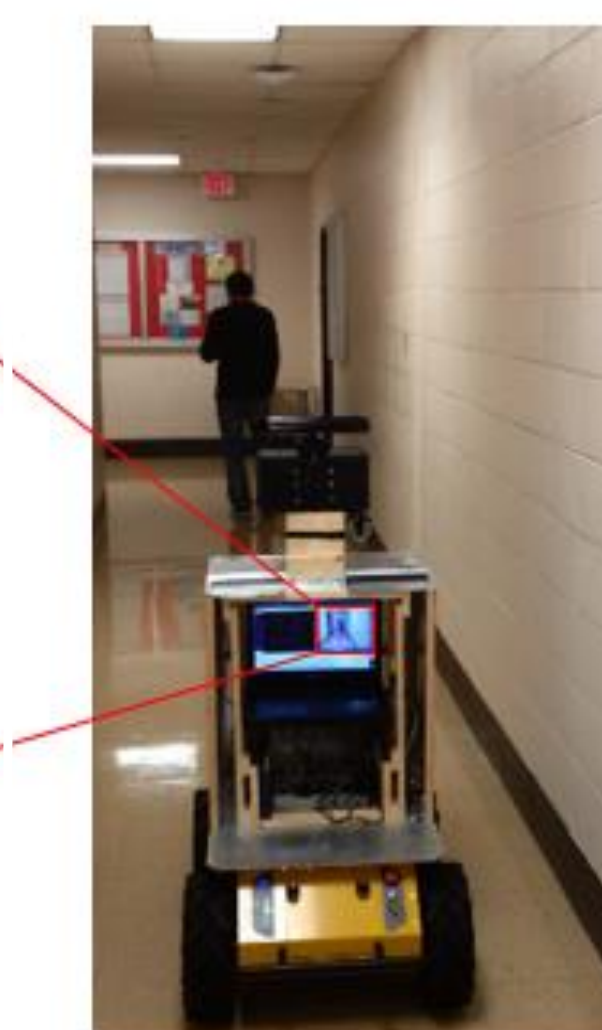
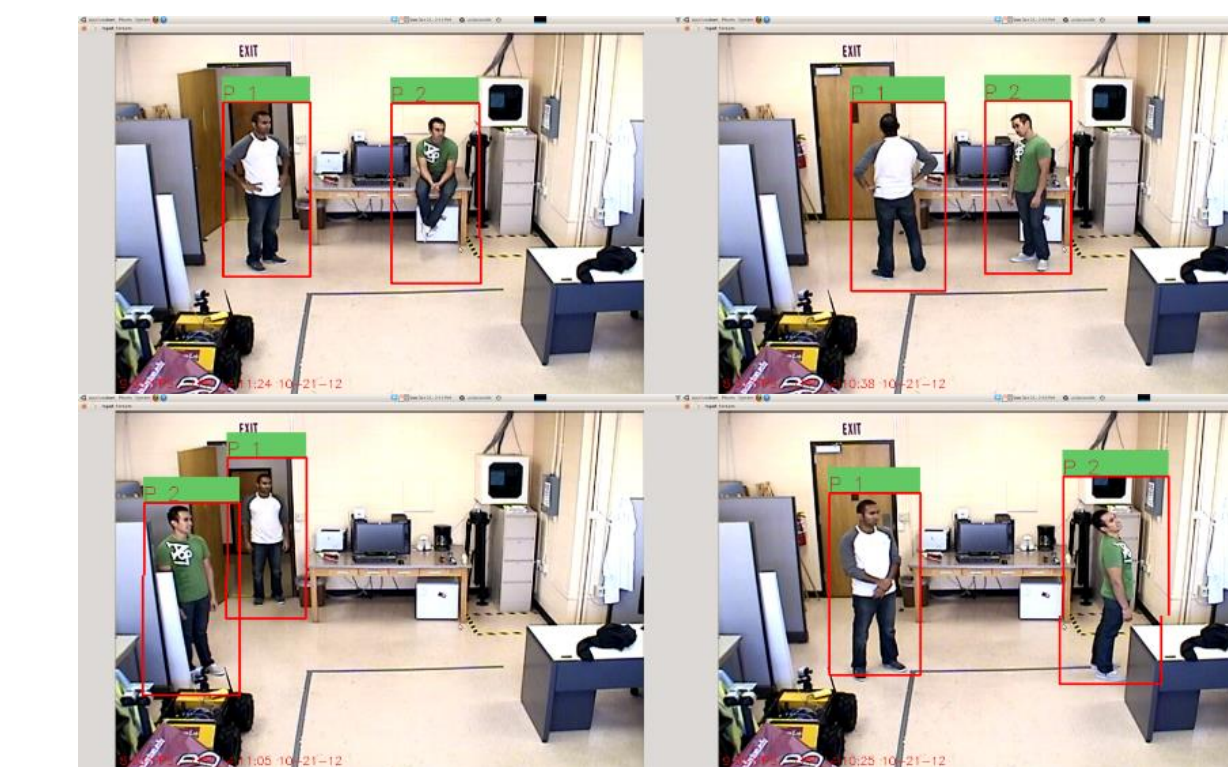
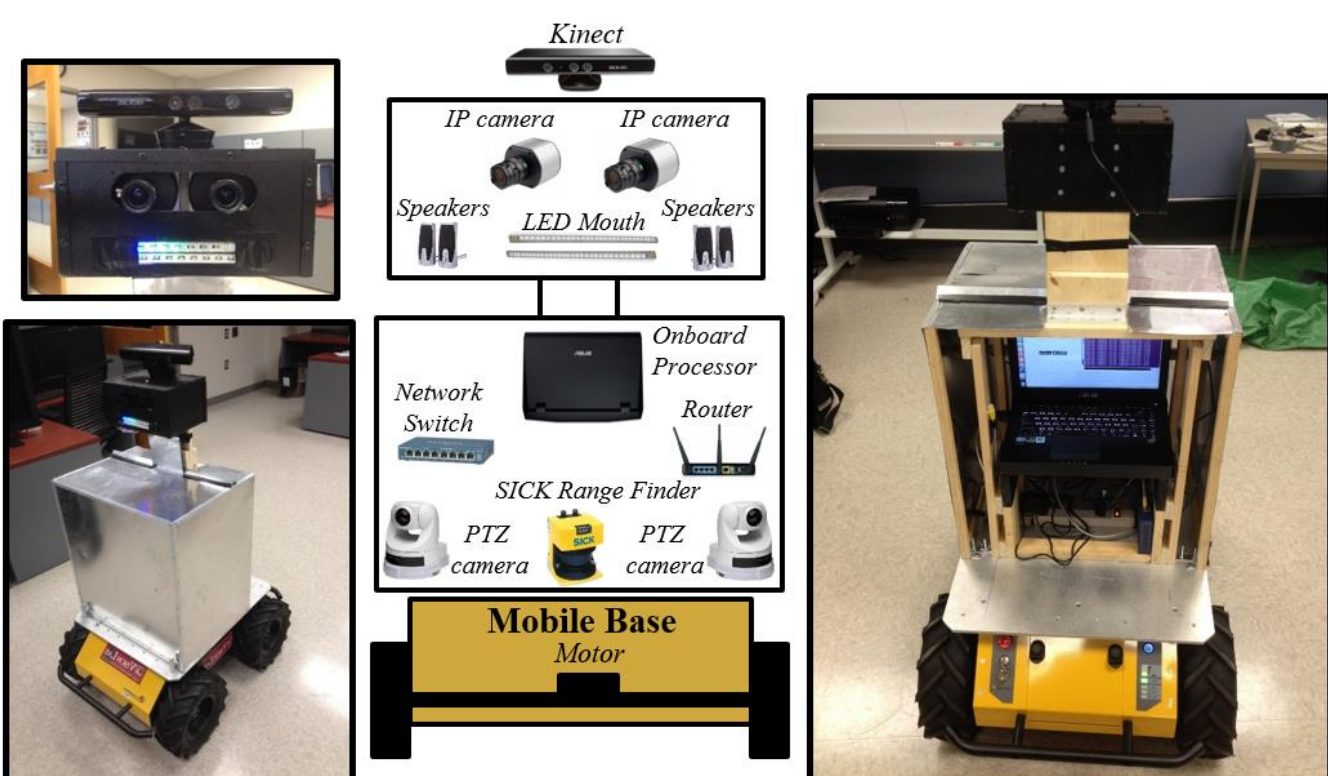
The Robust Artificial Intelligence-based Defense Electro Robot (RAIDER)

What is the RAIDER?

The Robust Artificial Intelligence-based Defense Electro Robot

is an autonomous Unmanned Ground Vehicle (UGV)
Robotic Base: The Husky A200 from Clearpath Robotics

- Base Equipment:
 - Network Router
 - 2 Arecont IP Cameras
 - Microsoft Kinect
 - Onboard Processor
 - 2 Axis PTZ Base Cameras
 - Vocalization Speakers



What Can It Do?

Multiple Modalities of Surveillance

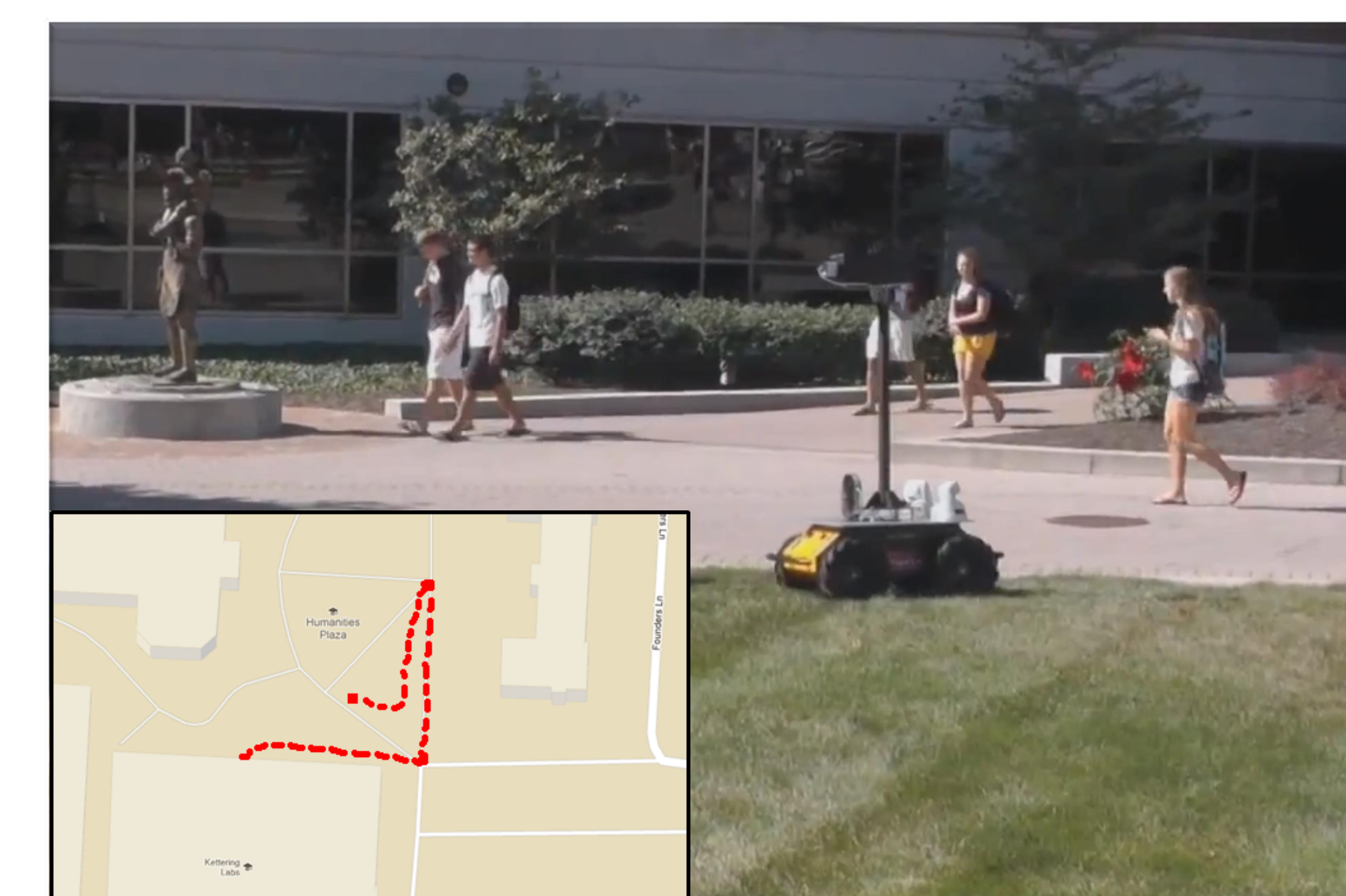
- Face Detection and Recognition
- Human Body Detection and Recognition
- Iris Identification of Individuals
- Detection of Changes to the Scene
- Human Activity and Action Recognition

Autonomous Navigation

- Following a Person of Interest
- Avoidance of Obstacles
- Reaction to Changes in the Scene

Scene Visibility and Understanding

- 3D Scene Reconstruction
- Ability to perform in multiple variations of weather, lighting and terrains

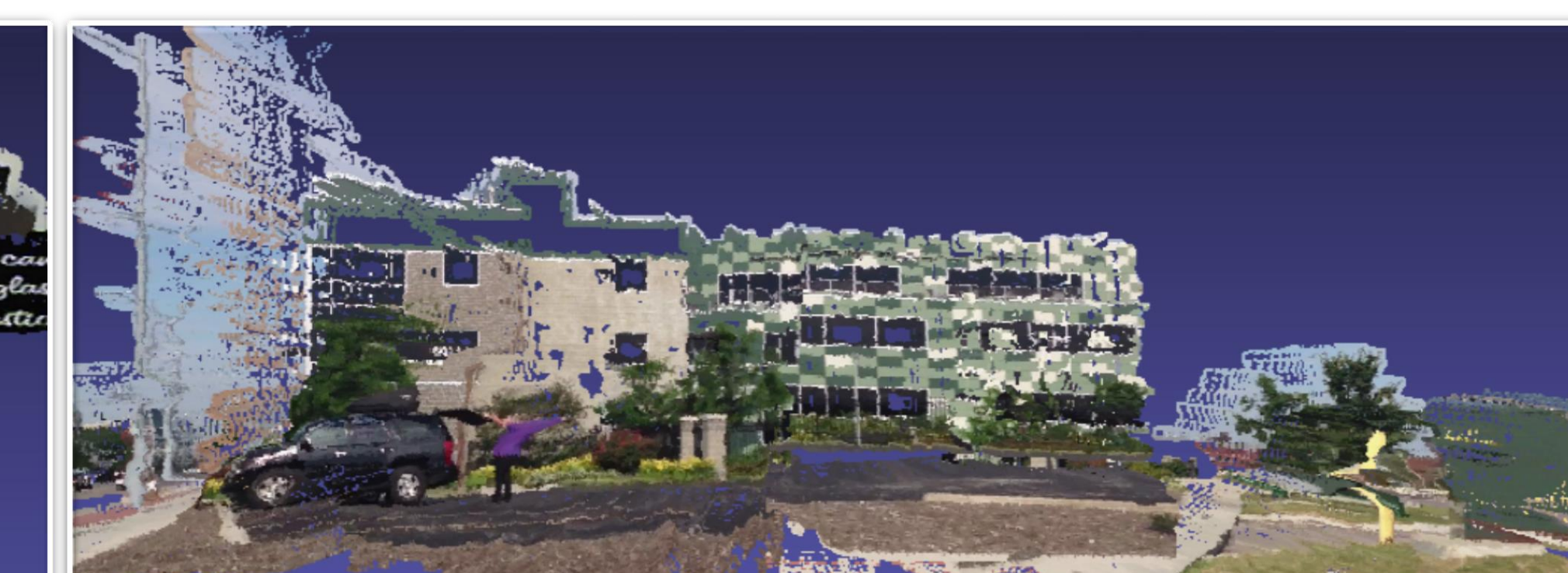
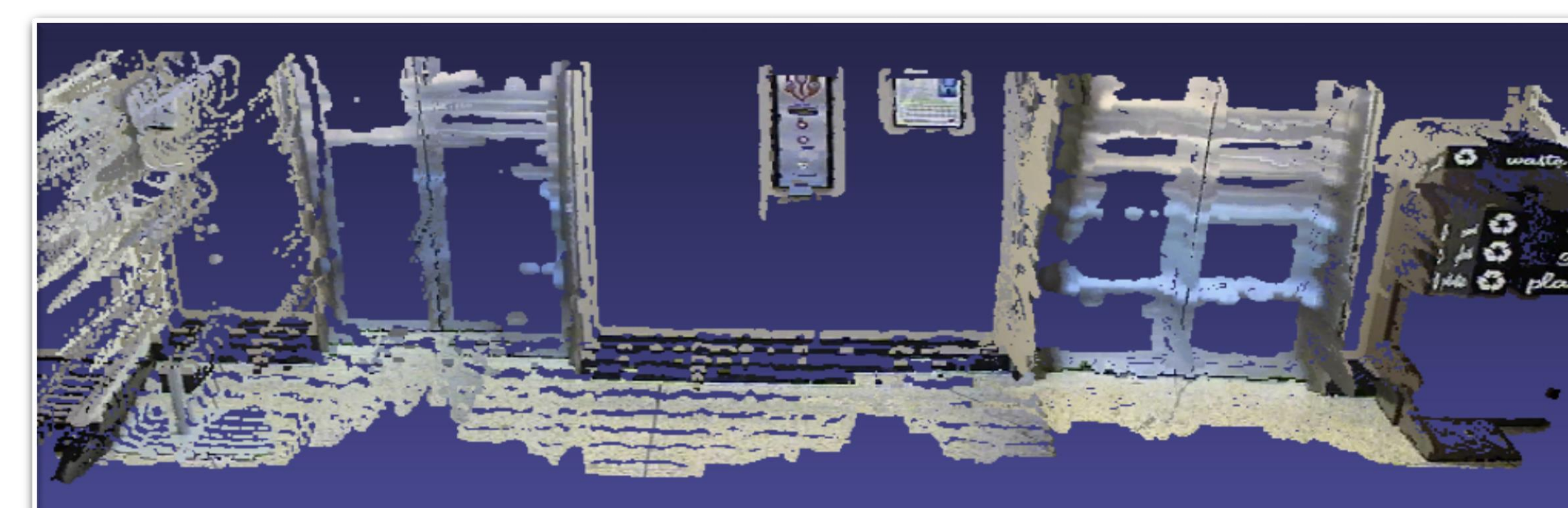


Autonomous Navigation

- Autonomous control signals from computer vision algorithms
- Challenges:
 - Vision-based Depth estimations
 - "Remembering" scene
 - Obstacle avoidance
 - Stationary
 - Moving
 - Optimal Path Selection

3D Scene Reconstruction

- In order to be able to navigate itself, the RAIDER relies on accurate 3D reconstruction to understand the depths and remember the surrounding environment.



System Hardware Design

- Control Processing
 - Automatic Detection, Recognition and Tracking image processing algorithms determine the direction and speed of the Robot
- Robot Onboard Processing
 - Network Trafficking and Communication among all IP cameras
 - Robot Operating System
 - Ethernet – RS232 Convertor of Robot Control Signals

Modalities of Surveillance

- Flag a Person of Interest
 - Body Detection/Recognition
 - Flag Suspicious Human Activity
 - Pose Invariant Face Detection/Recognition
 - Iris Recognition

