A Light, Accurate, Inexpensive, and Easy to Implement Indoor Localization System.

Mark Woodward

Goal:

➲ Localization System

➲ Requirements:
  - Light
  - Accurate
  - Inexpensive
  - Easy to Implement

➲ Assumptions
  - Flat uniform ground plane

Approach:
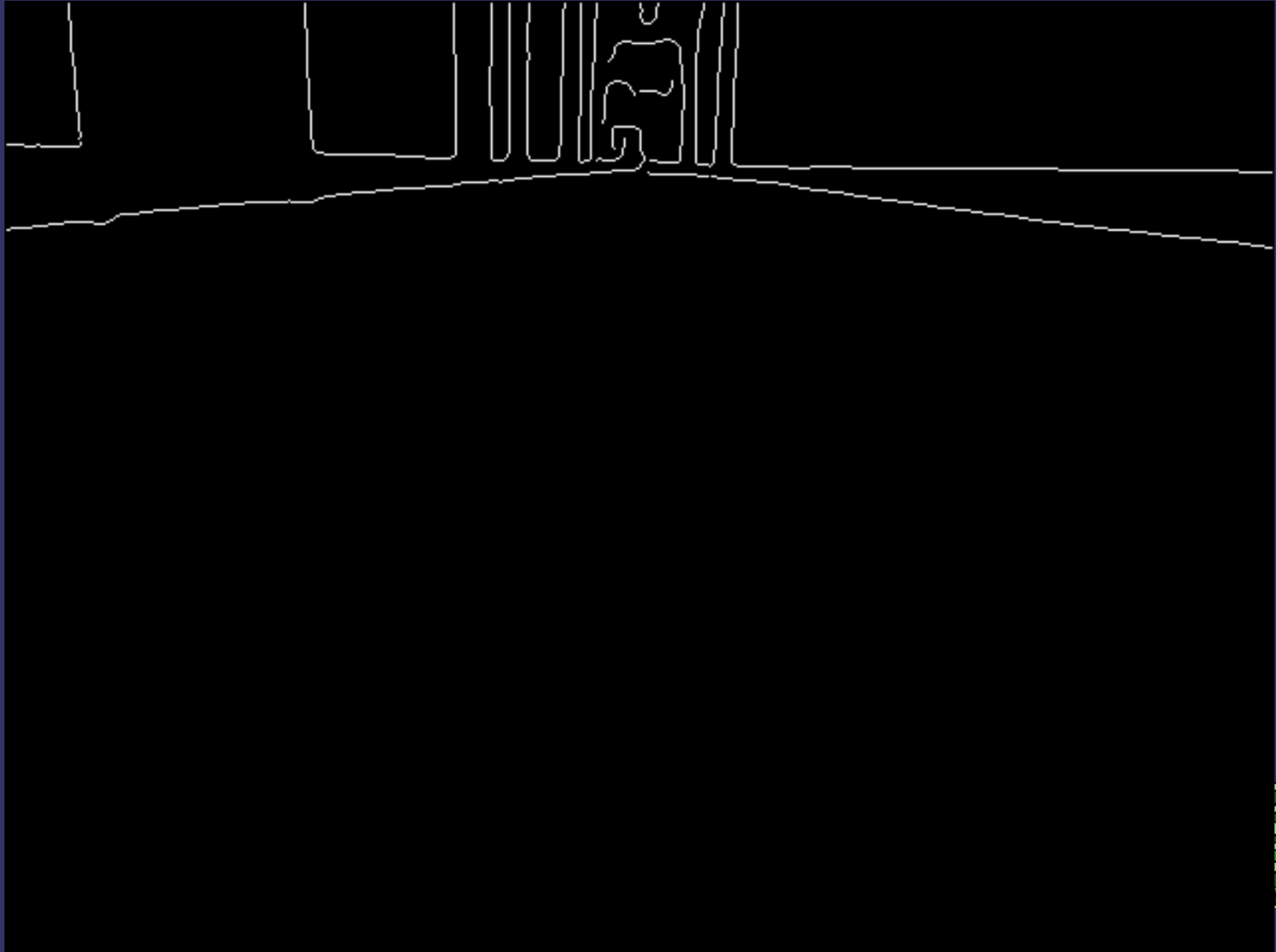
- ➲ Overview
  - – Video camera
  - – Canny edge detector
  - – Extract nearest edge as a wall
  - – Project onto flat ground plane
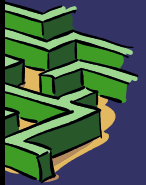 - – Use Projections as range estimates
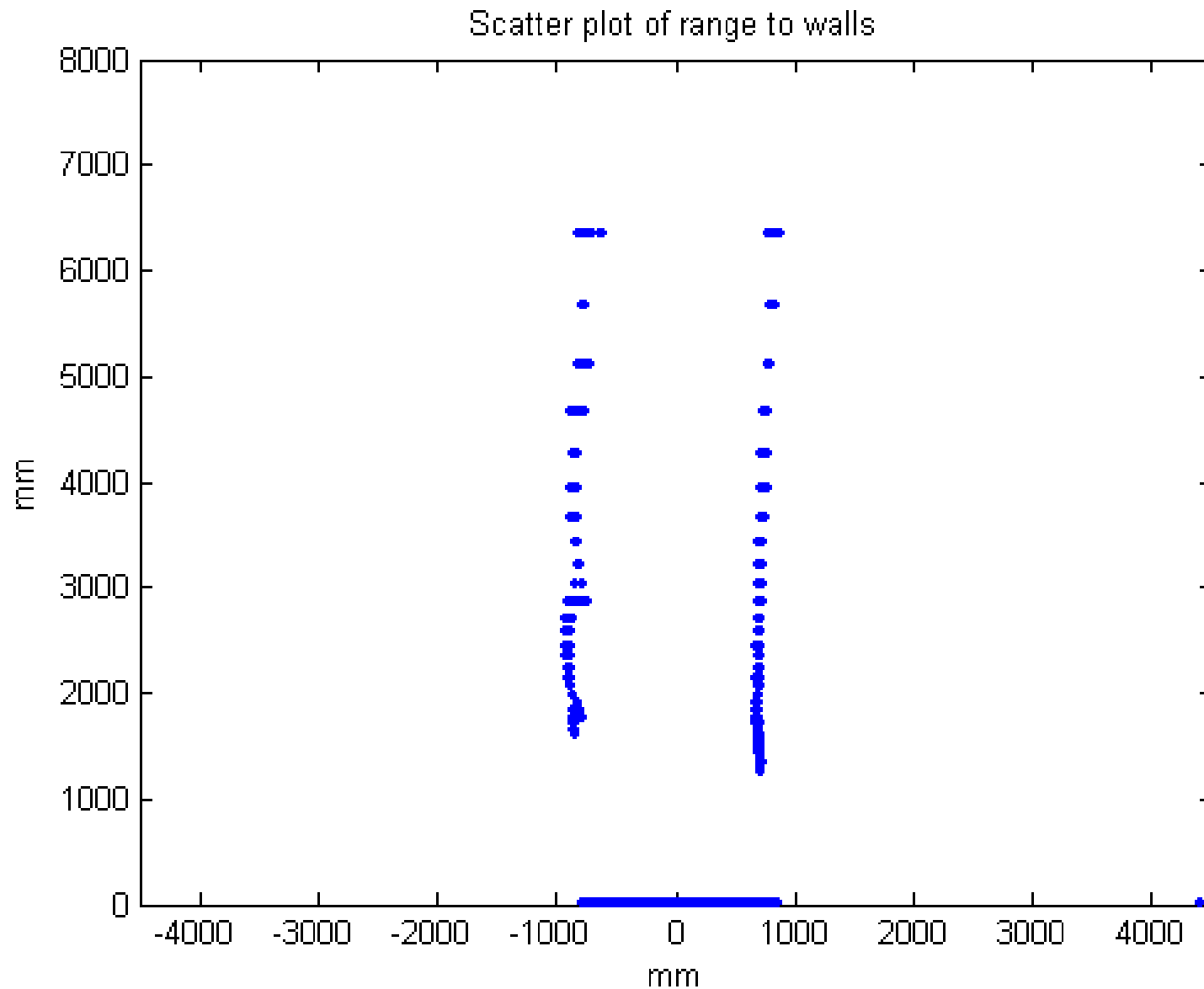 - – Run Monte Carlo Localization (MCL)

Approach (cntd):

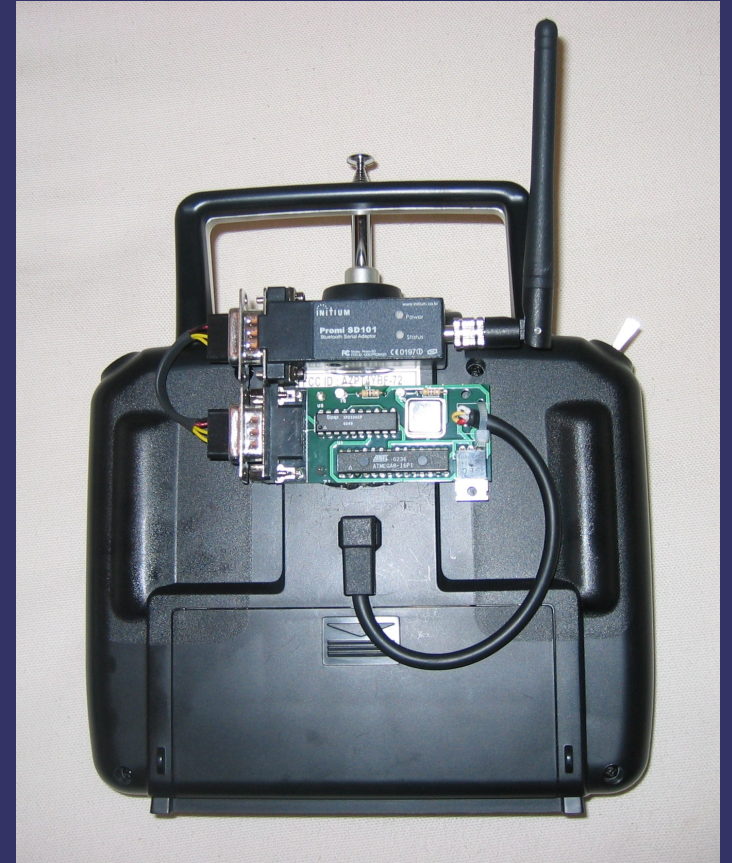# Approach (cntd):

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Scatter plot of range to walls

Approach (cntd):

➲ Run MCL

- $x^{[m]} \sim bel(x_{0:t})$
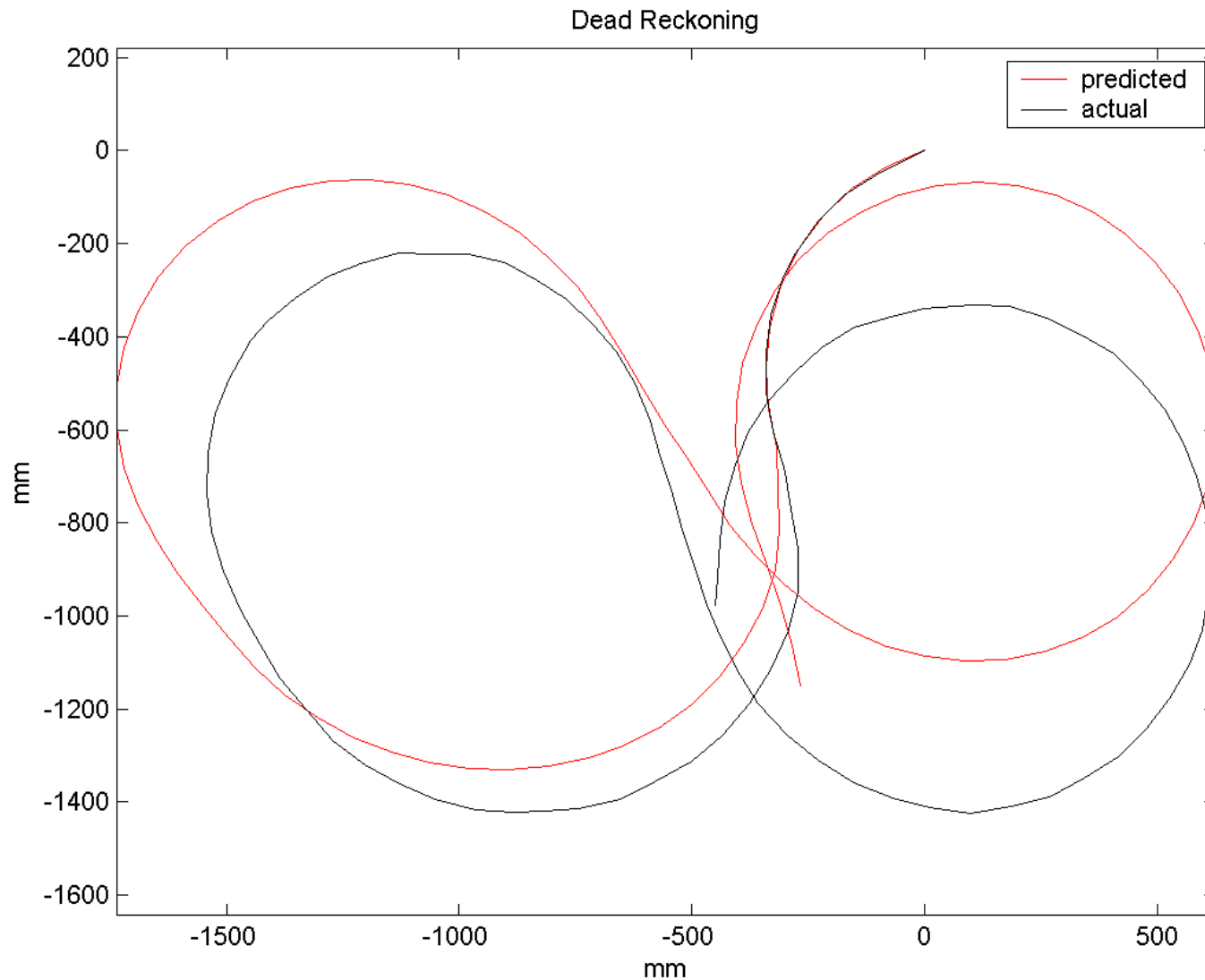- $bel(x_{0:t}) = n \, p(z_t|x_t) \, p(x_t|x_{t-1},u_{t-1}) \, bel(x_{0:t-1})$
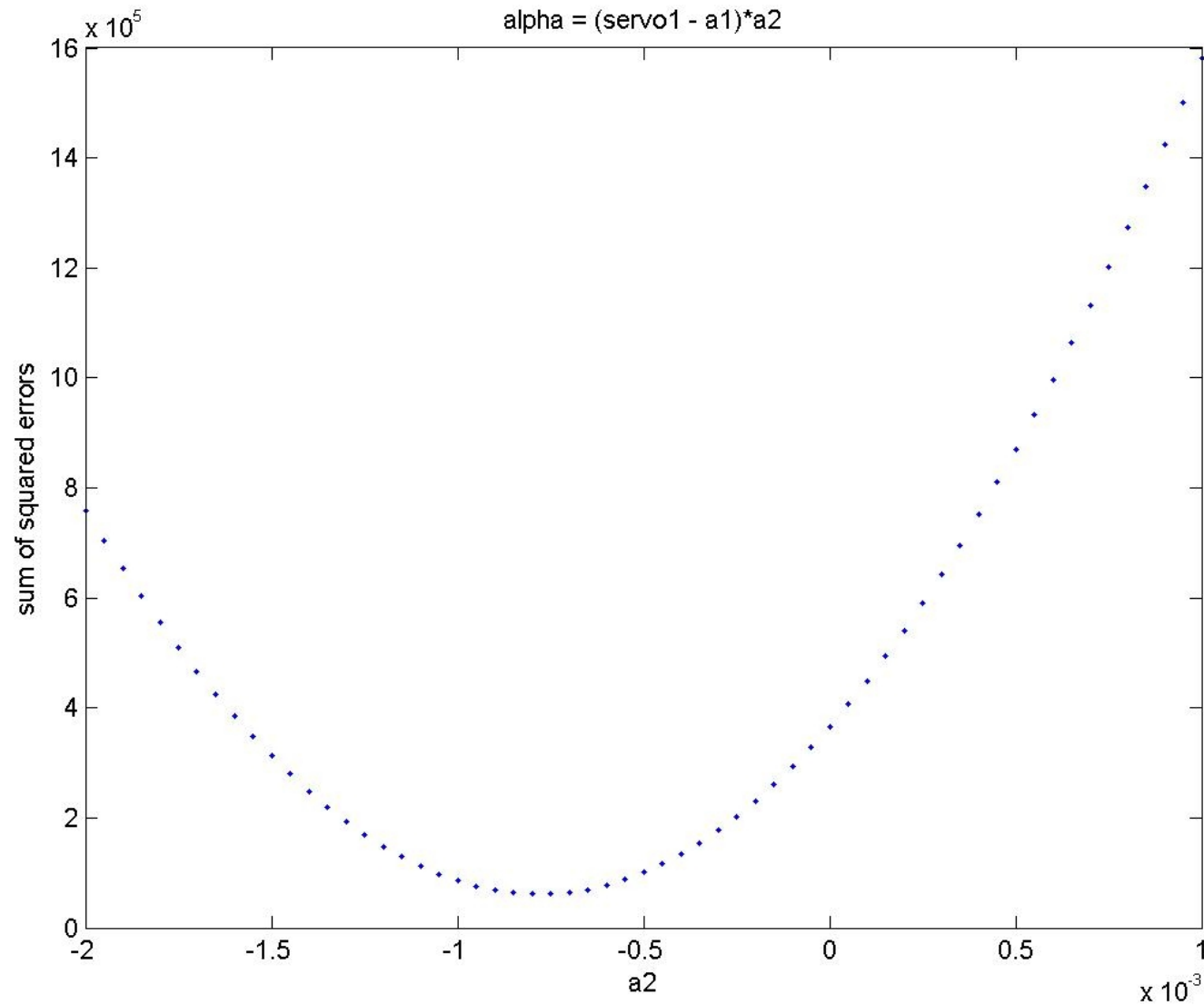
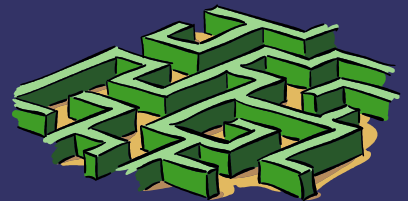# *Platform:*

➲ Hardware

Platform (cntd):

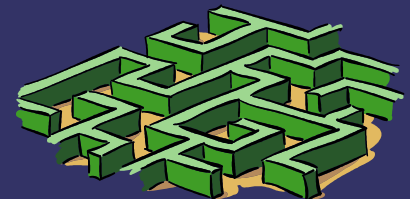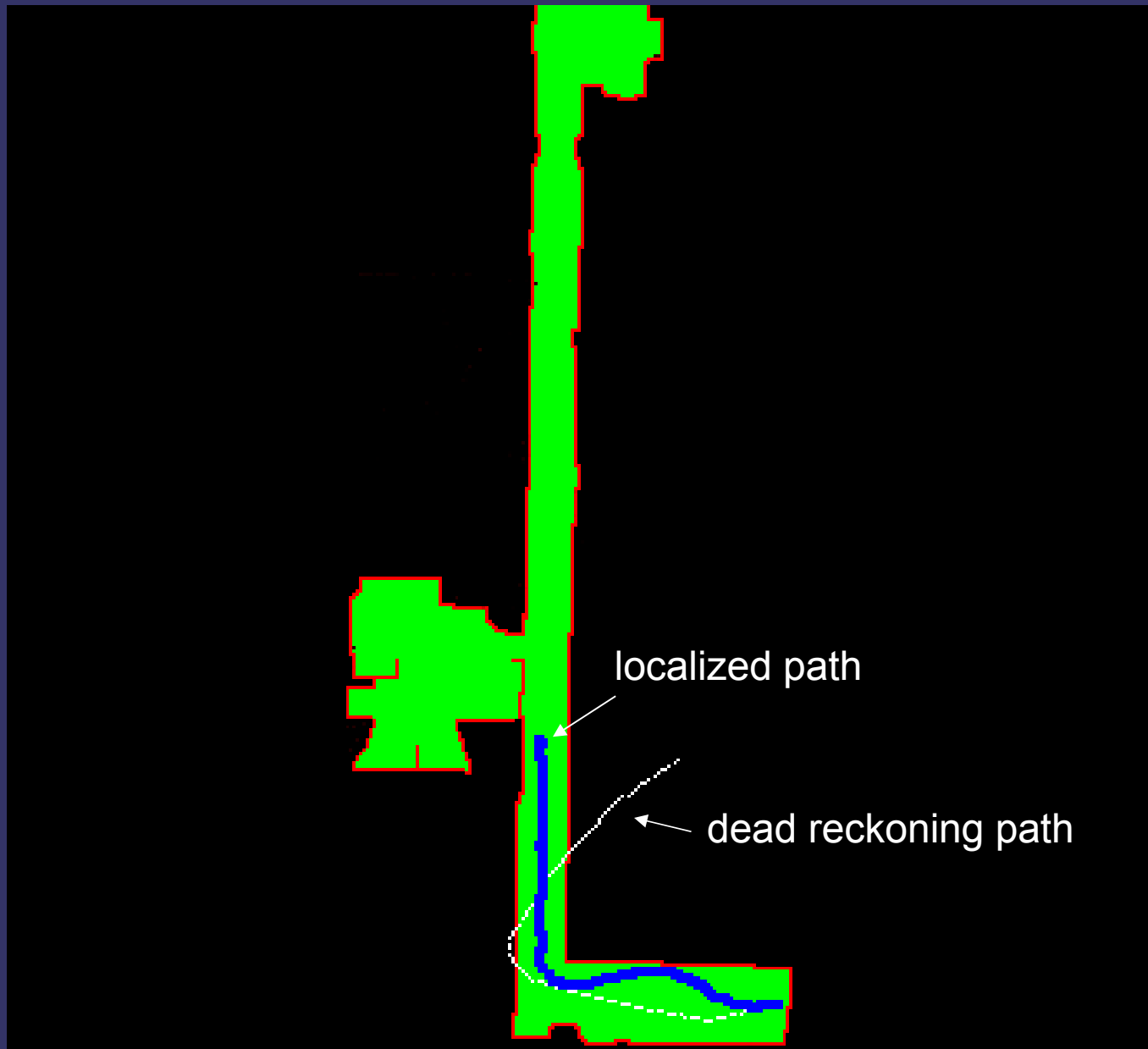➲ Motion Model

Platform (cntd):

➲ Motion Model

Results:

➲ Video

Results (cntd):

localized path

dead reckoning path

Problems:

- ⮫ Pitch
  - Pitch from the image
  - Put pitch in the state
  - Add an accurate IMU
  - Alter the sensor model
  - Change sensor (laser triangulation)

- ⮫ Corrupted Images
  - Corrupted image classifier

- ⮫ Motion Model Inaccuracies
  - Add velocity to the turning radius equation (side slip)

Thank-you