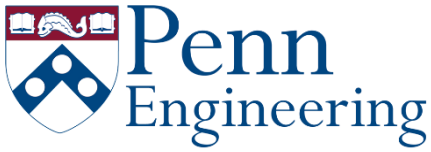
Robotics

Estimation and Learning
with Dan Lee

Week 3.

Robotic Mapping

3.1 Introduction to Mapping



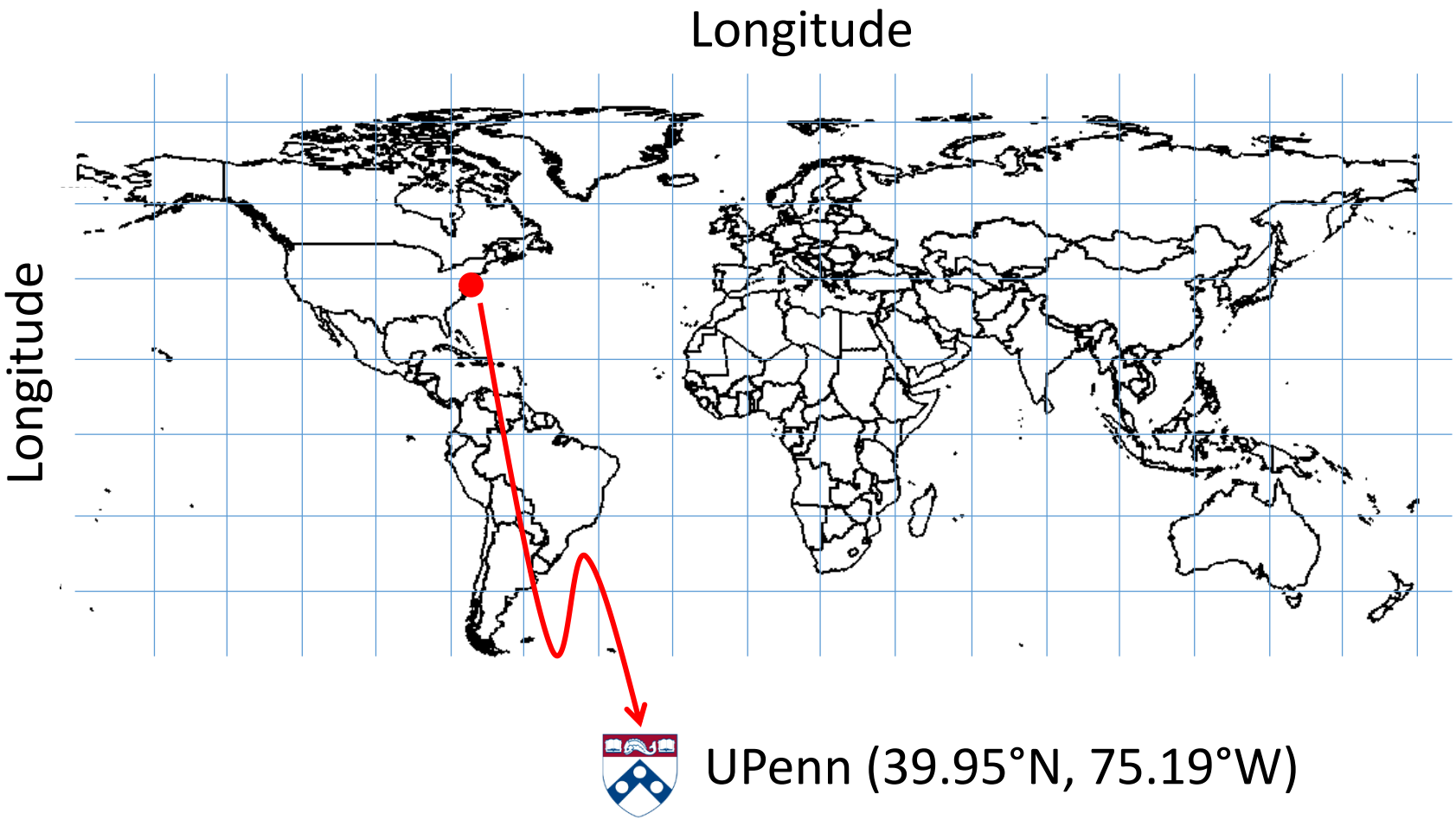
Map and Mapping

- Map is a spatial model of a robot's environment.
- Mapping is a process for building a map.
- Consideration for mapping
  - Map representation
  - Available sensors
  - Purpose of mapping

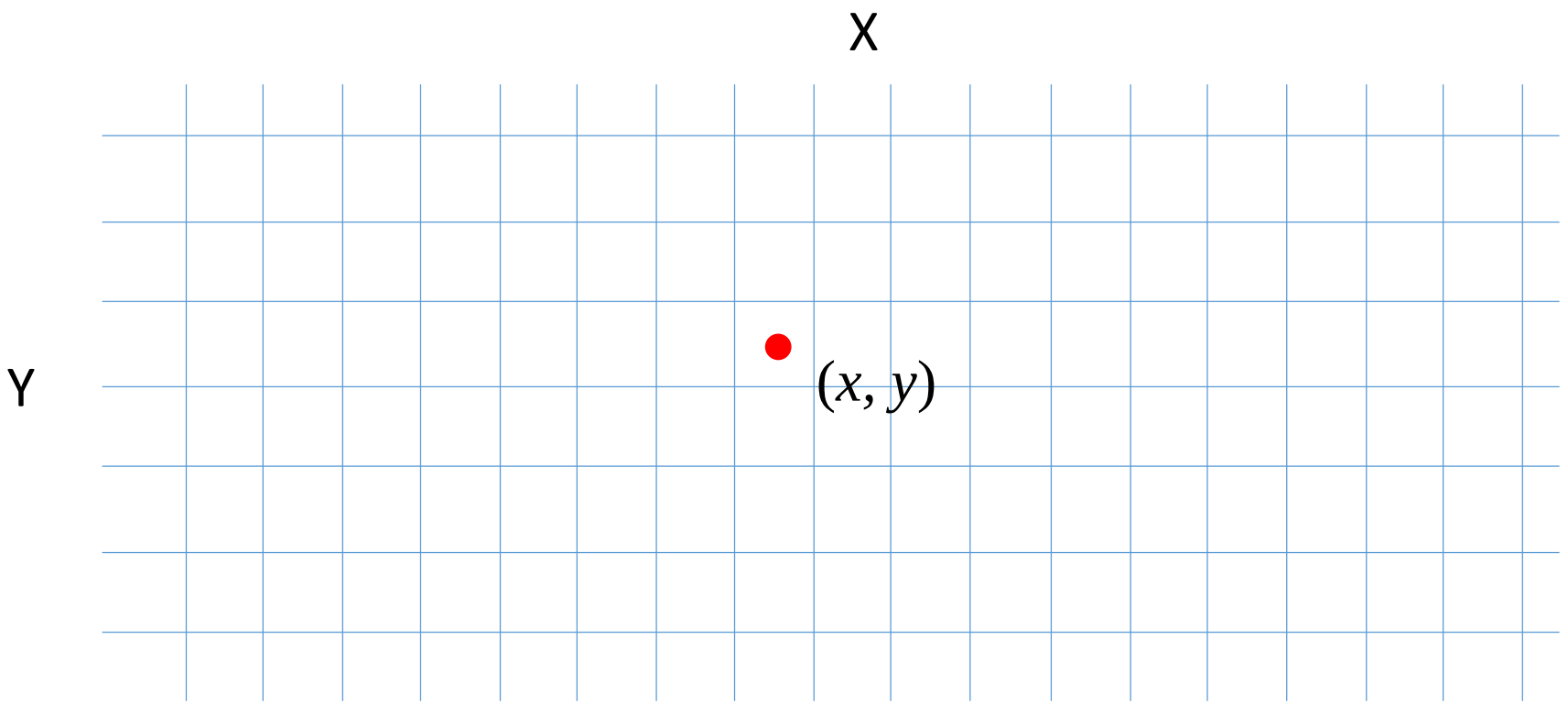
Types of Map

- Metric Map
- Topological Map
- Semantic Map

Types of Map (1) – Metric map



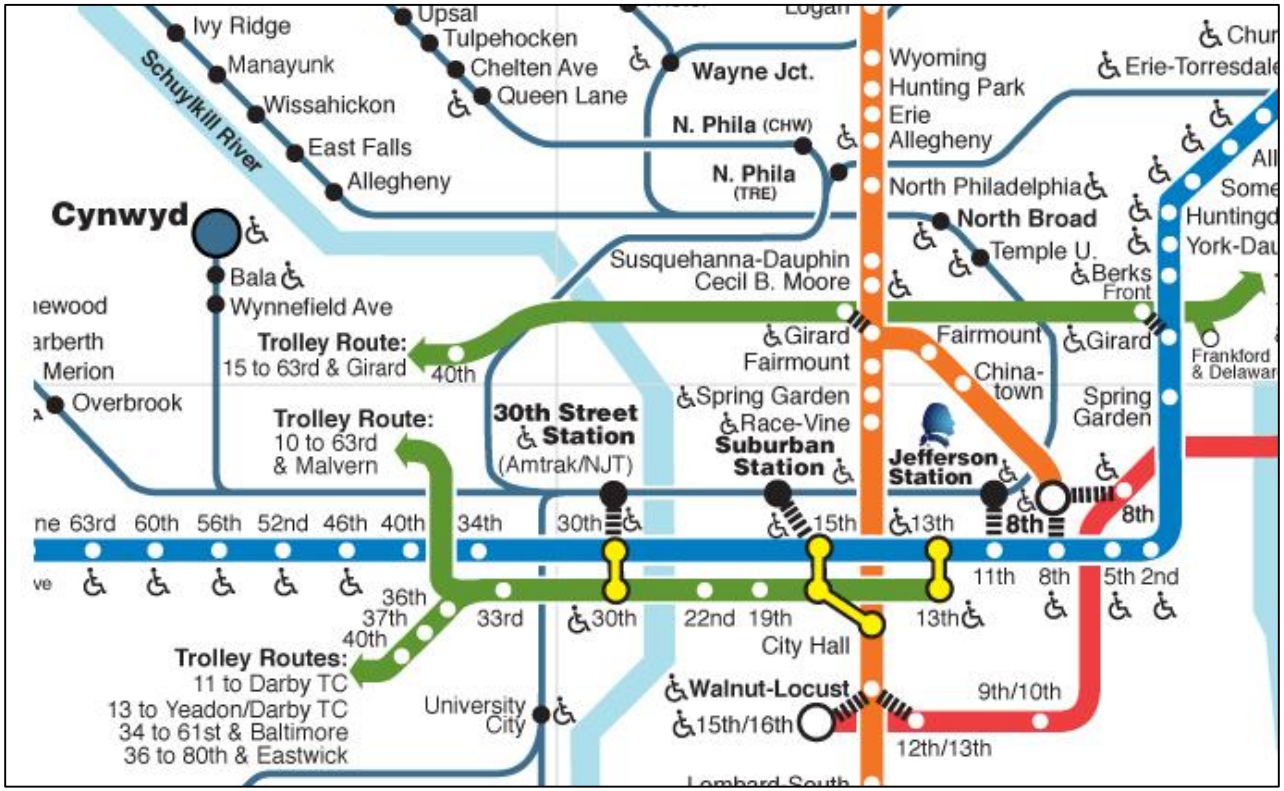
Types of Map (1) – Metric map



A location is represented as a coordinate.

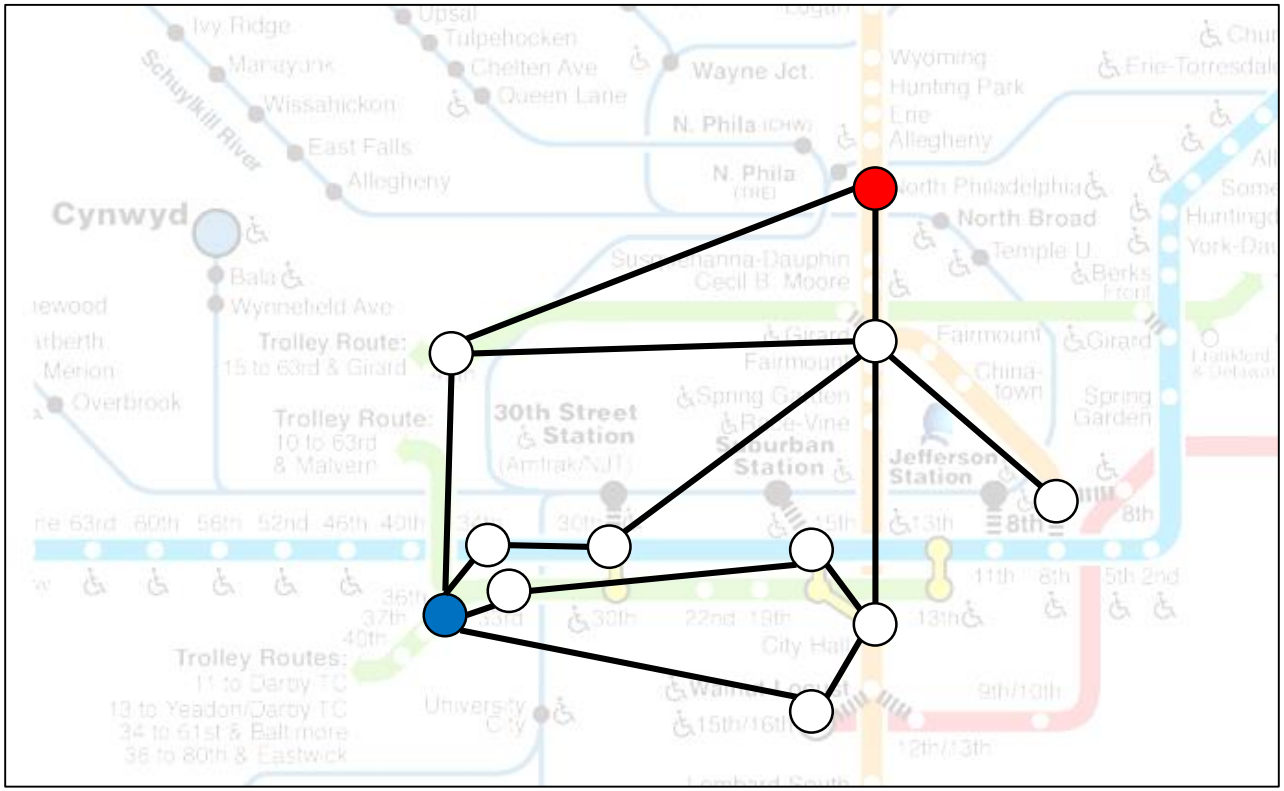
Types of Map (2) – Topological map

Part of SEPTA Train Map



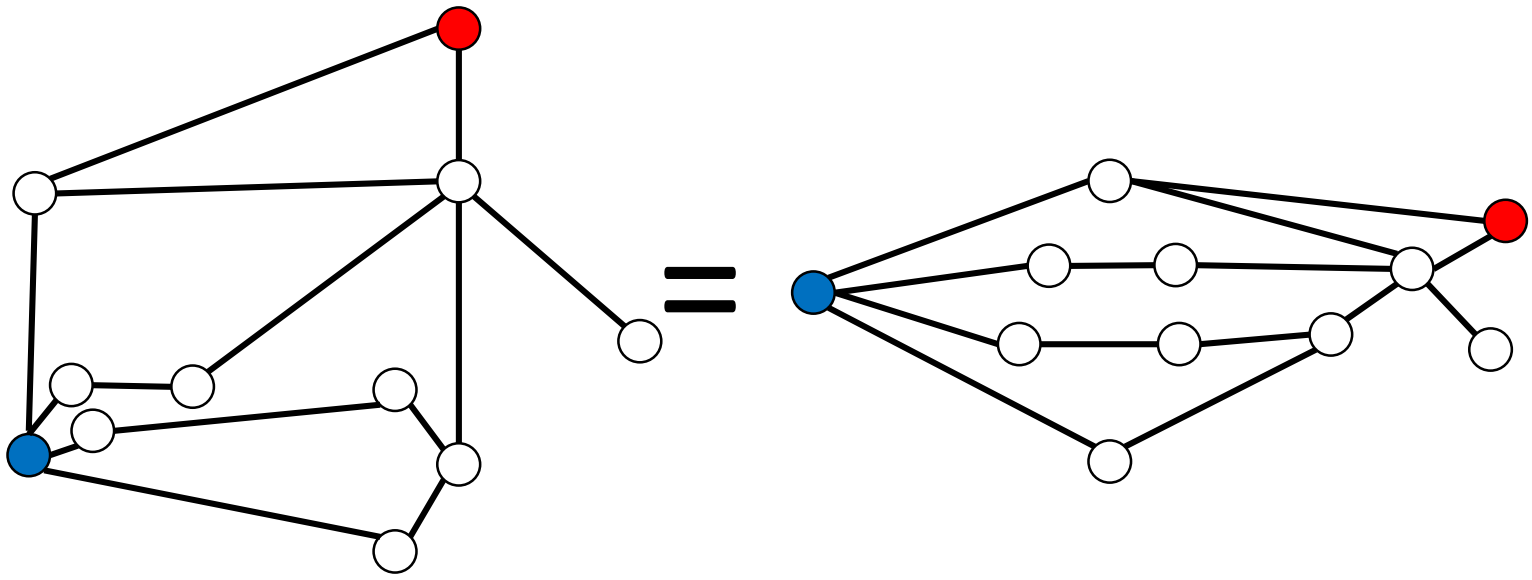
Types of Map (2) – Topological map

Part of SEPTA Train Map



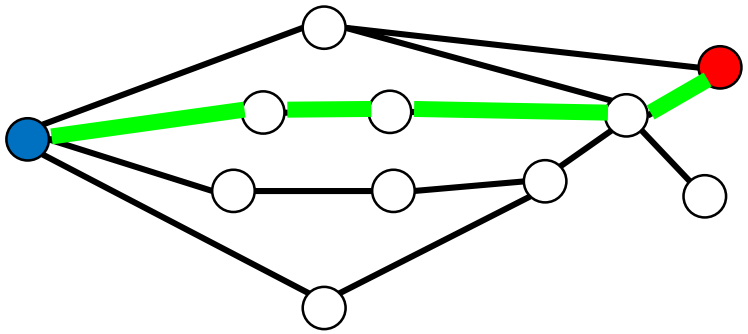
Locations are represented as nodes and their connectivity as arcs.

Types of Map (2) – Topological map



Only the connectivity between nodes matter.

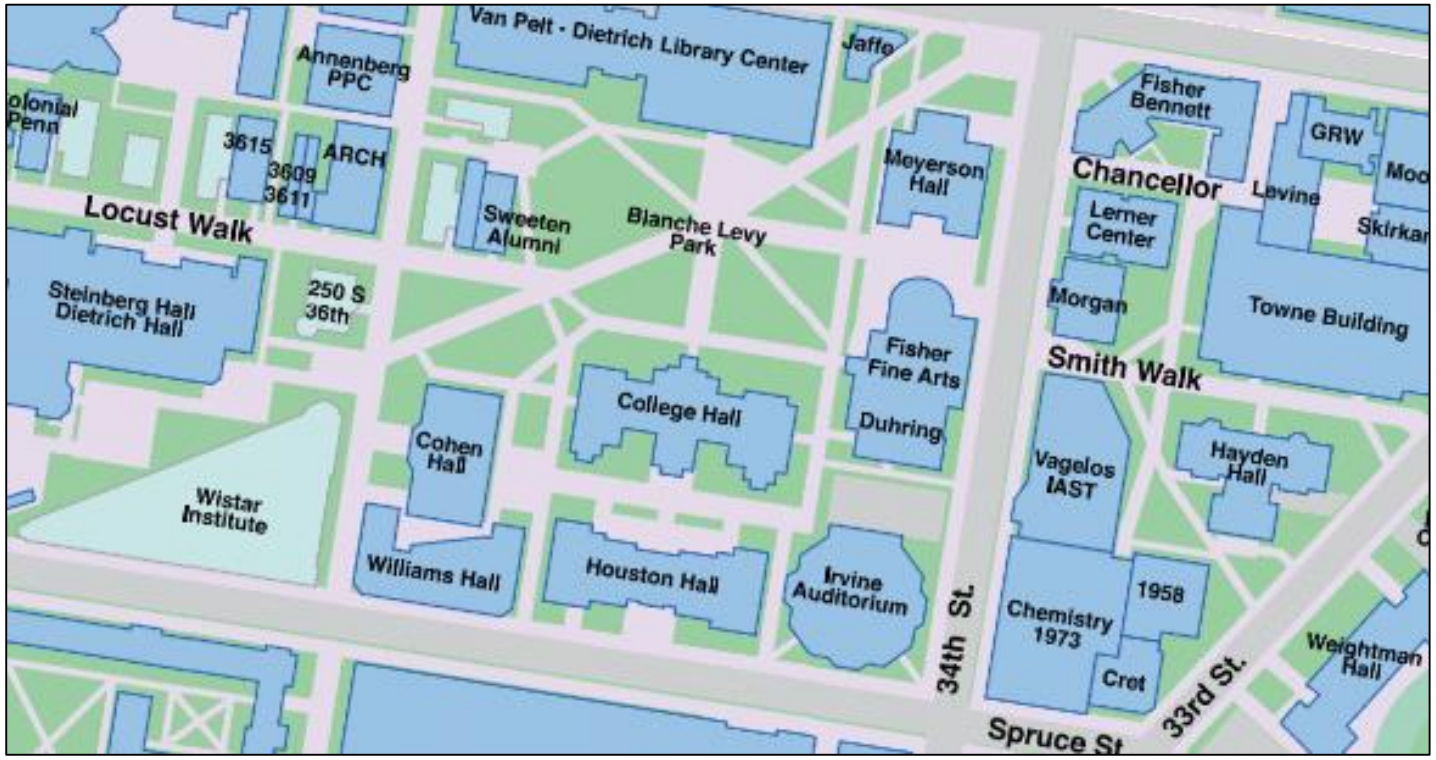
Types of Map (2) – Topological map



Graph representation is useful for path planning.

Types of Map (3) – Semantic map

Part of UPenn Campus Building Map



Semantic map is a map with labels.

Types of Map

- Metric Map
- Topological Map
- Semantic Map

Mapping

- What make it challenging?
  - Noisy measurement in local coordinate
  - Motion involved
  - Change over time

Acknowledgement

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