1. Background
   1. Research Area
      1. Multi-robot planning
      2. AI planning
      3. AI searching: advance problem of the structure search space since heuristic search does not scale.
   2. Industrial Robots (e.g. mining)
      1. Path planning
      2. Task planning
      3. Autonomous robot in manufacture
2. Amazon
   1. Combination of multi-path finding algorithm with limited area and congestion scheduling based approach
   2. Multi-robot in structural trails (multi-agent path planning)
      1. Problem: Free run robots in unistructural space -> causes large search spaces
      2. Solution: (1) sample the space (2) random tree (3) constrained optimization
3. Topics to learn:
   1. Understand the basic search methods
   2. Path finding and path planning: continuous planning
   3. Multi-robot coordination
      1. How you schedule & planning
      2. How to coordinate
4. Discussion Topics (4/13)
   1. Recommendation on the operation practice: (Kiva Picking Optimization, KPO team, wiki: https://w.amazon.com/bin/view/KivaPickingOptimization/)
      1. How long the shift should be? Do we need any overlap of the shift?
      2. Charging? How long should the robot charging?
5. Detailed projects his team is working on
   1. Multi-robot planning:
      1. Localization (Proteus, Eli and Andreas Kolling), state identification.
         1. mapping. Align the sensor reading with map.
         2. SLAM (Simultaneous Localization and Mapping): Robot builds map & localize
      2. Coordination: uncertainty
      3. Manipulation: Cardinal
      4. Navigation:
   2. Warehouse vs. Autonomous Car
      1. Rules: Warehouse is structured with fiducial and k-maps; Autonomous car run on the roads with lines and traffic signals and other rules. Therefore, warehouse has less rules compared to autonomous car.
      2. Different condition: sensor and safety conditions. Autonomous car processes more sensor information including perceptual and contingency.
   3. Construction sites: renting robots for mining. The problem is how to make robots working together.
6. Autonomous car
   1. Technical challenges:
      1. Perception issues: recognize signs, human activities, road structures
      2. AI interface with human beings
      3. Computation
   2. Maybe we should build a separate infrastructure for autonomous car since it behaves differently from human being.