Class and constraints

• Primary goal:
  • project groups build and execute applications controlling a real AGV
  • all learn some technologies for sensing, planning, mapping and control
    • with emphasis on visual and lidar sensing

• Key issues:
  • keeping safe from COVID
  • not getting hurt by the vehicle
  • you NEED to be registered

• Format:
  • for the first weeks, lecture only
    • lectures mostly in person, but I’ll use a lot of legacy video
  • after a bit, lecture and lab
    • more use of video, more time on car
• Mainly sensing, some control, some planning
  • for autonomous vehicles
• Vehicles
  • we have access to a Polaris GEM
    • from AutonomousStuff
    • and a simulator for this vehicle
• Structure (!?!)
  • mainly lecture
  • some paper presentations
  • some project practicals
CS 598 MAAV Outline

• Suitable for:
  • CS/ECE Grad students; CS/ECE Undergrads (independent minded)
    • with some experience
      • (AML; Vision; Computational Photog.; etc)
    • independent minded
  • Others
    • won’t get much support with minor programming problems
    • limited structure
    • great fun
• Generally, we’ll go through a lot of material quite fast
  • and quite superficially
CS598 MAAV - is this for me?

- First homework should help with that!
CS 598 MAAV History
Features

- (We think) only autonomous vehicle courses in country with a physical vehicle
  - very big deal for CS students
    - often have no experience of dealing with physical objects
  - cover
    - detection, sensing, mapping, slam
    - some control
    - some path planning
    - big class projects on real vehicle

- No deaths or injuries to date
  - we’re going to be fussy about safety!
Examples
Moving autonomously - MAAV course

- Autonomous car replans its path around a moving obstacle
  - https://www.youtube.com/watch?v=LBv49TwdY2o&feature=youtu.be
VEHICLE CABIN DIVIDER
PROTOTYPE
DO NOT USE
WITH MORE
THAN ONE
PERSON YET.
John
Vehicle dangers

- Heavy, but not particularly fast
  - it will hurt you if it hits you
  - ALWAYS a safety driver when moving
- It will hurt a lot if it goes over your foot!
  - this is the most likely accident
  - always use chocks on vehicle
    - either safety driver or chocks should be in
- Do not sit on the back
  - when it breaks, your rear end will land on high output battery connectors
- High center of gravity
  - turning while moving fast is scary
- Infection!
Safety roles

• Safety lookout
  • everyone - we’ll train collectively
  • responsible for
    • watching when vehicle moves;
    • ensuring chocks are in;
    • general safety

• Safety driver
  • responsible for ensuring vehicle is safe when moving
    • when chocks are out, safety driver is in
  • some, ideally one per group
  • I’ll train individually
The Chocks
Vehicle dangers
Vehicle dangers
Vehicle safety practices

- If the chocks are out, a safety driver MUST be in

- Roles
  - Safety driver
    - (inside vehicle) stop the vehicle from moving into wall, person, etc.
    - MAY NOT DO ANYTHING ELSE
  - Lookout
    - (outside vehicle) watch to ensure others are not in danger, esp feet!
  - Experimenter
    - (inside vehicle) complain at software, etc.
OLD Infection safety practices

• We will break up into project groups
  • I’d like about 5-7

• Only one person per group has access to the vehicle
  • the person could change from day to day, but only one per group at any time

• No more than four people in Highbay at any time
  • one of them is DAF
  • others are in stalls, one per stall
    • there is wifi access

• You can’t get in to Highbay without DAF letting you in
  • and you have to show me evidence of recent clean test

• The vehicle has a divider
  • so two people can be in vehicle, but ideally doesn’t happen often
This week...

- **Friday is a mixture:**
  - Technical topic: neural networks, mostly remedial
    - there are movies, etc. etc.
  - Safety lookout training (I’ll need email confirmation from each)

- **You should**
  - get vaccinated OR get and keep tested if you want vehicle access
  - follow lectures and written material
  - be trained as a safety lookout

- **If you want to be trained as a safety driver**
  - Requirements: over 21; US drivers license; safety lookout
  - Contact me at with 384 2864 in email header
  - I’ll set up training