

- ➔ Project breakdown:
  - To develop autonomous robot to maintain health of plant.
  - Current group built alarm system in case plant gets stolen
  - Our group: work with current group to get robot done by ImagineRIT, debug/test everything, develop software program so it can navigate autonomously
- ➔ Issues/risks:
  - Robot isn't completed by the time we're ready to inherit it
    - Prepared to deal with it, but expecting it's finished
- ➔ Discussed current design
  - Two separate drive trains
  - Plant care system
  - Electrical: IR, battery, electronics
- ➔ CAD drawings
  - What robot will look like when it comes time to ImagineRIT
  - Explained how Indiana Jones switch works
- ➔ Mechanically specific risks
  - Blind spots in sonar field
  - Drive train issues
  - Robot hurting people?
    - Attached bump sensors not working fully
- ➔ Electrical side:
  - Working on getting QNX working on BeagleBoard
    - Making a lot of progress
    - Keeping angstrom up to date as a backup plan, but QNX should work
  - Problems with hardware for I<sup>2</sup>C
    - Surfboard it's on is damaged and needs to be replaced
    - While it's shipping in, started working on MSP430s
      - Had about ½ of the sensors going before these teams, and working on getting sensors that aren't working, working (all of them)
- ➔ Electrical risks:
  - Parts coming dead on arrival
  - Software incompatibility (b/c still working with two operating systems)
    - Shouldn't be too big of an issue anymore
  - Move decision making up to Beagleboard (should we leave MSP430s to do the determination, or can it be done on the Beagleboard? (would be a software re-work to move the decision making up))
  - AKA, do we want to commit that time to the software?
    - Since ½ the sensors aren't working anymore, might try the time. Big thing is it has to be consistent throughout the team; either all software, or get data from sensors and transfer that to software.
    - SE's have to know how they're getting the data.
    - Sensors work, code doesn't work.

- Battery
- Light
- Accelerometer
- Sonars have to be reconfigured

→ Integration of P11216 with P11215

- Completing testing
  - Need integral knowledge of the current robot
  - Spent first three weeks learning about the robot

→ Critical customer needs

- Improve sonar range and area of vision
- Test bumpers
- Physical deterrence for the alarm (spending most amount of time (mechanical))
- Personalities
- Other sensors except for bumpers?
  - Bump sensors are just for touch
  - Sonars are to detect objects.
  - Bump sensors are just a failsafe (triple safety)
- Point of the plant?
  - Robot has to keep the plant alive
  - Idea is that if it can keep the plant alive, it can stay alive
  - Plant will alert robot when it's dying.
  - Adjustable plant holder to change plant
  - Customer doesn't want it to be a single plant
- Find optimal conditions for the plant so that it can keep it alive, what are you using?
  - Solar panels
- A lot of tests that need to be completed, have any of them been prioritized? (if you can accomplish one thing, then get to the next one)
  - We don't think it's been addressed in that order, but it's definitely a good idea

→ Engineering specifications

- Physical deterrence → water source
- Sensors → can detect when the plant moisture level is low, and when the reservoir is running low
- Are there any kind of commercial systems they use for growing plants? There might be computerized systems for monitoring the plant.
  - In nurseries, they have them on timers.
  - Robot needs to be able to survive in all conditions. We don't want it to drown the plant, so we don't want it on a timer system
  - Future opportunities for computerized systems/other systems for monitoring the plant

→ Mechanical additions

- Physical deterrence

- 360 degree sprinkler (either vane sprinkler, or a fire sprinkler)
    - Chris recommends going with a 180 degree field forward,
      - He doesn't want to necessarily test that on a regular basis (probably a good idea)
      - Other sprinkler types
      - Installing a shield
    - Have you thought of other systems for physical deterrence?
      - We were thinking water, because we want it to be self-sustaining.
      - We already have the main thing you need for a water deterrent system, so it might be easier (we were thinking that)
      - The water is just a second layer of defense, b/c the sound will be a deterrent anyway
    - Hoping for interaction
  - Adjustable plant holder
    - Thinking of changing current design, to a mechanical loop
    - Our original design was to have various brackets, and find the one you need, this will help will adjusting the side.
    - Dr. Slack thought that they didn't like the location of the plant and wanted that to vary, Nick thinks that the graduate assistant wanted a varying size for the plant
- ➔ Personality framework
  - We decided that personality is going to determine how the robot moves, and what it does; therefore diagnostic mode is a personality
  - Came up with 8 actions for interactions depending on the personality
    - Forward/backward movement
    - Leftward/rightward spin
    - Sensor servos moving as eyes?
    - LCD touch screen (face to show what the robot is "feeling")
    - Alarm system
    - Water sprinkler
  - 5 basic personalities
    - Apathetic (first personality; main one; ignores people for the most part)
    - Angry (if plant gets stolen)
    - Curious (wants to know more, but doesn't want to get closer)
    - Happy (interactive)
    - Super-care (similar to apathetic, but ignores everybody except the plant, and doesn't really wander)
- ➔ Software design review continues next week for more in depth (because advisor can't be there next week)
  - Software design
  - Threading models

- What are your methods of designing?
  - Not pseudo code, as much as different models and sequence diagrams
- Make a prioritized list of what each team is doing (what's realistic?)
  - Big priority=getting QNX working
  - The priorities are so straightforward, that there's really not much to prioritize
- ➔ Other thoughts/ideas
  - If you can get it to color, you can have a beacon on the robot to display other colors to show personalities
    - Part of what the LCD touch screen is for
      - Reposition LCD
  - Might want a warning sign about the potential for being sprayed with water
  - Are their sound files for the personality maybe?
    - Not yet, it's been talked about.
    - Would be nice, but last priority.
  - When the robot is all set, will it be running throughout the day/all the time?
    - Original thinking is that it's there to sustain the plant.
    - Customer wants curiosity factor and interaction with the people
    - Maybe when it got dark, it could go into "sleep mode"
      - Industrial design student that's going to work on a "house" build so that it has somewhere to go to recharge
  - If it runs around during the day, it gets busier during the day, maybe integrate a "get out of the way" on the hour
  - Maybe integrate a "snow personality"