P3 – Phase I – general comments

Purpose – define quantitative design requirements (specifications) for a device and propose a series of tests (procedures and data collection/recording techniques) to measure compliance with the design requirements

Purpose was NOT to – simulate an NFL player combine

- Generally well written and effectively organized ideas
- Pure text not the most effective way to organize and present your ideas
- Sometimes not too practical nor could one implement the ideas with the information provide
- Most common comment – "how could this "idea / test" be expressed as a design requirement (specification) that would assist or inform the actual design of the product"
- 4 grades – 2 on content (2.93/2.79), 2 on presentation(2.69/3.14)

Concerns - I

- How can you differentiate between the characteristics/performance of the machine and that of the human controller?
- There will be at most 11 machines to fill 8 positions on offense and defense – many will need to fill general roles but some will need significant specialization (OL, DL, DB, LB, RB, QB, K, P, etc…)
- Pass/fail or disqualification criteria (other than safety or basic rule non-compliance) were not the purpose of the testing process – a graduated rating/grading scheme is needed to provide a measure of compliance with quantitative design requirements
- In most cases all the requirements seemed to have equal importance – what is the relative importance of the "hows"
- Often no (or sometimes faulty) use of physics
- Testing compliance with specifications is not a competition
- Significant testing and evaluation should take place prior to the formal scheduled event – game practice after the event

Concerns - II

- There is a major difference between closed-loop (controller-in-the-loop) and open-loop behavior of this type of system
- How to you design-in "repeatability" (how would you use a requirement like "6 out of 10 completions required in order to be eligible to play" in your design decision making?
- Indicated a need for other devices to assist the product evaluation (e.g. "a machine that would accurately and repeatedly be able to throw the ball, brick wall, …)
- How would a requirement like "throw as far as it can" be useful during the design process? (e.g. a design requirement for a car – "go as fast as it can"?)
- A plan to conduct the testing needs to include consideration of who will do what, information to be collected and processed, as well as when and where (testing will most likely take place on the Tuesday before the "game day")
- You will not be able to just 'put it all together' and see if it works. Considerable effort will go into evaluation/testing of subsystems and systems integration testing.
- Electric motors – DOMAIN EXPERTISE

Some ideas to consider

- Steering – Speed – Traction – Power
- Open-loop control (autonomous control with "kill" switch)
  - Turn rate – reorient direction (deg/sec)
  - Proceed along a straight line (x deviation after moving y ft)
  - Steering resolution for preprogrammed turn (± x°)
  - Set and hold speed (± ft/sec)
  - Grasp/secure a ball and accelerate/decelerate/turn (drop y/n)
  - Climb a slope (traction/power test) (slope°)
  - Hold position on an inclined slope (traction test) (slope°)
  - Throwing/kicking mechanism (low, med, high) settings and measure repeatability (more evaluation than requirement compliance) (±ft)
- Closed-loop control – very limited sensors (various controllers?)
  - Pick up a ball from the floor (if you intend to include that capability)
  - Cone course …. Maybe more for show than effective machine assessment
- P3 – Phase II reports due: Thurs. Nov, 5th – Phase III volunteers?