Lecture 11 Guidance and Control Issues; Landing

Aspects of Apollo guidance and control

- approach to computing that was much more about real-time control instead of numerical input-output
- Lanning, Battin
- Draper Labs was innovative in inertial navigation in the late 40's-50's

Guidance

- Earth-horizon sighting was okay, but moon-horizon was best, since there was no atmosphere
- Batten did work on recursive estimation for Apollo – how many sightings are needed on the journey, and when do they need to be taken?

Design: optics and inertial unit were too large to put in front of where the astronauts were sitting; crew had to leave their seats to go down and take sightings. This made it less of a real-time piloting job, and more of a discreet, specialized operation.

NASA trusted the pilots to make minimal or no errors; software was designed with this in mind, which was problematic on the occasions when operator errors *were* made.

Analog computers probably made crew feel like they had more direct control, but there were still digital processes going on.

[slides showing control systems]

Verb-noun computer command syntax

Apollo code was literally woven into computer cores.