



M-Cubed CubeSat Developers Workshop

Cal Poly San Luis Obispo

4/9/08

Lab Introduction

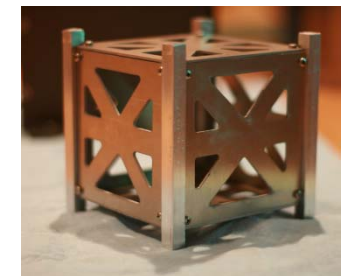
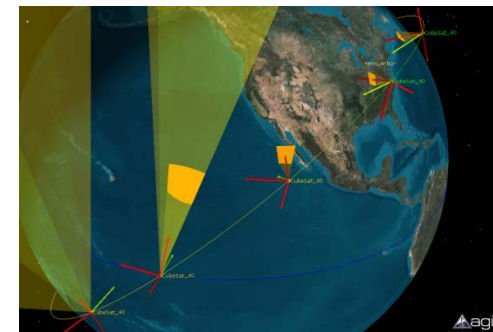
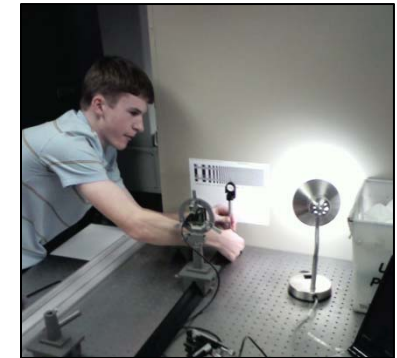
- The Student Space System Fabrication Lab (S3FL) is part of the University of Michigan College of Engineering.
- Dedicated to providing hands-on experience for students through the design and development of space systems projects.



- Get Away Special Projects (Space Shuttle)
 - Vortex Ring Transit EXperiment (VORTEX)
 - investigation of the propagation of a vortex ring through a liquid-gas interface in microgravity
 - Field Emission Get Away Special Investigation (FEGI)
 - Design, build and test of Field Emitter Array (FEA) technology
- Icarus Satellite Project
 - Provide stabilizing anchor for ProSEDS experiment
- MClimber (Space Elevator)
 - First team to complete traversing objectives but unfortunately did not complete it in the allotted time
- C9 NanoFet
- Tethered SATellite TesTbed (TSATT)
- BalloonSats



- Develop the first generation S3FL CubeSat to:
 1. Cultivate S3FL capability to develop, build, and operate a CubeSat system.
 2. Promote development of S3FL students through a interdisciplinary design, built, test environment.
 3. Use COTS components to provide a minimum of one image of the Earth's surface in the visual spectrum
- With the success of this first CubeSat system, future missions can encompass more complex payloads while still building upon S3FL heritage designs.

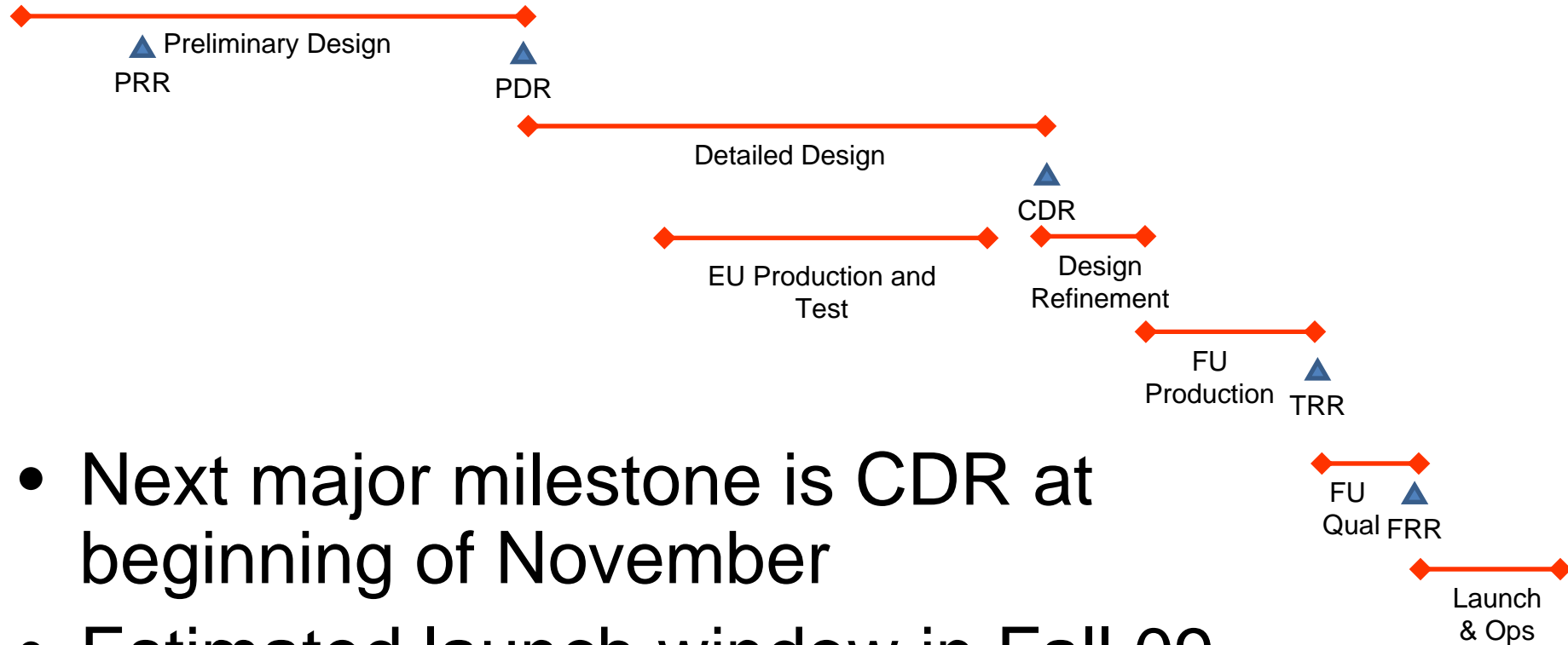




Project Schedule and Cost



2007					2008												2009		
Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			



- Next major milestone is CDR at beginning of November
- Estimated launch window in Fall 09
- Total estimated project cost of \$120K

Lab Course

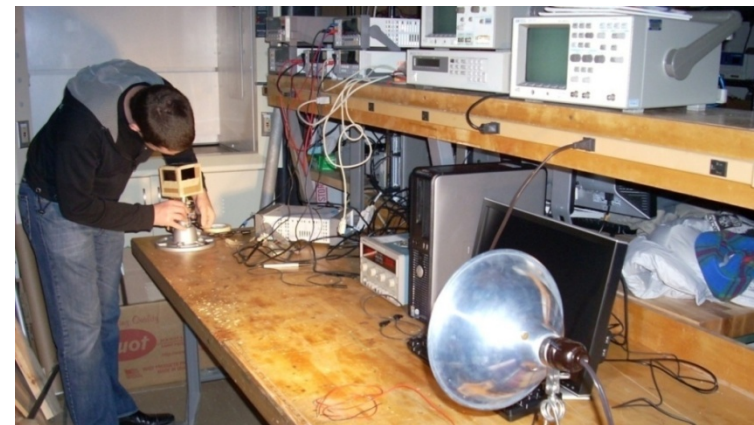
- Seeds to develop a Design-Build-Test-Fly sequence that is integrated and spans a program of study
 - Laboratory exercises for new DBTF course
- Design, analysis, fabrication, integration, and test activities for M-Cubed will be used as lab exercises for development of new course

Thermal system DBTF



← Payload team
conducting CCD
characterization

Power team
conducting solar cell
characterization →





U-Space Competition



- Competition to promote multidisciplinary systems engineering across the nation
- With strategic industry partners, universities can launch self-funded CubeSats into orbit and compete to achieve various mission objectives
- Develop a third-party source (Non-Profit Organization) to organize and administer the competition



Competition Overview



- Phase 0: Teams Selection “Competition”
- Phase I: CubeSat Design, Build, and Test Competition
 - Each university participates by constructing flight unit
 - Ends in the official CubeSat Flight Readiness Review
 - Each CubeSat gets a “Go/No Go” official result
- Phase II: CubeSat Test, Integration, and Launch
- Phase III: U-Space In-Space Challenge

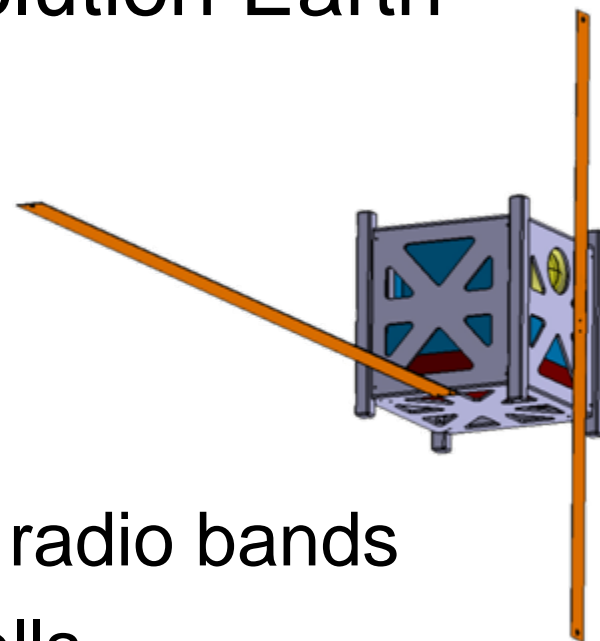




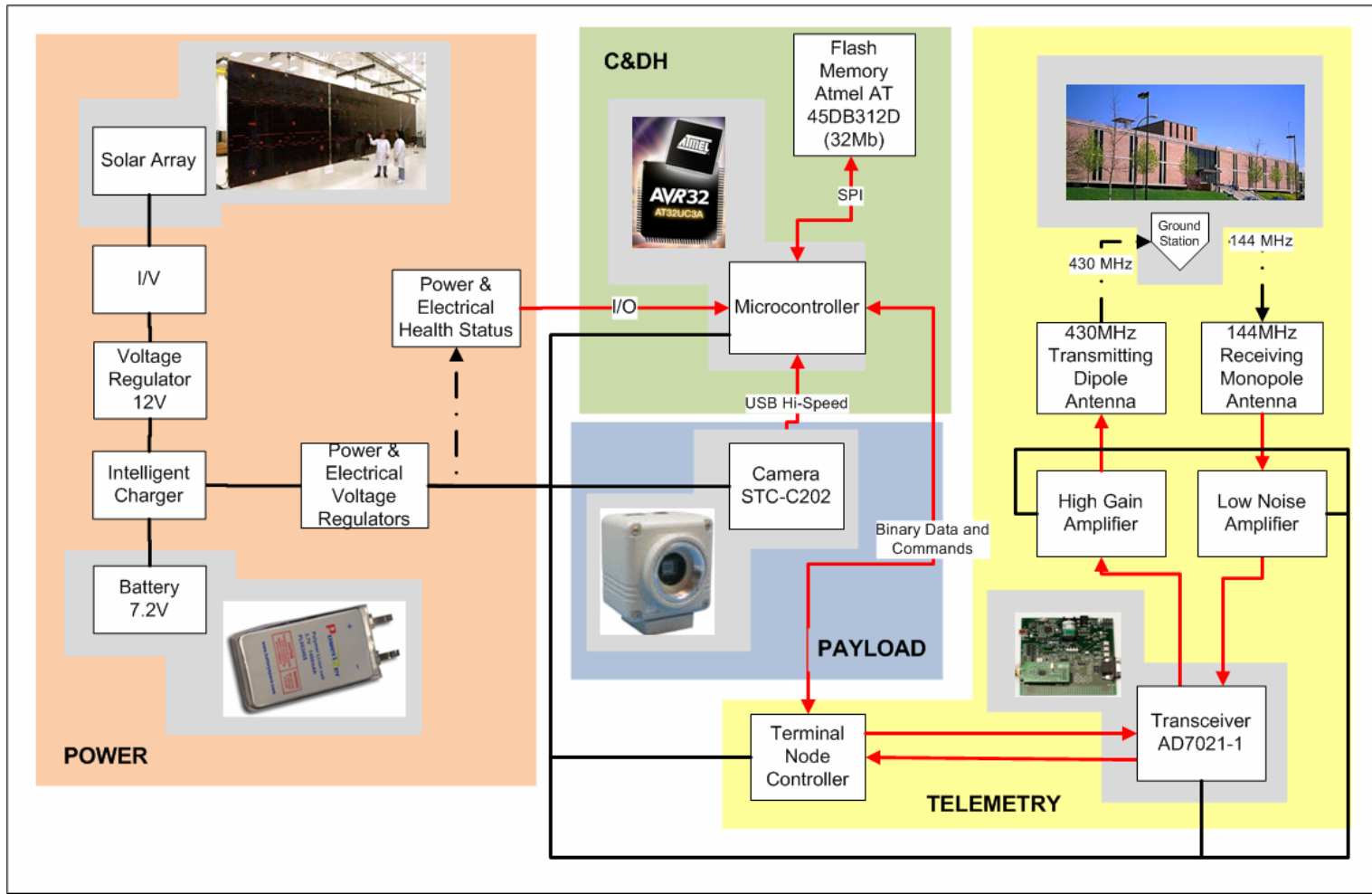
M-Cubed Overview





- Primary Objective is to develop a CubeSat capable of providing high resolution Earth imaging
- Proposed Baseline:
 - Single CCD camera Payload
 - Passive attitude control system
 - Communication using amateur radio bands
 - Power generation from solar cells
 - Simple cube structure as defined by Cal Poly



M-Cubed System Block Diagram



KEY	Power Line	Data Line
		

Goals For Workshop

- Introduce M-Cubed to the community
- Recognize opportunities for collaboration
- Gauge U-Space competition interest
- Discuss major technical concerns
 - Recognize risk items and plans for mitigation



M-Cubed Structural
Prototype



Thank you... Questions?

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