**Computer Hardware Requirements**
- Low power and processing similar to mobile devices
- Radiation tolerant design to protect system in the event of a single event upset and/or single event latch up
- Good thermal characteristics

**C&DH Design**
- Single processor model
- Triple modular redundant flash guards instructions from SEU
- CPU supervisor and current monitors detect invalid operational states
- Task specific devices share processing workload

**Software Subsystem Design**
- Modular separation of software modules based on the C & DH Subsystem
- Basic module, Subsystem manager
- Shared memory communication scheme
- Easily Tested
- Provides modularity in subsystem managers

**Integration and Testing**
- Failure on motor board
- Researched schematics and device drivers
- Discovered method to test electronics
- Verified signals from SPI bus
- Determined FPGA is not responding

**Difficulties Of Real-Time System**
- Will all tasks meet their deadlines?
- Pre-emptive priority based scheduling
- Priority inversion a possibility

**Command Set Implementation**
- Nominal & Off-Nominal Commands
- Antenna Deploy, Dump Log File, Dump GSS, … etc

**Device Interfacing**

**Current Work**
- Understand system at schematic and device driver level
- Test and Debug hardware
  - Motor Board
  - New Telemetry Board
- Develop documentation regarding hardware design, functional analysis, and procedures

**Implementation & Tools**
- Implemented in C/C++
- Real-Time Operating System, VxWorks
- Tornado II IDE, provides outstanding debugging facilities

**Low-Level / High-Level Time Lines**
- BSP
- Used to show how TOROID’s BSP differs from the standard VxWorks BSP

**End-To-End Testing & Debugging**
- Camera Board
- Temperature Sensors
- CMOS Cameras endure both high/low intensity sources

**Software Subsystem Design**
- Implemented in C/C++
- Real-Time Operating System, VxWorks
- Tornado II IDE, provides outstanding debugging facilities

**BSP**
- Used to show how TOROID’s BSP differs from the standard VxWorks BSP

**ADCS Manager**
- Relies on TLE
- 3-axis magnetometer reading
- Sun & horizon cameras
- Systems level ground station contact scenario with spacecraft

**Device Interfacing**

**Current Work**
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- Develop documentation regarding hardware design, functional analysis, and procedures