



University of Toronto Institute for Aerospace Studies
4925 Dufferin Street, Toronto, Ontario, Canada, M3H 5T6

Computer Hardware and Software Engineer

Level Definition:

This level covers positions involving the application of engineering knowledge and training in developing spacecraft computer systems, including the design, prototyping, assembly, integration and testing of all the necessary hardware and software. Employees may provide guidance to junior engineers and technical staff. They may also interact with graduate students undertaking research relevant to spacecraft computer development.

Typical Duties:

Typical duties may include:

- Defining the hardware and software architectures for spacecraft computer subsystems. This includes defining operating protocols and hardware connectivity. Performing trade analyses on various computer architectures.
- Defining development environments and real-time operating systems for spacecraft computer software.
- Selecting components for spacecraft computer subsystems, including processors, memory, communication buses, error detection and correction hardware. This includes searching for and acquiring evaluation components for breadboarding and testing.
- Designing, prototyping, assembling, and/or testing custom spacecraft computer boards (microprocessors, microcontrollers, digital electronics). This includes schematic design, layout, parts selection and documentation, derating analysis, following good EMC practice, soldering surface mount components, handling test equipment, following good ESD practice.
- Developing software for housekeeping, tracking, telemetry and command, and power control. This includes boot code development, operating system development, device drivers for custom hardware, application code.

- Communicating with other engineers to specify requirements on, and obtain requirements from other spacecraft subsystems that must interface with the computer system being developed.
- Interacting via meetings, e-mail, phone, and facsimile with consultants to the Space Flight Laboratory, so as to obtain detailed instructions, comments, and review of computer hardware and software designs, component selection and acquisition, and assembly and testing procedures.
- Communicating designs to reviewers and systems engineers.
- Interacting with graduate students who contribute directly to the computer subsystems currently being worked on. This includes students whose theses are focused on spacecraft computer hardware and software development.
- Reporting to the Space Flight Laboratory Director and/or senior staff with regard to technical progress, costs, and ability to meet schedule.
- Supporting the acquisition and installation of all required facilities for the development and testing of spacecraft computer systems.
- Facilitating new development contract opportunities for the Space Flight Laboratory through interaction with other engineers in the computer field.

Decision Making:

Exercises judgment in the application or adaptation of engineering methods and techniques to design or modify equipment and instrumentation to meet performance objectives. Makes recommendations on the purchase of commercial equipment and the placing of contracts with outside contractors. Selects materials and decides on recommended designs and design changes obtained from consultants or other engineers. Assists in the definition of the technical content of student work packages in consultation with the Space Flight Laboratory Director and senior staff. Determines best assembly and testing procedures to follow.

*Supervision
Received:*

Working under the technical, budget, and schedule direction of the of the Space Flight Laboratory Director and senior staff, conducts independent studies and analyses and provides interpretations and conclusions. Complex or unusual problems are normally resolved in consultation with supervisor.

Supervision

May provide guidance to graduate students assisting with

Exercised: computer subsystem development through thesis or course work. May supervise junior engineers, technologists or draftsmen when they are employed on the same projects.

Qualifications: Bachelor's degree in Computer Engineering with some specialization in computer hardware and software. Six years relevant experience following graduation or demonstrated equivalent capability. Some experience in the space industry is preferred.

Contact: Dr. Robert E. Zee
Director, Space Flight Laboratory
University of Toronto Institute for Aerospace Studies
4925 Dufferin Street, Toronto, Ontario, M3H 5T6