Fault-tolerant satellite computing with modern semiconductors

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Propositions

accompanying the thesis

Fault-Tolerant Satellite Computing with Modern Semiconductors

1. A hardware-software-hybrid fault tolerance architecture can be used to achieve strong fault coverage with satellite computers consisting of modern embedded and mobile-market Systems-on-Chip. (Chapters 4, 7 & 9)
2. Software-implemented fault tolerance can help make a system not only more robust, but also more flexible, simpler, scalable, allows spare-resource-pooling, and enables graceful aging. (Chapters 5 & 6)
3. A hybrid architecture can be designed so the techniques used complement, support, reinforce, and amplify each other, without incurring the constraints of traditional systems. (Chapters 3, 4 & 8)
4. A fault-tolerant computer architecture for miniaturized satellites is technically feasible with contemporary consumer- and industrial-grade components, at low cost. (Chapters 2, 7 & 10)
5. Science, engineering, arts and humanities all have to work together to solve the most difficult challenges that we face today.
6. Theoretical work that just states the obvious, and otherwise has no interest in application, serves no purpose.
7. Applied science that merely re-applies existing well-known concepts in the same context in which they were proposed first, without re-imaging them to new problems, is not science but merely homework for the uninspired.
8. To proof that a theoretical concept is valid, it is required to apply, test, and validate it. Implementation, practical testing using fault injection, and prototyping is one way to do so, but not the only way. Choose any suitable way. But choose one.
9. Academia should move on from monologue-like lectures and exams where the pace of memorizing data matters more than understanding. Scientific progress is achieved by scientists, engineers, and creative tinkerers, not by drones that merely execute.
10. University education should be centered on nurturing a student's capability for research and hands-on projects with an outcome valuable to science or society.
11. To advance mankind, spaceflight has to be a host for innovation, and provide constructive criticism. It must not be a bastion of conservationism that treats innovation with fear of loosing the artifacts of old. However, it should also not be reckless.
12. Caste and class-thinking in academia, politics, health care, and many other fields must be overcome. Especially access to education and proper health care should not be a prerogative for a select few.

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