Computing for the Future of the Planet
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Background
There are many issues threatening the future of our planet. The impact of climate change is a prominent topic. However, there are numerous other problems such as overfishing, desertification, deforestation and rising energy demands. These are all compounded by a global population which is expected to grow to 9 billion people by 2050. We believe that computing has a significant role to play in solving these problems and have highlighted four initial areas of research.

Modelling and Simulation
Tools and theoretical techniques are required to ensure that software bugs or fundamental limitations such as floating-point precision do not distort the results produced by complex models.

Power-Sensitive Computing
Power consumption is a problem affecting all forms of computing, from server farms to mobile devices. In order to inform the development of algorithms and strategies for power saving we have developed a measurement platform to provide direct, live measurements of PC components. Our initial results focus on the power consumption of hard drives [1] (Figure 1). One significant finding is that the power consumption of reads and writes is asymmetric.

Sensing the Planet
The ability to collect and record detailed sensor data about the planet will be vital to understanding the impact of our current activities and for providing feedback on the success of any mitigating strategies we adopt. Mobile sensors are a promising strategy for efficiently achieving good sensor coverage. The Sentient Van [3] incorporates various sensors including GPS, accelerometers, gyroscopes, CO\textsubscript{2} measurement and networking technologies such as 802.11b, GPRS, and 3G. Our measurements of 3G signal strength are shown in Figure 2.

Living in Cyberspace
Electronic equivalents are emerging for many of our physical activities. Examples include: newspapers on the web, downloadable music, and online shopping. We are researching ways in which participating in virtual worlds might replace the profligate activities of the physical world. This has the potential to be an alternative to legislative restrictions on people’s activities by instead providing alternatives which are compelling in their own right.

Papers

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