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TO NEWS EDITOR
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Mathematician Sounds Warning to Computer Enthusiasts

Computer buffs heed the warning. Your computers may not be giving the precise answers to your mathematical calculations all the time. And as technology becomes more complicated, the chance of encountering such "bugs" might increase.

This is view of Dr. Peter Tang of the Department of Mathematics at the Chinese University of Hong Kong. An expert in computer arithmetic, Dr. Tang is one of the few who advised Intel, the world's biggest chip-maker, when its flagship chip Pentium reveals a wrong result when dividing 4195835 by 3145727. Intel stated that the chance of encountering a wrong division is rare -- only once in 27,000 years to an average user -- and offered to swap any flawed chips with their corrected versions on users' demand.

For those who retain a flawed chip for whatever reasons, Dr. Tang and his collaborators have come up with an ingenious "fast patch" formula which will screen out possible division problems. A paper detailing their findings will be presented in the Institute of Electrical and Electronics Engineers (IEEE) International Symposium on Computer Arithmetic in Bath, England this July.

Although the "Pentium incident" is now history, its implications are still to be fully digested. "It brings the issue of safety, or its lack, of technological infrastructure close to home, literally," Tang said. "Concern for high accuracy is not at all a mere academic matter. This is not the first time inaccuracy has affected everyday life," he added. An innocent-looking bug in a computer programme was known to have caused an unusual declining trend in a stock exchange in New York. The problem was corrected only after the programmer rounded off the long ranges of numbers after decimal points instead of just truncating part of them. Dr. Tang illustrated his point further: "We can also speculate on the consequences if the US National Aeronautics and Space Administration (NASA) were to make a computer mistake in its space shuttle trajectory calculations. Will the astronauts be able to come back to earth? A down to earth question indeed."

Tang can appreciate the difficulty of getting things perfectly correct. "Afterall, we are jamming millions of transistors into a tiny compartment that is expected to complete millions of calculations in a split second." The whole infrastructure is much more complicated still. "Besides the hardware, we have the operating systems, the computer languages, the system and application softwares, all the way up to advanced user-machine interface such as sound, video, and even virtual reality."

Ensuring a correct infrastructure is highly non-trivial and devising new methods to achieve this goal is an active research topic both in industries and universities. "The role of a mathematician in this area is to ensure correctness by analysis and proofs; and a reliable technological infrastructure is no less relevant to society than that of a reliable social or political infrastructure."

Note to Editors:

Attached photo available on request. Please call Mrs Shirley Kwok of the University's Information and Public Relations Office at 2609-8897.