

ASU professor to explore DNA based computing

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Arizona State University School of Life Sciences professor Wayne Frasch was recently awarded a \$1.2 million grant from the Defense Advanced Research Projects Agency and the U.S. Air Force Office of Science Research to fund a 2-year project linking DNA technology with computer science. This could result in a computer that uses DNA, rather than electronic components, to crunch numbers.

Frasch uses his lab's single molecule DNA detection technology--among the most sensitive detecting systems available in the world--to take advantage of a DNA property known as hybridization to make the calculations. Frasch believes what will result is a massively parallel computer that can make lots of calculations simultaneously.

A traditional computer solves problems one at a time using long strands of 1s and 0s, but Frasch's parallel computer will use DNA to make all the calculations at once, dramatically increasing the speed at which it can solve problems. Frasch expects a working prototype of the computer to be complete within a year, and a more refined, more powerful version within two years.

There are certain logistical problems that are prohibitively time-consuming and complicated, even for powerful modern computers. Frasch illustrates this with an example of a salesman visiting 100 diversely spaced cities trying to travel the shortest distance.

The problem has 9.3×10^{157} (or the number 93 followed by 156 zeroes)

possible answers, and with additional factors like costs of travel added to it, it can take the most powerful computers in the world several years to solve, said Frasn. Problems like the traveling salesman can also have implications for evacuation logistics, such as mapping out the most efficient routes for evacuees leaving a city due to a hurricane.

"Our computer will be able to calculate the solution for the optimal number of people who should take each road out of a city in order to evacuate the city in the least amount of time," Frasn said. "It will determine the best means to evacuate people from a large number of cities.

"The computer will also be able to determine the optimal logistics of moving in supplies to rescue people after a hurricane. It will be able to calculate an optimal course of action in a time frame that can save lives," Frasn added.

Source: Arizona State University

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