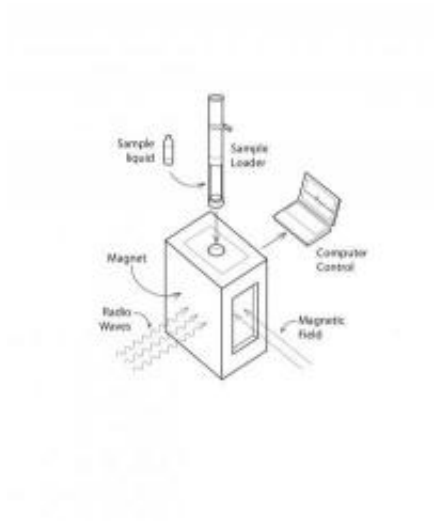
Liquids scanner for airport security

February 8 2011



In this sketch, a sample is loaded into the top of the machine where there is a strong magnetic field. Radio waves are used to scan the sample and the results are fed to a computer. Credit: Jan Conroy/UC Davis

(PhysOrg.com) -- Air passengers one day may be able to carry their soaps, shampoo and bottled water onto the plane again, thanks to technology originally developed at UC Davis to check the quality of wine.

The U.S. Department of Homeland Security's Science and Technology Directorate recently awarded a contract to a Denver-based defense firm to develop a magnetic resonance scanner that could be placed in airports and used to check bottles and cans for explosives without opening them.

A prototype of the machine will be constructed in the laboratory of Matthew Augustine, the UC Davis chemistry professor who invented and patented the technology, with an initial allocation of $800,000.

The technology is similar to the magnetic resonance imaging machines used in medical scanning. It employs a pulse of radio waves and a strong magnetic field to extract a signal that shows the chemical structure of the sample.

Augustine began experimenting with the technology some years ago to check bottles of wine for spoilage without opening them.

That technology was patented in 2002 and licensed by UC Davis to Madison Avenue Management Inc., which set up a subsidiary company, Winescanner Inc., to commercialize it.

After a thwarted 2006 plot in which terrorists planned to carry liquid explosives on board at least 10 transatlantic airliners, Augustine started looking into whether magnetic resonance could be used to identify more than bad wine.

"I'm a tinkerer, I like to build stuff," Augustine said.

Early tests showed that his wine-analysis technique could distinguish gasoline or other dangerous liquids from toothpaste or other innocuous ones.

But the challenge was to design a system suitable for use in airports: relatively small, easy and quick to use, and capable of scanning containers in a wide range of sizes and shapes, from lipsticks to water bottles.

Arriving at such a design involved careful trade-offs between high-

frequency radio waves, which give the best information about chemical structures but are blocked by metal, and lower-frequency waves that could pass through a soda can.

UC Davis is the lead subcontractor on the project. The contractor is Defense Capital Advisers LLC of Denver, which has a sublicense from Madison Avenue Management to develop Augustine's technology for airport security.

Provided by UC Davis