RESEARCH

MAKING AIR TRAVEL SAFER

New research, sensors pinpoint hazardous materials inside planes

By Mikel Livingston
Summer Reporter

A group of Purdue researchers hopes to make air travel a little safer.

With a grant from the FAA, six Purdue faculty members and 10 graduate students have developed a mathematical model which will help pinpoint the source of hazardous materials inside an aircraft's cabin.

The effort is sponsored by the Air Transportation Center of Excellence for Airline Cabin Environment Research, a group of universities of which Purdue is the co-technical leader. The Center is sponsored directly by the FAA and is focused on identifying potential threats to aircraft.

The project began in September of 2004 and is set up as a 10-year study.

"We are now at the end of the three year initial period," said Qingyan Chen, mechanical engineering professor and principal director of the Center. "We are negotiating with the FAA for further research."

The model works by a process known as inverse simulation.

"The final goal is to find the source," said Tengfei Zhang, a graduate student who worked on the project. "This will help up propose measures to protect from biological or chemical problems. With any airborne substance, we can use the mathematical model to make a simulation. By our calculations, we use this information to trace the contamination backward."

By placing sensors in the cabin, the model allows researchers to backtrack in order to determine the source of the pathogen, Chen said.

"If we have the source, we can use a model to determine how it is dispersed," Chen said. "It's not just terrorist attacks. Say you have the Avian flu or something life threatening. We can find the person responsible.

>> See RESEARCH, Page 4

>> RESEARCH

FROM PAGE 1

Flight attendants can go to the passengers around the person and give them masks."

With seven years left to go in the study, the team is far from finished.

"The next step we are proposing is to improve the computation of these," Zhang said. "Right now it takes a considerable amount of time but we hope to speed up the computation. Our final goal will be to do this in a fairly short time of several seconds."

Chen said the model will continue to be tested during this time.

"We need to continue the testing and make sure the model really works," Chen said. "Preliminary data show it works well but we need to make sure before we implement it in a real aircraft."

According to Chen, the technology is not limited to aircraft.

"This technology could be used not only for airplanes but for buildings," Chen said. "I really see a lot of different applications.

But it will be a long time before such technology is implemented.

"It depends on how much of a need there is," Chen said. "It will be a long while but we should get the possibility and the technology ready."

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