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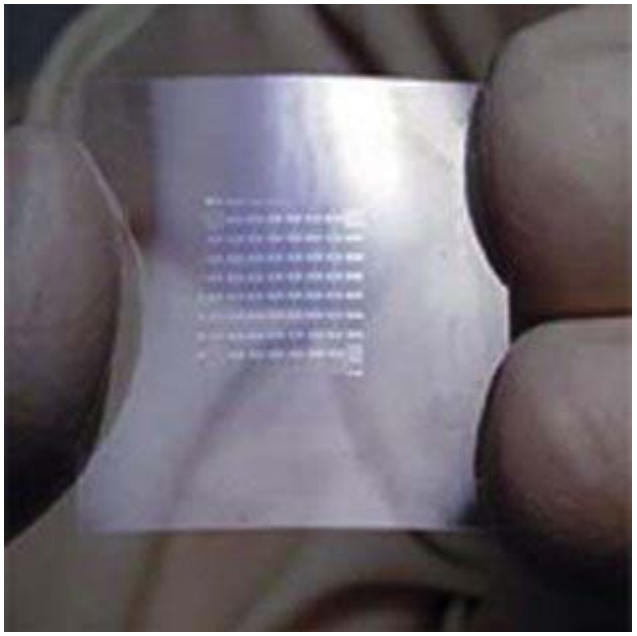
Building a "smart" carpet for safer living

By Vicki Hodder | Published 02/ 6 / 2008

Nearly one–third of American seniors 65 and older fall each year, and such falls cause more deaths than any other injury, government statistics show.



Mizzou Engineering Professor Harry Tyrer is using arrays of organic ink sensors such as those pictured above to build a "smart" carpet that would alert caregivers if a senior fell. Image courtesy of Harry Tyrer

Harry Tyrer, a University of Missouri electrical and computer engineering professor, hopes to create a safer environment for seniors. Tyrer has received $200,000 from the Alzheimer's Association to work with MU's nursing school to develop a "smart" carpet that would electronically monitor a senior's location and sound an immediate alert if the resident fell.

"This is an unobtrusive monitoring system that will increase the safety of seniors and improve their ability to live independently," Tyrer said.

Fall prevention and detection is at the center of a handful of Mizzou Engineering research projects, including an ongoing effort to develop video silhouette monitors that capture movement but still protect privacy. Joining forces with MU nursing Associate Professor Myra A. Aud, Tyrer is exploring how new sensor construction technology may apply to the problem.

Tyrer and Aud's smart carpet project incorporates a new type of sensor that

can be printed on thin, flexible sheets using what is known as “organic ink.” Organic ink sensors are not only flexible but potentially inexpensive—making it practical to use them in the thousands on a sensor sheet layered between a room’s carpet and carpet pad, Tyrer said.

Tyrer is developing circuits that will feed the sensor sheet’s signals several times a second to a computer for display and electronic analysis. Ideally, a caregiver will be able to “see” where a person steps on a smart carpet, assess that person’s gait and realize immediately if the person falls, he said.

All of which would be a significant improvement over current floor sensor systems, which rely on vibration readings that may easily be misinterpreted. Tyrer conceives of the system as a way for seniors to live both independently and safely longer, providing caregivers or family members an electronic emergency alert system.

That system would benefit frail seniors and people with Alzheimer’s disease alike, Aud said. While falls are a risk for many seniors, Aud said people with Alzheimer’s disease are at increased risk of falling because of the progressive damage Alzheimer’s inflicts on brains.

After developing and improving a prototype over the next two years, Tyrer plans to test the smart carpet at TigerPlace and The Bluffs, two senior housing complexes in southern Columbia. The researchers hope the carpet will register not only falls but changes in gait or behaviors that would serve as red flags for caregivers.

“If this turns out to be a good reliable fall detector, then we hope to see it used in homes, apartments and long–term care facilities,” Aud said.

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