

Safety, Human factors, And Resilience Engineering Lab

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Dr. Changwon Son established the Safety, Human Factors, and Resilience Engineering (SHARE) Lab in the fall of 2021 to further his research in human cognition and cognitive engineering. The SHARE lab is home to many projects with the hope to “improve safety and health” of all people.

“I wanted to do research on disaster response,” Son said. “How do humans perceive information? How do they make sense of ongoing situations? How do they adapt? How do they communicate with another person?”

After witnessing a workplace tragedy in the earlier years of his career, Son decided he was going to quit his job to pursue this research and further his education.

“What’s the underlying mechanism that puts people into an unsafe situation?” Son questioned. “I wanted to study more about why people behave a certain way... that’s why I became interested in human cognition and behavior.”

Son received his Ph.D. from the Department of Industrial and System Engineering at Texas A&M University where he did his doctoral research in resilience engineering in complex human systems. Soon after, Son joined Texas Tech Industrial, Manufacturing, & Systems Engineering as an assistant professor and established the SHARE lab.

“I wanted to do research, because that’s what I do best,” Son said.

In 2013, a fertilizer warehouse in West, Texas caught fire. Volunteer firefighters were responding to the fire as a chemical compound called Ammonium Nitrate was burning inside the plant eventually causing an explosion resulting in the death of 13 people.

“I read the incident investigation report,” Son said. “It said ‘Lack of situation awareness’ which means they didn’t know Ammonium Nitrate was being burned... Had they known, they would have decided to retreat instead of putting out the fire.”

This incident is one of many incidents that acts as a model for the work and research the lab is producing.



Photo: Stephanie Cross



Photo: Sara Wiechman

To improve the safety and health of all individuals and organizations.

“In my lab I wanted to understand - What if we provided more information before the firefighters get to the scene?” Son asked. “Does it affect their decision making and firefighting performance?”

The SHARE lab uses a variety of complex technology to conduct its research. Students in the lab use technology like virtual reality (VR) to run different simulations and complete missions in teams. Some examples of these missions include house fires and structural fires.

“The cool thing about this VR is that there is a force reaction; force feedback,” Son said when referencing the fire nozzle used in the lab simulations. “Once you pull the trigger, water is coming out of the hose virtually and then your body gets pulled back because of the force.”

Although the research in the lab does have an interest in firefighters, it also focuses on other sectors of emergency response such as police departments, search and rescue, and healthcare workers. Some of the other projects in the lab include Multiple Simultaneous Disaster (MSD) which focuses on how to cope with disasters, Disruptive External Stimuli (DESS) focusing on the auditory distraction of active shooters and how to de-escalate

such situations, and First Incident Responders’ Mental health and wellness (FIRM) focusing on first responders’ mental health regarding PTSD, anxiety, and depression.

“Pursue the great goals,” Son said when referring to the lessons he wants his students to take from the lab. “There is always a greater goal: Protecting humans... We always need to make this society safer.”

For more information visit the SHARE lab website at <https://www.thesharelab.org/> or the TTU IMSE website at <https://www.depts.ttu.edu/imse/> or contact Dr. Changwon Son at changwon.son@ttu.edu or (806) 742-3543.

