AWARD-WINNING RESEARCH WITH A PURPOSE: Tennessee Tech Student Revolutionizes Flood Simulations to Garner Swiss Award

Computer Science doctoral candidate Mohammed Bulbul Sharif from Tennessee Tech University has received the Best Paper award from the Swiss Platform for Advanced Scientific Computing. The top award was for a paper titled, “Performance Evaluation of a Two-Dimensional Flood Model on Heterogeneous High-Performance Computing Architectures”.

Computer based flood simulations are a powerful tool for protecting lives and property. They allow scientists and emergency managers to visualize what happened during a flood so that communities can be better prepared for next one, and they allow forecasting of future “what if” events so that emergency preparedness can be set up beforehand. The problem is that the computer simulations are time consuming. If you begin a large area flood simulation with your Monday morning coffee, you won’t receive results until Saturday morning. Mohammed’s work gives you results in less than 20 minutes.

“During my internship at Oak Ridge National laboratories (ORNL) last summer, I was fortunate to have access to one of the world’s two fastest computers,” said Sharif. “The code (TRITON) I developed on the Summit supercomputer is the fastest two-dimensional flood simulation code in the world and performs 200,000 trillion calculations per second

“Sharif simulated the 2017 Hurricane Harvey at 5-meter resolution using TRITON on the Summit under 20 minutes” said Dr. Sheikh Ghafoor, professor of Computer Science at Tech and Sharif’s research advisor. The simulation was 390 times faster than the previous fastest simulation. Fast simulations like this can help researchers to experiment and improve the flood prediction models enabling emergency planners to prepare for impending flooding from events such as dam breaks and hurricanes.

Computer Science doctoral student Mohammed Bulbul Sharif won the Best Paper Award from the Swiss Platform for Advanced Scientific Computing.

Sharif’s peer-reviewed paper was published in the Association for Computing Machinery conference proceedings. The flood modeling research is a large collaborative effort between ORNL scientists Mario Morales-Hernandez, Shih-Chieh Kao, Sudershan Gangrade, Katherine J. Evans, TTU faculty Alfred Kalyanapu, Sheikh Ghafoor and doctoral students Md. Bulbul Sharif, Thomas Hines, and Tigstu Dullo. The flood modeling research was funded by the U.S. Air Force via ORNL. Sharif has been invited to present the paper at the PASC conference in Geneva, Switzerland in 2021.