



## Engineer hopes to improve campus, state roads



Dr. Mohammad Moin Uddin has a drone sitting on top of his desk, looking as if it could take off at any moment.

Uddin, an ETSU assistant professor in Engineering Technology and a professional engineer, has the same sort of contained energy, ready to follow a new pursuit.

The drone is connected to Uddin's interest in energy efficiency and sustainable design and construction.

"I am constructing a whole building energy model of my office building, Wilson-Wallis Hall, to determine what energy costs exist now and what changes could be made to reduce those costs," Uddin says. "If we could reduce those costs by 10 percent, and then extend the changes to all the campus buildings, think of the money that could be saved."

The drone is part of a plan to send the flying devices over the tops of campus buildings to search for cracks, leaks and other deficiencies where heat or air conditioning escape.

Uddin also loves teaching and serves as the graduate coordinator for his program. "I especially enjoy helping students become involved in research," Uddin says. "They learn so much through learning what others have done and then going through the research process themselves."

Another of Uddin's interests recently earned him an ETSU Research Development Committee (RDC) grant. He hopes to improve the quality of highways, bridges and other transportation infrastructures.

He explains, "In the 1960s, states used prescriptive specifications for highway construction. For instance, a 'recipe' would give details about exactly what materials should be used for construction. Later, a statistical analysis method was used to determine a contractor's quality of work. Now, projects are handled by each state saying, 'This is the finished product we want. Figure out the best, most cost-effective way to produce the quality we need.' This is known as performance-based specifications.

"But how can the quality of, for instance, a highway extending a great many miles be assured? What tests need to be formed? How many samples are needed? What processes, procedures and practices should be followed to ensure design quality?"

Since each state handles transportation infrastructure differently, Uddin will interview the state quality assurance manager in every state and accumulate best practices. Then, he will amass a list of the best of best practices as a model for all states to use. The result should produce highways and bridges that are of the highest quality and the most cost-effective, he says.

Uddin developed an interest in this topic as a graduate student and brought his research interests with him to ETSU in 2011.

His journey to East Tennessee began in his native Bangladesh, where he lived in the large capital city of Dhaka. To earn his master's degree, he spent five years in Japan. First, he studied at the University of Ryukus to earn a graduate degree in engineering, and then he did postgraduate work assisting students as they began doing research projects.

"That was a defining time for me," he says. "I realized that I loved to teach, and I would need to get a doctoral degree to teach at the graduate level."

To reach that goal, Uddin enrolled at the University of Kentucky, where he earned a Ph.D. in civil engineering.

Now, Uddin is turning his attention to his many ideas for better, more efficient living, often collaborating with ETSU's Facilities Management and Director of Sustainability Kathleen Moore. For Uddin, the drone may be just the beginning of innovations to come.

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