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TTU Alumni Dr. Jonathan Sprinkle Wins National Award

TTU graduate Dr. Jonathan Sprinkle has recently won a prestigious award from the National Science Foundation, focusing on cyber-physical systems. The Career (or Early Faculty Development) award is the NSF's top honor for junior faculty members, and includes a $460,000 grant over a five-year span to support his education and research goals.

Dr. Sprinkle's has engaged high school students in his project, putting them behind the wheel of a full-sized robotic car so they can see firsthand the way that cyber-physical modeling techniques are put to use in real-world applications. The 10^{th}-graders from Tucson high schools will then go on to write computer code that monitors and controls the car's performance for certain tasks. Dr. Sprinkle's code-verification software will ensure consistency and safety in aspects like velocity, steering angle and distance as the car is put through its paces. His research team aims to expand the project to more schools, and is courting additional grant money to reach that goal.

Cyber-physical systems are the connection between computers and real-world applications, as seen in areas like mobile patient monitoring, air transportation, robotic cars, robotic surgery, nano-level manufacturing, energy-efficient buildings, and much more. Smartphones have become an ideal platform for cyber-physical systems, with their processing capacity and multiple systems for wireless connectivity. The problem with cyber-physical systems comes down to their complexity and intricate mix of controls, computation and communication. With the systems built from scratch, problems are seldom identified until the testing phase, often sending the project back to square one. The built-from-the-ground-up nature of the systems means that the economies of scale have yet to kick in, and the projects often go over budget and past deadlines.

In the case of Dr. Sprinkle's research, the robotic car is serving as a test bed for new modeling ideas, helping the development team troubleshoot the project in a safe environment while giving prospective engineering students hands-on experience. "We want to build models so that we know by the time the models verify themselves that they are going to be safe," said Dr. Sprinkle. "I know the students are going to use the car safely, because we are only going to allow them to generate safe code." The hope is that through Dr. Sprinkle's research, problems can be pinned down before the testing phase, leading to graphical models and new programming languages that will make it easier to develop the systems.

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