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Title: Keeping the Software Monster in Check

Abstract: As reported by the Wall Street Journal in 2011, "software is eating the world". For better or for worse, software continues to devour the world like a monster. Currently, software systems and applications are being created at enormous rates and of dubious quality. For example, millions of mobile applications are used by billions of people and devices, exposing users to billions of bugs and security threats. As another example, autonomous cyber-physical systems are increasingly emerging in the form of self-driving cars and drones—whose software safety and security remain suspect, especially as these vehicles have already killed people. As a last example, a software failure on the Boeing 737 Max killed nearly 350 people in 2018 and 2019, resulting in the grounding of such planes.

All of these different kinds of software suffer from decay and defects in their high-level design (e.g., software architectural drift and erosion) and low-level code issues (e.g., null dereference errors and buffer overflows). To address these issues, we have and continue to produce a wide variety of software analysis, testing, and design approaches—with the hope of keeping the software monster in check. I will cover some of these approaches and projects that you can work on as part of your honors research program.