Automatic Unit Testing on a Large Scale Robot Soccer System

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This summer I continued my honors project from the year entitled “Continuous Integration Framework”. The goal of that project was to introduce a framework in which software testing could be accomplished for Bowdoin’s RoboCup Soccer Package. The fellowship I received this summer, allowed me to continue to push that work and develop additions and implementations for that framework with the Northern Bites, Bowdoin’s RoboCup team.

The core of the framework is a piece of software called Serenity. It’s purpose is to monitor GitHub.com, a website that the Northern Bites use to facilitate changes to the codebase. Once a potential change is detected, Serenity automatically executes a series of tests to ensure that the change is ready for deployment. This summer I made it easier for tests to be added to Serenity’s list and made a few testing suites for various subsystems within the Soccer Package.

The purpose of these tests is not only to speak to the reliability of changes to the codebase, but also ensure that a change retains old behavior that may be relied upon. For example, a developer could improve an algorithm’s efficiency but forget to set certain values appropriately that cause another algorithm down the line to function improperly. I am proud to say Serenity prevented me from doing that very thing. In addition to improving easy of use for Serenity, I worked on several systems this summer including the Behavior system.

In my work with the Behavior system, I helped to improve the command sequence for approaching the ball, which included a new exception to account for a new kickoff rule this year. This year, the defending team, when on a kickoff, cannot enter the center circle until the ball moves or ten seconds have passed. As a result of this rule change, we had to prevent our robots from approaching the ball given those circumstances.

Other changes in the approach ball commands resulted from a vastly improved Localization system (responsible for determining where on the field a robot is). With reliable localization the robot can make a snap decision about where to kick the ball, rather than having to reestablish where it is before a kick. This allows play to be much faster, but required the command sequence to expect a faster decision.

In the future, more tests could be added to Serenity’s list so that more modules and systems are tested for reliability. This would increase productivity for the Northern Bites heavily and allow for the confidence of bug free code. The approach ball commands could also be refined further and tightened up so that it is seamless. Work on that has already commenced and the results look promising.

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