CSE 621: Fundamentals of Software Engineering
Project Phase 3 – Performance Trials and Model-Based Testing
Due Date: 11:59pm on Monday, May 4, 2020

Description

In this phase you will ensure your code generator works as expected by demonstrating it's robustness through two approaches: multiple tests runs and model-based testing.

Details

1. In order to ensure your code generator works for more than one example you will need to create four (4) more statecharts that conform to the specifications from Phase 2, using StarUML. You will construct four (4) statecharts that are significantly different from the one provided to you (and from each other) that demonstrate the functionality of the robot and the code generator. You may need to fine tune your code generator if you run into issues.
    a. For each of the statecharts, run your code generator to obtain the resulting Java code.
    b. Run the code on the robot and demonstrate that it works as desired.
    c. You will need to create videos of your robot completing each of the four statecharts.
2. Following the demonstration of robustness from the trial approach above, you will need to demonstrate robustness of your robot through the application of model-based testing. You will need to create test suites for two (2) of the models created in Step 1.
    a. Choose two models that demonstrate significant functionality for your robot.
    b. For each statechart, create the Symbolic Execution Tree (SET) to show all execution paths for the robot (keep in mind you can use subsumption to avoid infinite paths).
    c. For each statechart/SET, you will need to define the test suite that will provide 100% coverage of paths. This will take the form of a series of actions/triggers that will cause the paths to be followed (e.g. "press button", "drive over red paper", "be closer than X distance to the wall", "drive over blue paper"…). This will essentially be a script for your robot to follow. Keep in mind that for each SET there will be multiple (many?) scenarios to ensure 100% coverage.
3. Run your robot through the scenarios for one (1) of the generated test suites. Select the larger of your two test suites from Step 1 (if equal in size, choose either) to execute. You will document this process in video form as well.
    a. For each scenario in the test suite, record a video of the robot following those steps; narrate the video to highlight it following the script.

What to Submit

- A PDF Containing the Following:
    - 4 StarUML Statecharts
    - The Generated Java Code for Each Statechart
    - 2 SETs for your selected statecharts
    - 2 Test Suites for the generated SETs (each test case is an order list of actions)
- Videos Demonstrating Robustness
    - 4 Videos For Part 1 demonstrating your 4 StarUML Statecharts
    - Videos for each scenario in your Test Suite (number will vary)
    - Clearly Name/Label Each video to correspond to PDF document

Grade Breakdown

There will be a total of **100 points** available, broken down as follows:

Category	High Quality	Medium Quality	Low Quality	No Points
StarUML Statecharts	4 significantly different state charts were submitted that conform to the specifications for LeJOS statecharts. The statecharts are free of errors and showcase diverse functionality. **20 Points**	There are some errors regarding conformance to specification for any of the statecharts, or they are not significantly diverse enough to provide coverage of functionality. **15 Points**	There are less than 4 statecharts submitted, or there are significant issues with quality of the submitted statecharts. **10 Points**	No statecharts were submitted. **0 Points**
Generated Java Code	The Java Code generated by your code generator is correct, and there are 4 code submissions submitted that correspond exactly to the submitted statecharts. **20 Points**	There are minor discrepancies between the statecharts and generated Java code, but the functionality is not significantly impacted. **15 Points**	The code generator was incapable of generating code for 1 or more of the provided statecharts. **10 Points**	There was no successfully generated code submitted. **0 Points**
4 x Robustness Videos	Each video demonstrates the robot completing the tasks outlined by the 4 statecharts. The behavior is as defined in the statechart with no unexpected behavior. **10 Points**	The videos submitted do not show the robot conducting behavior that represents the 4 state charts (some issues with expected behavior). **7 Points**	There are less than 4 videos submitted. **5 Points**	There were no videos of the statecharts submitted. **0 Points**
Creation of 2 x Symbolic Execution Trees	Two full SETs have been correctly generated for the selected statecharts. There are no extra paths/states included, and the SET represents the optimal path coverage. **20 Points**	The generated SETs are missing paths or contain unnecessary paths (due to the improper application of subsumption). The errors impact the correctness of the SETs. **15 Points**	Only one SET was submitted and/or was correct. **10 Points**	No SETs were submitted. **0 Points**
Creation of 2 x Test Suites	Two test suites have been created based on the generated SETs. Each test suite demonstrates 100% path coverage of the statechart and SET. The format of the test suite is appropriate and easy to understand. **20 Points**	The submitted test suites do not demonstrate 100% path coverage for the selected statecharts, or the specification of the test suites is unclear, making it difficult to determine the required testing actions. **15 Points**	Less than two test suites were correctly included in the submission. **10 Points**	No test suites were submitted. **0 Points**
Videos of Test Suite	There are videos submitted for EVERY test case in the selected test suite. The videos are clearly labeled and narrated to demonstrate correct behavior. The videos are professional. **10 Points**	There are one-two videos missing from the submission from the complete set of test cases, or the videos lack proper labeling, narration, or professionalism. **7 Points**	A significant number of videos were not submitted as part of this phase. **5 Points**	No test suite videos were submitted. **0 Points**