Propose a vacation student project for Summer 2020

This call is now closed

The deadline for making your proposal(s) was 18:00 Friday 13 March 2020.

This form is for one project proposal, so to propose multiple projects please submit a separate form for each project. Any queries, do ask - Toby.

Project supervisor email *

lucas.cordeiro@manchester.ac.uk

Title of the project *

Automatic Generation of Test Cases to Ensure Security in Software Systems Implemented in C

Source of funding *

- ( ) Department funding requested
- (•) You have your own funding (e.g. research grant)

Objective of the project *

The main objective of this summer project is to implement a solution for the automatic generation of test cases using code coverage criteria supported by the ESBMC tool [1] in an environment of continuous integration. The solution will use open-source benchmarks to obtain validation metrics, such as those made available by SV-COMP [2], a software verification competition. The specific objectives are:

(i) Implement a solution for automatic generation of test cases using the code coverage criteria.
(ii) Implement and validate the tests generated using the ESBMC tool.
(iii) Check the possibility of automating the choice of regression tests, based on the commits inserted in the SV-COMP code.

[1] https://ssvlab.github.io/lucasccordeiro/papers/ase2018.pdf
[2] https://sv-comp.sosy-lab.org/2020/

Number of students requested (justify if > 1) *

1

Start date, end date, total duration (weeks) *

5 weeks (June 24th to July 28th)

The benefit to the Department *

The University of Manchester has recently created a research group on Digital Trust & Security, which is led by Prof. Emma Barrett and underpins a broad range of societal challenges and is intrinsically multidisciplinary. This research group encompasses a broad range of topics, including the security and resilience of the underlying ICT, work practices and processes, law and regulation, human behavior, social norms and context. This summer project will contribute to the primary targets of this research group, which include but are not limited to ensure the security of software systems. This topic is of extreme importance to formally build verified trustworthy software systems, where trustworthy comprise five attributes: reliability, availability, safety, resilience and security. Lastly, the results of this summer project can also be used in undergraduate courses, where we teach the C programming language.

The benefit to the student *

The students will learn skills related to software testing and verification with a particular focus on security.

Skills needed by the student. *

C/C++ programming languages and logic in computer science.

Details of the work that the student would do *

For the development of this summer project, an iterative methodology will be used. Therefore, for each phase, we will have the implementation and validation of the proposed methodology.

1. In the content analysis phase, all the theory referring to areas such as test case generation, continuous formal verification and continuous integration, will be reviewed.

2. In the implementation phase, the development of the summer project should be carried out, with the codification of the proposal for generating test cases based on coverage and analyzed during the previous phase. During coding, integration with the ESBMC tool will take place.

3. In the validation phase, the first part will be to validate the proposal to generate test cases automatically. After that, we will check whether the test cases are valid, testing and verifying the proposed code and, if possible, finding flaws in the tested code.

Infrastructure requirements and any required staff support other than the project supervisor *

A computer (or laptop) that is already available in our laboratories.

Supervision arrangements throughout the duration of the project (named staff and dates covering the entire duration) *

Lucas Cordeiro (June 24th to July 28th)

Location of the project work (building/room) NB projects must be on-campus *

Kilburn building / Collab.