# GUI-level Sequence testing with HOL-TestGen

## Phd Proposal

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**Abstract**:
Generating tests at the GUI-level of an application is a variant of a test sequence generation problem. Some functionality of a system may only be accomplished by following some complex sequence of GUI events. For example, to open a file a user may have to click on the File Menu and then select the Open operation, and then use a dialog box to specify the file name, and then focus the application on the newly opened window. Obviously, increasing the number of possible operations increases the sequencing problem exponentially. This can become a serious issue when the tester is creating test cases manually.

In this thesis, we propose to extend and adapt existing techniques in the HOL-TestGen system to generate test- sequences based on extended finite state machines (EFSM's). Particular emphasis is put on the "mediation" between abstract events (write_file("F")) and sequences of GUI-events (find_top_left_menu_button;...) as well as the concrete generation of code to be executed in a GUI test environment ("robot").

**Context**:
Nowadays, a significant part of testing in the industrial practice is done by hand by manual testers on the basis of application scenarios (stemming from the requirement analysis phase). Given the fact, that these tests have to be repeated potentially on various system platforms (MacOS, Windows, Linux) for various GUI technologies (Nokia's Qt Software Frameworks, Web/HTML/AJAX, Java SWT, Eclipse RCP and AWT, Swing, Mac OS X Carbon/Cocoa, Native Windows (MFC, .NET, etc.), iPhone/iPod/iPad CocoaTouch), the test space explodes easily for a commercial application to be run on various versions and platforms. Moreover, the size of the problem in itself is already substantial: Unlike a command line interface system, a GUI has many operations that needto be tested. A relatively small program such as Microsoft WordPad has 325 possible GUI operations. It is therefore rewarding to combine GUI test-frameworks with model-based (EFSM) test sequence generation techniques such as HOL- TestGen.

**Objectives:**

Develop a technology to automate testing of applications

1. choice of a "practical modeling language"
   (UML State machines ? Test Sequence Diagrams ?)
2. develop a mediator mechanism (mapping abstract system events to GUI events ...)
3. demonstrate feasibility with several medium-size case studies...

**Working programme:**

1. - Analysis of existing tools ("GUI robots")
2. (research prototype as well as Squish, Seapine, Ranorex, etc.)
3. - Analysis of existing programmable GUI test frameworks
4. - Develop an executable Isabelle theory for a chosen GUI test framework
5. - Develop a "mediator theory" that maps abstract events from a system model (e.g. an ESFM) to GUI-events
6. in the GUI test framework. (including identification problem)
7. - Choose a "practical modeling language" for system models (e.g. an existing Statemate theory or an own EFSM format in Isabelle)
8. - Perform several medium size case studies to show feasibility.

**Collaborations**:

- **Acial**

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