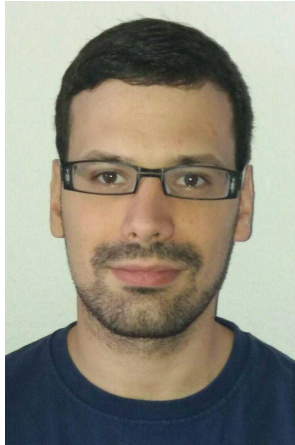


# Automated Test Case Generation for Reactive Systems from a Controlled Natural Language

(Masterthesis)



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## Motivation

Testing is one of the key components in assuring software quality and reliability. This is especially the case for reactive systems, where errors can cause serious damage to material and humans alike. Requirement based testing generally involves several manual steps to obtain test cases from natural language requirements. This process is very time and resource consuming and limited by testing budget and human resources.

A controlled natural language (CNL) based automated test generation would allow to reduce the involved manual steps.

## State of the Art

For reactive systems the tool NAT2TEST\* uses a formal methods based approach combined with a limited CNL. Particular is the support of time in test generation. A feature most other approaches lack.

Outside of the field of reactive systems the use of lexica and ontologies has been successfully used to support more keywords through synonyms allowing for a broader CNL.

## Objective

Goal of this thesis is to develop a automated test case generation based on the CNL Attempto Controlled English with time and lexicum support. We try to answer the following three research questions:

1. How well suited is Attempto as a general purpose CNL for writing requirements for reactive systems?
2. Are lexica based approaches suitable for supporting multiple keywords for reactive systems requirements?
3. How good is the test generation compared to manual testing and NAT2TEST\*?

## Methodology

The automated test generation is built around the Attempto parser, which provides a parse-tree for valid Attempto sentences. From that tree we develop an adequate formalisation based on certain keywords to generate logical formulas for our SMT-Solver based test generation. We implement a lexica-based approach to support multiple keywords.

\*<http://www.cin.ufpe.br/~ghpc/>