

## Technology Profile Fact Sheet

**Title:** Method of Converting a Computer Program with Loops to One without Loops

**Aliases:** None.

**Technical Challenge:** To provide a high level of assurance that delivered source code conforms to its initial design specification by creating a semi-automated verification tool that harnesses Automated Theorem Proving (ATP) techniques. An obstacle in achieving this goal is the initial translation of control-flow diagrams into the mathematical equations needed to utilize ATP techniques.

**Description:** This prototype processes control-flow diagrams to replace nested and branched loops with recursive functions. This allows effective analysis via ATP mechanical techniques implemented using Computational Logic for Applicative Common Lisp (ACL2).

**Demonstration Capability:** Prototype demonstration and tool software is available upon request.

**Potential Commercial Application(s):** Further enhancements in development would lead to a software assurance tool that could be used by programmers to iteratively check for bugs during the development stage and by testers to mathematically prove that the final software product does precisely meet its specifications.

**Patent Status:** A patent application has been filed with the USPTO.

**Reference Number:** 1400