THESIS INFORMATION

Title: **Model-driven and Rule-based Development of Smart IoT Wearables for Software-intensive Systems**

Major: Computer Science

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PhD. Student: Ton Long Phuoc

Advisors: Dr. Le Lam Son, Dr. Pham Hoang Anh

University: Ho Chi Minh City University of Technology, VNU-HCM

1. ABSTRACT

A wearable is a lightweight body-worn device that relies on data-driven communications to keep people connected purposefully, for instance, for fire-fighting, prompting fast-food clients, and medical treatment. With rise of wearable computing in the era of IoT-driven smart applications, programmers now expect the time to market for these devices to be shortened. While support for IoT programming in general has gathered traction, tool proposals that automate the development of smart solutions based on the Internet of Wearable Things, though of paramount importance, still stay on the sidelines. We propose a code generation tool called Micraspis that allows a wearable to be described both functionally and architecturally - as if they are two sides of the same coin. The tool has an underlying model-to-code transformation mechanism to generates source code that is executable on a specific IoT programming platform such as Arduino. Our experiments demonstrate that programming code generated by Micraspis amounts to at least 60% of the source code needed to fulfill the business logic of ordinary wearable devices. We conduct an interview to meticulously collect programmers' assessment on how Micraspis assists them in programming and architecting smart IoT wearables. A total of 161 programmers responded to a Likert scale questionnaire, with which at least 65% of them either agree or strongly agree. Overall, the results show that Micraspis has promising applicability in supporting IoWT-enabled smart solutions.

PhD student has published nine scientific articles, including one in an SCIE-Q1 journal (PhD student is the first author of seven articles, co-authored one), one in a domestic journal, and seven in the proceedings of international conferences (two A2-ranking and four Scopus-indexed).

2. MAIN CONTRIBUTIONS

- ***Propose a source code generation approach for applications by a combination of* model-driven and rule-based development**. Generating source code for applications in software engineering has always been a concern of software developers in the field. The challenge of properly defining application domains as well as specifying applications is always a difficult question for source code generation.
- ***Propose a code generation framework for* smart IoT wearable applications in software-intensive systems.** The thesis focuses on the problem of generating source code for applications with two approaches: (i) using modeling; (ii) using rule sets for constraints in the application**.**
- ***Based on the proposed framework, build a tool called Micraspis to generate source code for applications running on smart IoT wearables.*** At the same time, the thesis proposes a method to evaluate the tool for correctness and effectiveness in an objective and reliable manner.

ADVISOR 1	ADVISOR 2	PHD STUDENT
Dr. Le Lam Son	Dr. Pham Hoang Anh	Ton Long Phuoc