Chapter 3

UAPPI: A Platform for Extending App Inventor Towards the Worlds of IoT and Machine Learning

Antonio Rizzo
University of Siena, Italy

Francesco Montefoschi
University of Siena, Italy

Maurizio Caporali
University of Siena, Italy

Giovanni Burresi
University of Siena, Italy

ABSTRACT

This chapter describes the opportunities offered by an extension of MIT App Inventor 2 named UDOO App Inventor (UAPPI). UAPPI aims to facilitate learning in programming the behavior of objects in the physical world (e.g., internet of things). In addition, UAPPI offers the opportunity to experiment with the emerging field of interactive machine learning. Two case studies devoted to different user groups are described to illustrate these opportunities. In the first, dedicated to middle school students, a door is made interactive; in the second, aimed at interaction designers, a light source is controlled by the blink of the eyes and the smile intensity.

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INTRODUCTION

Most common visual programming environments for youths and newcomers to the computing world (for example, Scratch, Alice, Greenfoot, AgentSheets) provide solid platforms for creative activities such as designing games, animating interactive stories and running simulations. However, much of the activity is confined to a computer screen and limited to the programming the behavior of pixels. App Inventor is a programming environment that provides an important step toward programming real-world tools.

App Inventor was designed to make the development of mobile applications easy and rewarding (Wolber et al, 2015). Today’s mobile devices are better equipped to interact with the physical world than a computer thanks to, for example, GPS, magnetometers, gyroscopes, accelerometers, near-field communications and so forth. App Inventor offers a specialized environment for programming real-world tools, which in turn makes programming more attractive to novices.

In what follows, we present an extension of the App Inventor 2 (AI2) Integrated Development Environment (IDE): the UDOO App Inventor (UAPPI for short; available at http://appinventor.udoo.org in a beta version). This extension transforms App Inventor into an environment for programming not only smartphones and tablets but also physical objects, by integrating microcontroller-managed sensors and actuators onto a UDOO board running Android (http://www.udoo.org; Palazzetti, 2015). UDOO App Inventor aims to gently introduce beginners to the intriguing world of the Internet of Things (IoT), a fast-growing frontier of computing that is transforming everyday objects into human-centered interactive systems (Kortuem et al, 2010).

Below, we briefly introduce App Inventor and two of its key features, live programming and event-driven programming. We then explain how UDOO for App Inventor works and the range of incentives that it offers novices of any age, acquainting them with coding by addressing real world issues with innovative solutions right from the start including the intriguing world of Machine Learning (Amershi et al., 2014).

APP INVENTOR

App Inventor for Android is a visual programming platform for creating mobile applications (apps) for Android-based smartphones and tablets. It was developed at Google Labs by a team led by Hal Abelson on sabbatical from MIT (Abelson, 2009). Today, App Inventor runs as a web application administered by staff at MIT’s Center for Mobile Learning - a collaboration of MIT’s Computer Science
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