

TEACHING CYBER-PHYSICAL SYSTEMS USING MIT APP INVENTOR 2

Ghassan Bati¹ and Saman Zonouz^{2*}

¹Teaching Assistant, Umm Al-Qura University, SAUDI ARABIA, gfbati@uqu.edu.sa

²Assist. Prof., Rutgers University, THE UNITED STATES, saman.zonouz@rutgers.edu

*Corresponding author

Abstract

A Cyber-physical System (CPS) is defined as a system which combines computation and communication abilities along with monitoring and/or control entities in the physical environment. This definition shows how crucial the use of sensors and actuators are because they bridge between the cyber and the physical worlds. Currently, smartphones are equipped with many sensors. There is no doubt that smartphones are becoming, to many people, the primary communication device in their daily lives. Also, sensors allow smartphones to experience a revolution across a wide range of domains. Using sensors of smartphones in cyber-physical systems introduces mobile cyber-physical applications that are defined as computer systems which process and respond to data from the physical space and make decisions which influence it. It is anticipated that as sensors become smaller and cheaper, more markets will get introduced. MIT App Inventor is a blocks-based programming tool which simplifies building Android applications. It targets several audiences like educators, employees, volunteers, designers, product managers, researchers, and entrepreneurs. It deals with many types of sensors which makes it a great educational tool to teach cyber-physical systems for undergraduate and graduate students. Furthermore, this teaching methodology will enhance the students' skills in terms of dealing with this enormously growing market of smartphones and the world of applications. This paper presents several scenarios and examples of using MIT App Inventor 2 in a class setting to deal with AccelerometerSensor, Clock, Microphone, LocationSensor, and OrientationSensor.

Keywords: Cyber-physical Systems, Smartphones, Sensors, Android, MIT App Inventor 2, Teaching, internet of things, internet of everything.