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RESEARCH ARTICLE

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Improving student engagement on programming using app development with Android devices

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Abstract

This work presents our experience on Android teaching at Miguel Hernández University (Elche, Spain). We decided to orientate our courses toward Android app development, and encouraged students to carry their Android phones or tablets to the classroom. The results, in terms of student motivation, satisfaction and engagement in programming have been extraordinary.

KEYWORDS
Android, app development, coding, engineering education, student motivation

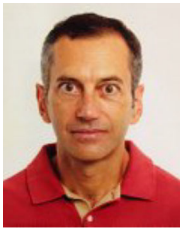
1 | INTRODUCTION

Increasing student motivation to programming subjects in Engineering and Computer Science degrees has been a key issue in Miguel Hernández University (MHU) since its creation in 1997. We have been equipping our classrooms with different devices, mainly robotic devices, with successful results. Nowadays, however, such hardware is no longer necessary. The mobile devices are now everywhere and the task of developing apps is highly motivating for most of the Engineering students. In this paper, we present our experience in Android and Java teaching at MHU (Elche, Spain). Since 2012, we decided to orientate some of our courses toward Android app development, and encouraged students to carry their Android smartphones or tablets to the classroom. The results, in terms of student motivation, satisfaction and engagement, have been really positive.

Object-oriented programming languages and, in general, computer programming or coding are dry, difficult subjects for some students [15]. Many of them do not get the necessary motivation to keep on studying these subjects. However, mastering a programming language is a necessary skill for future engineers. Moreover, coding is inherent in many subjects of the Engineering and Computer Science degrees [5], from the most basic courses, where the students usually learn languages as C, C^{++} or Java on console applications, to advanced courses as Robotics, Microcontrollers or Control Theory, where different languages can be used as programming tools (Matlab, assembler, Python, etc.) in combination with lab devices. Our experience in teaching such subjects [6,22,23] shows that students are discouraged when delving deeper in the programming language features and finally, they are only able to learn their basics.

In order to increase student motivation, different alternatives have been used for the last years. They can be roughly classified in four groups:

- To equip the classroom electronic devices and robots [3]. The students find programming a much more motivating task when their programs can make a robot move, walk, or even become intelligent. Obviously, the main drawback of this alternative is the cost of the equipment, which cannot always be afforded.
- The use of remote laboratories [8]. Remote laboratories help in keeping costs low, as multiple students, which operate it through the Internet, can share a single device. There are several disadvantages, though: concurrency of several students at the same time, devices that need human



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M. A. VICENTE received her MS degree in Electronics Engineering from University of Valencia in 1999. In 2007 she obtained her PhD degree (extraordinary doctorate award) from Miguel Hernandez University. Since 2000, she is working as associate professor at Miguel Hernandez University, Systems Engineering and Automation Department. Her teaching subjects include linear circuits theory and android programming. She has carried research on innovation in engineering education, computational neuroscience, and computer vision. Currently, her research is focused on mobile health.

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