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AdMoVeo: an educational robotic platform for learning behavior programming

Abstract

Most of the design students do not have inherent affinity towards programming and electronics. The AdMoVeo robotic platform is designed, purely for teaching the industrial design students basic skills of programming and for motivating and encouraging the design students to explore their creativity with their passions in graphical and behavioral design.

1 Introduction

Like many other design departments, we are facing the challenge of teaching the engineering principles and practices such as computer science and mathematical modeling to design students that are neither mathematicians nor computer scientists [1]. Most of the students in our department do not have an inherent affinity towards programming and electronics. But they do have passion in visual designs and product behaviors. Traditional ways of teaching programming and electronics by lectures combined with exercises had been tried in our department, but the students found that it was hard for them to build the link between the theory and the practice. Design students are often eager to put the just learned knowledge into their practice, if not immediately, as quickly as possible. Any longer delay in delivering the hands-on experience only builds up their frustrations and disappointments. The AdMoVeo robotic platform is designed purely for the purpose of teaching the industrial design students

basic skills of programming. Moreover we aim at a platform that motivates and encourages the design students to explore their creativity with their passions in graphical and behavioral design, which in turn gives them spontaneous and intrinsic drive in learning programming.

2 Hardware design

The design of AdMoVeo features a detachable Arduino Diecimila board and two wheels integrated within the round shape of the chassis (Fig. 1). The chassis and motor mount are made from transparent acryl glass, giving it a see-through look into everything inside. The sensors include two line readers at the bottom, three infrared distance sensors at the sides and in the front with sensibility of 0 to 20cm, two light sensors in the front, two sound sensors at the sides and two optional encoders coupled to wheels. The actuators include two motors driving two wheels, a buzzer and a RGB color LED integrated into the acryl chassis. An XBee module is optional for wireless communication.

3 Software design

The software design is based on a layered structure of composition and inheritance. It has mainly two major parts – the firmware IDuino running in the Arduino microcontroller of the AdMoVeo robot, and the Java API library for programming and controlling AdMoVeo in the Processing programming environment. Processing is an open source programming language and

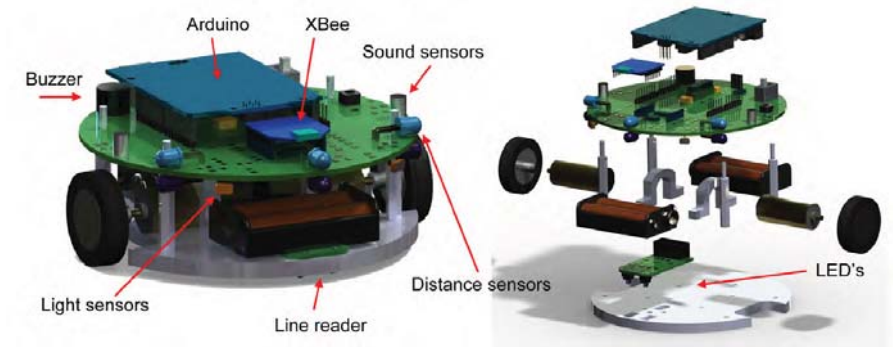


Fig. 1. 3D rendering of the design of AdMoVeo

environment widely used by artists, designers and researchers to program images, animation, and interactions.

4 More Information

More details about the design of the AdMoVeo are described in [2] and at admoveel.nl. Information about the Creative Programming course can be found at wiki.id.tue.nl/creapro, and example videos created by students are available at wiki.id.tue.nl/creapro/WallOfFame.

References

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2. Alers, S. & Hu, J. (2009) AdMoVeo: A robotic platform for teaching creative programming to designers. In M. Chang, R. Kuo, Kinshuk, G.-D. Chen, & M. Hirose (Eds.), *Proceedings of Learning by Playing. Game-based Education System Design and Development* (pp. 410-421). Berlin: Springer.

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