Robots for Learning

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ABSTRACT

An increasing amount of Human-Robot Interaction (HRI) research is focused on the development of social robot tutors. While robots have been popular as a tool for STEM teaching, the use of robots as tutors is novel. The field of HRI has started to report on how to make effective robot tutors. However, many challenges remain. For instance, what interaction strategies aid learning, and which hamper learning? How can we deal with the current technical limitations of robots? Answering these and other questions requires a multidisciplinary effort, including contributions from pedagogy, developmental psychology, (computational) linguistics, artificial intelligence and HRI, among others. This abstract provides an overview of the current state-of-the-art in robot tutors and describes the aims of the Robots for Learning (R4L) workshop in bringing together a multidisciplinary audience for furthering the development of market-ready educational robots.

Keywords

Human-Robot Interaction, Robots in Education, Tutor Robots, Child-Robot Interaction

1. INTRODUCTION

An increasing amount of HRI research is focused on the development of applications of service robots in everyday life. In education, while robots have been popular as a focus for STEM teaching (see Lego Mindstorms or Thymio [5]), the use of robots in other learning scenario is novel. The field of HRI has started reporting on how to make effective

robot and how to measure their efficacy [2, 6]. Social robot tutors

> the jump to social robotics is a bit fast, we should include any robots using for educational purposes that aimto increase social interaction either between the robot and the user or among users

have the potential to enhance learning via kinesthetic interaction [3], can improve the learner's self-esteem [], and can provide empathic feedback [1]. Finally, robots have been shown to engage the learner, to motivate her in the learning task or to enhance collaboration in a group []. However, many challenges remain and this workshop aims to bring together a multidisciplinary group of researchers to discuss these challenges and share expertise.

The second iteration of this workshop builds on the previous version hosted at the IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN), 2016. The previous workshop utilised keynote speakers, participant speakers, and small group discussions to raise issues and challenges facing the community researching robots for use in delivering educational content. The second version of this workshop seeks to engage with more researchers in the field, and draw a more multidisciplinary audience to further the development of market-ready educational robots.

2. BACKGROUND

Mubin [4] distinguish three roles for robots in education: **tutors** - providing help to students, **peers** - stimulating learning and **tools** - physically enhancing a concept to learn.

At first, in the 70's qnd 80's robots tented to be introduce in schools as a tool for teachers to teach about robotics or other STEM sciences. However, this specificity of usage of robots penalized their adoption in educational contexts [**?**] Nowadays, with robots being cheaper and more easily deployable, application in education and deployment in schools become accessible to other types of learning.

The current state of the art presents robots used in various learning scenarios related to non-programming curricula. Often involving social robots these scenario usually investigate the social aspect of the robot-learner relationship:

empathy [], immediacy, spatial arrangement[], . . .

limits of the soa: - Design of this experiment often without involving educational specialist or practitioners. - long term use of robots - many works have been done in CSCL to introduce technologies (computers, tablets and other hci device ias tools) need to llok at how and why - proving the impact of learning with a robot, is it only motivational?

3. OUTLINE OF THE WORKSHOP

The aim of this workshop is to engage scholars who wish to gain expertise in education and in robotics. Participants will benefit from hearing from the forefront of field and from discussions on how to move from fundamental research towards the development of market-ready educational robots.

The workshop aims will be achieved through

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