‹› Proposta de Trabalho para Dissertação de Mestrado 2022/2023 ‹›

Augmented Reality for Enhanced Data and Information Visualization in Robotics Research

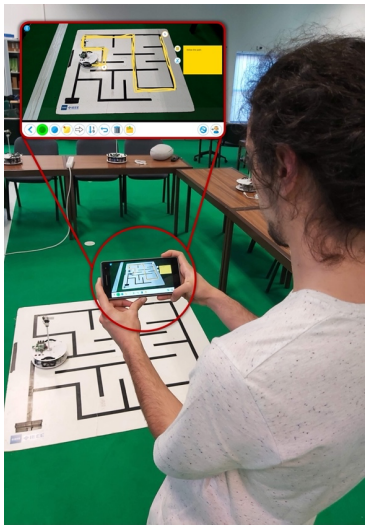
Área Científica:	Informática
Orientadora:	Eurico Pedrosa (DETI-IEETA)
Co-orientador:	Paulo Dias Marques (DETI-IEETA)
Colaboradores:	Bernardo Marques (DigiMedia)
	João Alves (DETI-IEETA)

MOTIVATION

Augmented Reality (AR) technologies enable users to visualize and interact with virtual objects more easily than they can through a simulation or a computer screen, making them more appropriate when a) access to computers is not easy and b) the time for searching and acquiring assistance is limited [1][2]. In Robotics research, AR presents several possibilities for the future, as direct manipulation of robot skills, presentation of information associated to the robot and use of new low-cost hardware [3].

WORK DESCRIPTION

The goal of this dissertation proposal is the development of AR features to provide the audience of a robotic competition with an augmented representation of the competition in real time, informing, for instance, about robot performance and decisions.



The solution may include, among others, the following features:

- Allow users to visualize what a specific robot is "thinking" (displaying its log) and other details, by pointing a mobile device to it;
- Present information captured by the robot (images, videos, logs), to understand if the robot properly identifies signs while moving through a specific course;
- Allow to track a robot on the course in real-time;
- Enhance the area surrounding the course (with different virtual content for different user profiles) where the robot is passing. Several tracking methods may be investigated depending on the technologies used or available [4];
- Display an augmented representation of the robot (similar to a "ghost" of the robot on the track), allowing users to understand how the current run compares to other runs;
- Enable to create a Heat Map of the areas of the course where the robot has spent more time.

Some challenging factors are related to the necessary interdisciplinary knowledge in areas such as Virtual and Augmented Reality, Human-Computer-Interaction, Computer Vision, Computer Graphics, Robotics, and others.

The work will be organized according to the following plan:

1. Literature review of the state of the art on AR for robotics;
2. Identification of possible usage scenarios and requirements;
3. Familiarization with Virtual and Augmented Reality SDK's, API's and Devices - ROS, Unity, Vuforia, OpenCV, etc;
4. Iterative design and development of prototypes;
5. Continuous evaluation and testing of the developed prototypes to demonstrate their usefulness;
6. Writing the Dissertation.

RECOMENDED COURSES

- RVA - Virtual and Augmented Reality
- RMI - Smart Mobile Robotics
- CV - Computer Vision
- IM - Multimodal Interaction

Commented [BM1]: Verificar se com os novos mestrados os nomes ainda se mantem

For more information

- Eurico Pedrosa - efp@ua.pt
- Paulo Dias – paulo.dias@ua.pt
- Bernardo Marques - bernardo.marques@ua.pt

- https://sites.google.com/view/varlab/home

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