

Bachelor's Thesis, Term Project

Touch the Virtual Reality Using a Hand Tracking Controller and Wearable Device for Haptic Feedback

Supervisor (s): (Assist. Prof. Dr. Eng. Amir Roushdy)

Wearability of robotic devices will enable novel forms of human intention recognition through haptic signals and novel forms of communication and cooperation between humans and robots. Specifically, wearable haptics will enable devices to communicate with humans during their interaction with the environment they share. The proposed tactile system is extremely wearable, effective, inexpensive, and completely wireless. There are in fact no workspace restrictions apart from the ones related to the gesture recognition technique. **There is a Lab Engineer from the ARATRONICS Laboratory, guiding and directing the student with Assist. Prof. Dr. Eng. Amir Roushdy.**

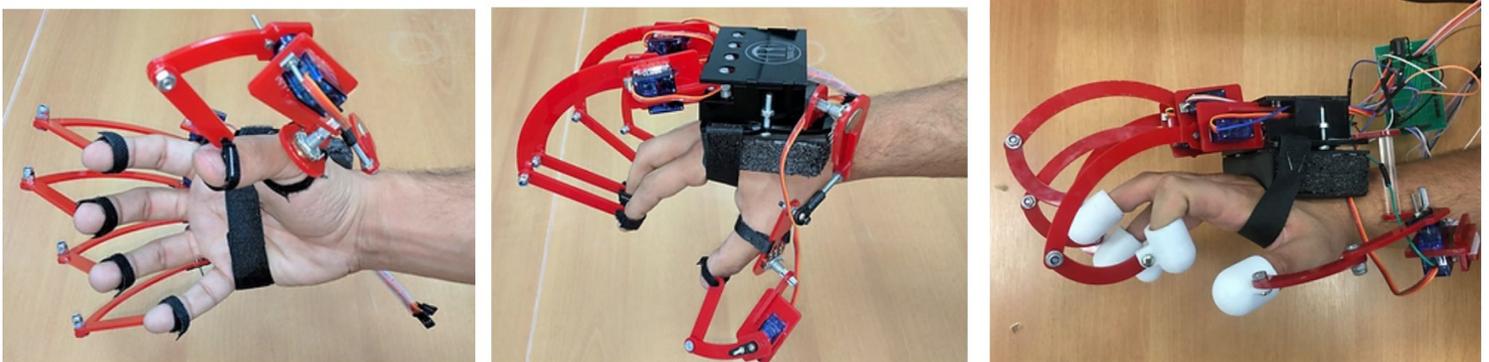


Fig.: Touch the Virtual Reality Using a Wearable Device

Project description and objective:

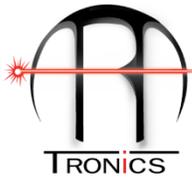
In this project, the head-mounted display (HMD) and the haptic device are used in conjunction as a method to provide feedback to the users in order for more realistic work to be conducted in the virtual space. The VR environment was created with Unity, which can manipulate machines in a virtual space. A Leap Motion controller was used to track and display the hand of each subject in a VR environment. The haptic device was configured using Arduino and a vibration motor to provide feedback on the fingertips. As a result, the tracking of the hand using Leap Motion together with gloves shows that the detection rate greatly differs depending on the material of the glove. Using the VR environment and the haptic feedback, we demonstrate the effectiveness of intuitive operation, which is similar to reality.

Research focus of this project:

- Literature review on the project should be studied properly.

For more details please contact:

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- Not only, creating a software control system for the project but also the hardware.
- Experiments using the gadget and control system should be built properly.
- The outcomes must be documented.

Requirements:

- Passionate to learn more about 3D Printing design, Robotics and control.
- Prior mechatronic design expertise is desired like “SolidWork”.
- Enthusiasm for completing actual practical work with 3D printing staff (design fabrication and construction).
- A method of working that is both structured and self-contained.

General tasks of the project:

- The complete methodology is already available in the ARATRONICS Lab, so we will discuss it from the first day to start the automation process for it
- Fabricate the machine/system using 3D printer/CNC machine (small parts).
- Assembly all parts of the system/glove.
- Changing the working variables and see the effect on the locomotion of the system/glove.

Other notes:

- A weekly meeting with the advisors will be required for this project, as well as weekly progress updates (*The meeting could be more than once during the week based on your progress and based on your achievements*).
- You should to be in the Lab two days per week (*It could be more than two days based on your progress and based on your achievements*).
- All reports must be prepared in the style of a research paper.
- The outcome of this research will be published in one of the coming international Conferences and , or Journal