

TU/E Wearable senses

About ManusVR

ManusVR is located on Strijp-S in Eindhoven and makes Datagloves; gloves that track hand movement and position and uses this data to create a digital model of the hand. This model is used for e.g. virtual reality applications, medical applications and robotics.

Our product distinguishes itself from the competition by its compact form factor, reliable data and comprehensive software package.

The next steps for our company are to broaden our product spectrum regarding wearable sensors (mostly regarding motion tracking and feedback) and improving our dataglove.

Why does ManusVR offer these assignments

Two members of our team have studied ID at the TU/e and we are very familiar with ID's way of working, hopefully leading to good collaboration. We believe Industrial Design students can deliver work that is valuable to our own product development process.

Furthermore, we want to meet new talent. ManusVR is growing and we will require more colleagues in the near future. Talented and motivated Industrial Design students are prime candidates to reinforce our team.

In return we offer an opportunity to do work in the context of your education that is likely to have a significant impact on real products for a real company that will exist in the real world. Not to mention working with fun and cutting edge technology.

About the assignments

All assignments concern areas of development that Manus is currently pursuing. This means the results of your work is likely to have a big impact on the products ManusVR will make in the near future.

The assignments can be done by groups or individuals in any format, and the scope of the assignment can be adjusted accordingly. We are open to discuss alternative ideas and approaches.

We will also provide opportunity to test the results in VR if possible and access to tools such as a SLA 3D printer and a laser-cutter.

Assignment : Conductive yarn

Duration negotiable

Description

ManusVR wants to integrate conductive yarn in the ManusVR Glove, to facilitate the detection of fingers touching one another.

The goal of this assignment is to deliver a recommendation in the form of a functional prototype. The decisions made need to be well explained in the form of a concise report. A risk analysis of the concept is highly appreciated.

We have identified a few issues with this idea, that could prove to be especially challenging and need to be addressed:

1. We want the glove to be washable. How can we make sure the addition of conductive yarn will not undermine this requirement.
2. The ManusVR glove needs to last a year of intense use. How can we make sure the conductive yarn will not be the weak link in the design.
3. The assembly of the product is handled by a third party, and different components are sourced from different industries. How can we make sure the ManusVR Glove is still manufacturable on an industrial scale without complicating the process too much.
4. The Textile components of the ManusVR glove will have to connect with a removable electronics module. How can we make sure the end user can remove the hardware from the glove, and still have a durable and easy to use connection with the conductive yarn elements in the Fabric.
5. The implementation of the conductive yield reliable results with no false positives during product use. The shape and positioning of the electronics need to be optimized for this.

Required skills and opportunities for development:

1. Fabrics
2. Electronics
3. Design for Manufacture
4. Sourcing and Supplier communication
5. Prototyping
6. User Testing

Assignment: Motion Capture Suit

Duration negotiable

Description

ManusVR is considering making a suit that can be tracked in VR, a motion capture suit. We want to use proprietary trackers, that work with the SteamVR tracking system.

The goal of this assignment is to deliver a design proposal in the form of a functional prototype using standard Vive tracking Pucks. The decisions made need to be well explained in the form of a concise report. A risk analysis of the concept is highly appreciated.

This project leads to a concrete proposal for a product that ManusVR is planning to manufacture. However, up till now ManusVR has specialized in the design and manufacture of tracking gloves. This means this project will require research to determine the exact requirements of such a suit.

We have identified a few issues with this idea, that could prove to be especially challenging and need to be addressed:

1. Ease of use is paramount. We don't want a suit that takes 10 minutes to put on. Aim for a 30 second set-up time.
2. Because the tracking models need to be attached to all extremities, they need to be connected somehow. Both regarding power management and signal processing. The method of connecting cannot limit movement and comfort too much.
3. The suit, and its electronics, needs to survive a year of intensive use.
4. The suits will be used for motion capture. This means the users must be unrestricted in their movement by the suit. Nor must parts of the suit hamper movement by snagging or colliding with the environment.
5. The suit should fit all adults, can that be done with one design, or are separate size version needed?
6. How can the suit be kept clean with little effort.

Required skills and opportunities for development:

1. Fabrics
2. Electronics
3. Design for Manufacture
4. Sourcing and Supplier communication
5. Prototyping
6. User Testing

Research sensor fabric interaction (ManusVR Glove)

Duration negotiable

Description

ManusVR uses stretch and Flex sensors on a fabric glove, to measure hand movement.

If desired, this project can also solely focus on Stretchable sensors, that could replace the currently used flex Sensor.

We are interested in researching better ways to integrate these sensors in our gloves, aiming for the sensors following the hand pose perfectly, without measuring artifacts caused by friction and snagging in the glove.

The goal of this assignment is to deliver a recommendation in the form of a a concise report and prototypes to back up claims. A risk analysis of the concept is highly appreciated.

We expect this project to be highly iterative, testing prototypes made with a variety of materials and shape configurations.

We have identified a few issues that are the focus of this project.

1. Depending on the sensor type, how can the shape and the integration of the sensor be improved in order to improve sensor performance.
2. How can the materials of the glove be improved, to increase sensor performance.
3. Can the respective sensor technologies applied to gain additional information regarding hand pose.
4. What are the implications of promising Sensor configurations for the manufacturability and the cost of the glove.

Required skills and opportunities for development:

1. Fabrics
2. Electronics
3. Design for Manufacture
4. Sourcing and Supplier communication
5. Prototyping

Applying Haptic Feedback in wearable electronics

Duration negotiable

Description

ManusVR will integrate haptic feedback in the next iteration of the glove. We already determined we will forgo force feedback, so no exoskeleton robot contraptions for now. But there is still a lot to explore in the realm of vibration motors, electropolymers, shape memory alloys and muscle wire.

The goal of this assignment to explore and prototype possible haptic feedback solutions and determine what and how they can communicate in the context of the ManusVR Dataglove use-cases.

The main deliverables for this assignment are a recommendation in the form of a report, a pro/con overview and prototypes/reasoning to back up claims.

We expect this project to be highly iterative, testing prototypes made with a variety of technologies. The resulting proposal must demonstrably adhere to the provided requirements.

.We have identified a few issues that are the focus of this project.

- 1) Modularity: Because not all use-cases require haptic feedback, we propose a modular approach: A solution that can be attached to the glove and is sold separately.
- 2) Determine what types of information are most important to communicate, and how should they be communicated (clearly) with the proposed technology.
- 3) Comfort: Restriction of movement and loss of comfort must be avoided as much as possible.
- 4) Durability: Some use-cases are in rough environments. The proposal needs to be durable and only detach from the glove when desired.
- 5) Manufacturability: Because the proposed solution will serve as a basis for new products directly, availability of components, manufacturability and production costs are a factor.

Required skills and opportunities for development:

1. User experience
2. Prototyping
3. Electronics
4. Design for Manufacture
5. Sourcing and Supplier communication