PV160
HCI Lab + Visit Lab

Semester Kickoff Meeting,
Spring 2024

Course Basics

- Individual or team work on research projects related to HCI or Visit labs
- Each student has a “supervisor” to consult with
- Evaluation based on mid-semester and end-semester presentations of your work
- No fixed teaching schedule, individual/team consultations
- Possible basis for long term cooperation - Bachelor, Master theses

The LAB

- This room (A421)
- Opened 24/7, shared google calendar
- Equipment:
  - Stereoscopic projection screen
  - Motion Capture system
  - VR headsets: HTC Vive, Oculus/FB/Meta Quest, Pico Neo
  - 3D printer
  - Force Feedback devices

Goal of Today’s Meeting

- From the list of topics, select the one(s) of your interest and discuss it (them) with the corresponding supervisor(s).
- Today or in the following days (**until Friday, March 1**), agree with a supervisor on your topic and discuss the time schedule.
- After agreeing on the topic, you will be finally enrolled in the course (you need to ask for permission through information system).

Possible Topics

- List of prepared topics, will be presented by their supervisors.
- You can come with your own idea for the project, we will discuss them individually after the presentation today.

- Now take a notebook and mark titles and supervisors of interesting topics…

(long) list of topics...

Hybrid Game

Hybrid events are playing an increasingly important role. Conferences are organized where participants can be present on site or online. An essential part of this is networking, exchanging ideas with others.

The idea is developing a game where offline and online persons play together to solve puzzles in a room or location. Only together they can solve it. The idea is that they play it pairwise at the same time - one online and one person who is on site, e.g. by wearing the online buddy as a necklace via smartphone.

Contact: Simone

Photo by visuals on Unsplash

Photo by Antenna on Unsplash

Evaluation of Spectatorship Experience

Spectating other people playing games has become a mass phenomenon over the last years

However, to the best of our knowledge, there exists less research on how such approaches can be evaluated to assess if they provide a positive spectatorship experience

We will focus on interactive possibilities for live streaming as first step. We identified four use cases depending on the level of disruption/involvement: 1) Viewing, 2) Chat interaction, 3) Stream overlays/interaction, and 4) In-game interaction

Goal:

- Analyze already existing questionnaires (e.g., for player experience) to identify which ones can be interesting for the evaluation of spectatorship experience and how the identified objective metrics and subjective metrics can correspond with them
- And if not how such questionnaires can look like

Image from https://mitcentralcoast.org/wp-content/uploads/2018/08/esports.jpg

Image from https://www.computerhowtoguide.com/wp-content/uploads/2016/12/playing-games.jpg

Contact: Simone

Evaluation of Gameplay Visualization Tool

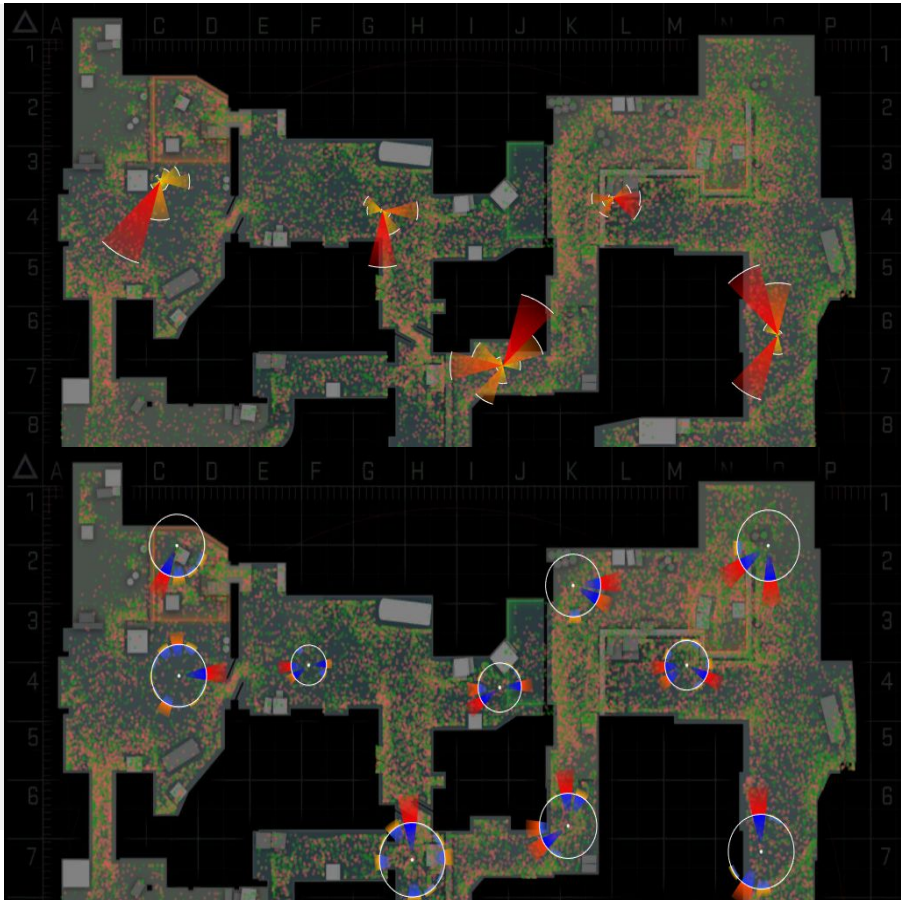
Rose diagrams are useful for visualizing both magnitude and direction values at the same time. As such they can also serve as a valuable visualization for level designers to, for instance, visualize the amount of hits coming from a particular direction. Insights gained can then, in turn, inform the design of a level.

The goal of this project is **to evaluate an existing tool** that uses such rose diagrams with game designers, ideally level designers.

Tasks thus include preparing the data for the study

- developing a study protocol
- recruiting around 10 level/game designers
- conducting interviews with them

The interviews should consist of predefined tasks and open-ended questions to understand performance and gather feedback on usefulness, benefits, and drawbacks as well as insights gained.



Contact: Simone

Quantified self at work and digital humanism

Quantified-self technologies (QSTs) *"those technologies that help people collect personally relevant information for the purpose of self-reflection and gaining self-knowledge"* (Li et al., 2010)

Aim and task: Development of a self-tracking tool to improve productivity at work. Integrate a set of design (gamification) elements into it and test the acceptance of these elements. Investigate the extend to which these elements create "conditions of worth" or support "self-reflection".

Relevant work:

- Choe, E. K., Lee, N. B., Lee, B., Pratt, W., & Kientz, J. A. (2014). Understanding quantified-selfers' practices in collecting and exploring personal data. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 1143–1152. https://doi.org/10.1145/2556288.2557372
- Avrahami, D., Williams, K., Lee, M. L., Tokunaga, N., Tjahjadi, Y., & Marlow, J. (2020). Celebrating Everyday Success: Improving Engagement and Motivation using a System for Recording Daily Highlights. Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, 1–13. https://doi.org/10.1145/3313831.3376369
- Sailer, M., Hense, J. U., Mayr, S. K., & Mandl, H. (2017). How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. Computers in Human Behavior, 69, 371–380. https://doi.org/10.1016/j.chb.2016.12.033
- Feng, S., Mäntymäki, M., Dhir, A., & Salmela, H. (2021). How Self-tracking and the Quantified Self Promote Health and Well-being: Systematic Review. Journal of Medical Internet Research, 23(9), e25171. https://doi.org/10.2196/25171

Photo by Pixabay

Contact: Simone

Mini Game for Esports Training

E-Sport players need to practice the skills necessary for optimal performance. We are already looking at mental health and teamwork. But do you have any other brilliant ideas?

Your task would be working with us to design and develop a minigame oriented around training some important life skill for esports players. We also need to develop means of reliably accessing the data from this minigame for research purposes and to track skill development. We can discuss VR as an option as well.

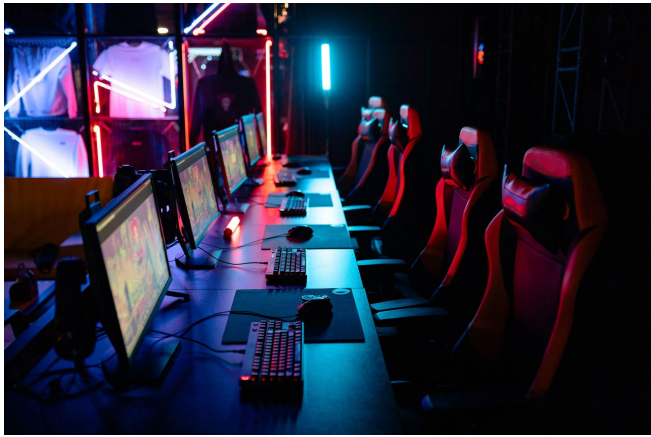


Photo: Yan Krukov from Pexels
https://www.pexels.com/photo/gaming-setup-for-competitive-esports-9072394/

Contact: Simone + Danielle

Mobile Augmented Reality Mini Games

Photo: Mika Baumeister on Unsplash
https://unsplash.com/photos/person-holding-silver-iphone-6-sWVAxoLmIzY

Mobile augmented reality games have gained significant popularity due to their ability to blend virtual experiences with the real world, creating immersive gaming environments.

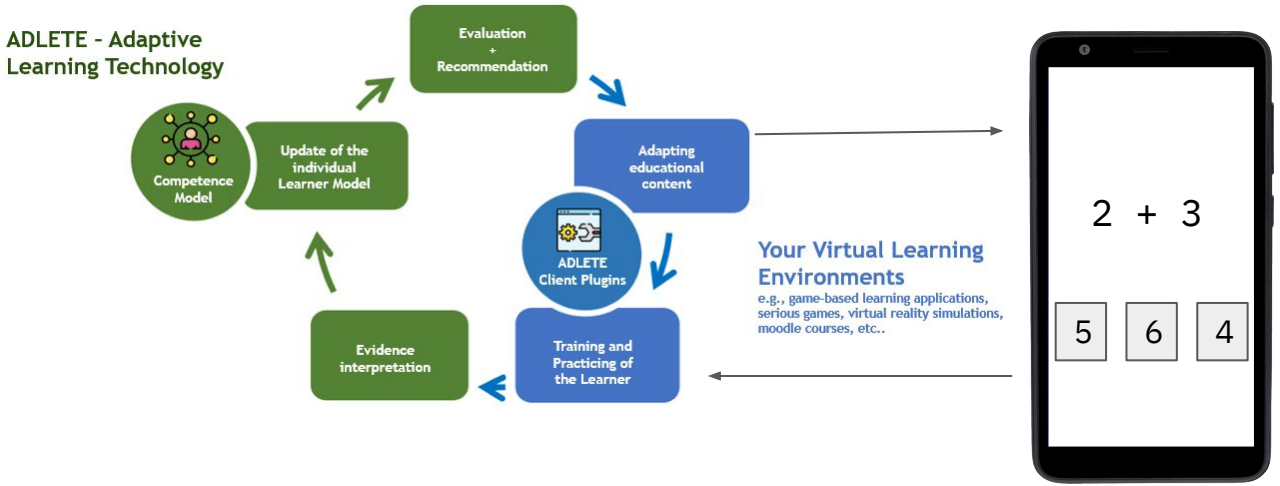
Aim and task: Design and development of an Mobile augmented reality (MAR) mini-game. We will also evaluate and analyse existing MAR games to create a repository for comparison of different HCI principles like interaction, usability, interface design etc.

Contact: Vinaya

Game-based Learning APP for Arithmetic (Unity)

A demonstrator for an Adaptive Learning Technology called ADLETE

Dyscalculia is a learning disability in mathematics: Children might display deficits in **accurate or fluent calculation** and many others[1]



- Summarise current examples of Dyscalculia Apps.
- Develop a game-based learning App in Unity
- Creating basic Exercise Types
- Connect with the ADLETE Framework.[2]

[1] Luoni, C., Scorza, M., Stefanelli, S., Fagiolini, B., & Termine, C. (2023). A Neuropsychological Profile of Developmental Dyscalculia: The Role of Comorbidity. *Journal of Learning Disabilities*, *56*(4), 310–323. https://doi.org/10.1177/00222194221102925

[2] Athlete Adaptive Learning Engine Available From: https://gitlab.com/adaptive-learning-engine/arithmetic-demo

Contact: Flo

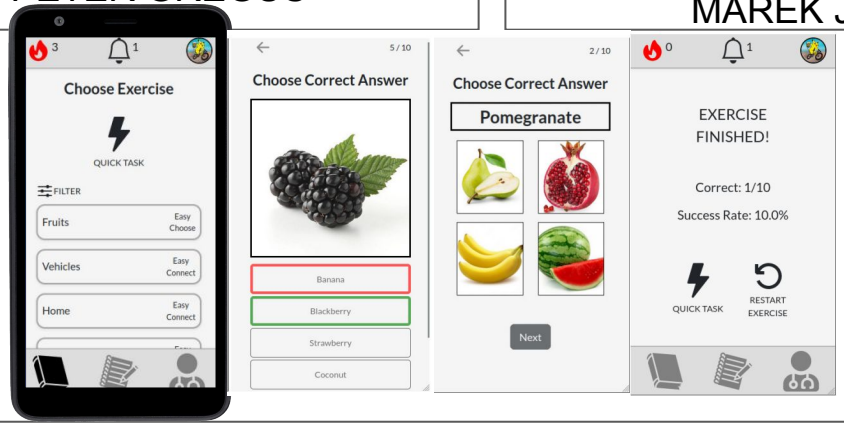
Aphasia Rehabilitation APP (Web-App)

A demonstrator for an Adaptive Learning Technology called ADLETE

Aphasia *is an impairment of language, affecting the production or comprehension of speech and the ability to read or write.*[1]

Speech Therapist Service Layer
Bachelor's Thesis
PETER GREGUS

User Interface for Patients in Speech Therapist
Bachelor's Thesis
MAREK JUSKO



Extend Project by:

- Think about what difficulty means in this context?
- Creating new Exercise Types
- Connect with the ADLETE Framework. (PHD-Project by Flo [2])

[1] National Aphasia Association [online]. [visited on 2022-11-09]. Available from: https://www.aphasia.org/.
[2] Athlete Adaptive Learning Engine Available From: https://gitlab.com/adaptive-learning-engine/arithmetic-demo

Contact: Flo

Blender addon implementing [idea]

- **Background:** Blender is an open-source 3D modelling tool. Polygoniq
- **Task:** Implement one of our suggestions or your own idea.
  - Make a procedural animation of a growing tree/flower out of a botaniq asset
  - Make an addon for "visual diff" mesh comparison (two meshes, highlights the difference, take inspiration in MeshGit)
  - Figure out how to serialize .blend files into text
- Possibly suitable as **Bc./Mgr. Thesis**
- Possible collab with **polygoniq** :)

Contact: Filip

Player Dynamics

How can playing together affect relationships? Bonding in online communities, live-streams, etc.

- Design a multiplayer game with variants of the main mechanics:
  - Cooperative
  - Competitive
  - One against the rest
  - One leading the rest…
- Implement in Godot using existing framework
- (Future work) Compare the effects of the variants on relationships in the community

From https://youtu.be/qvHRbKL6Fds

Contact:
Tomáš

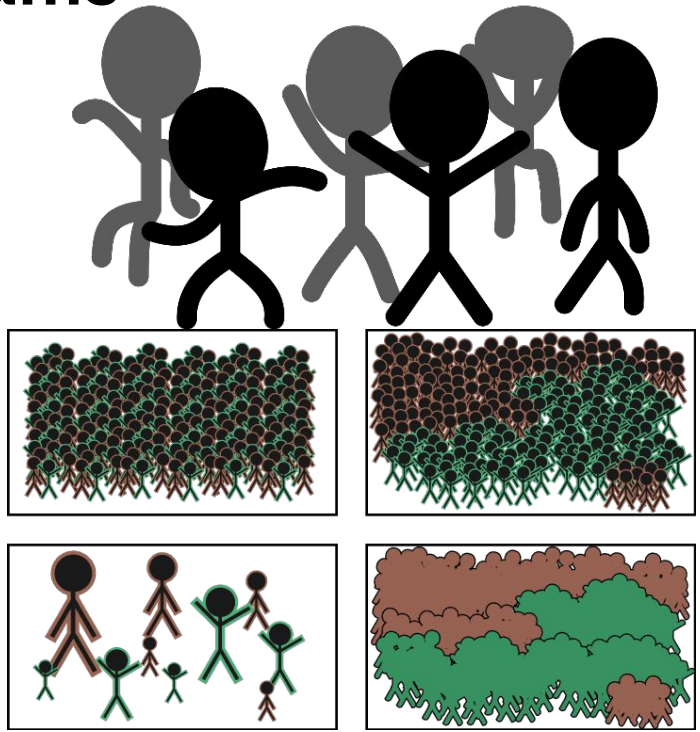
Audience Avatars ~~in Live-Streams~~

Background: Make ~~streams~~ hybrid events closer to offline events by representing the participants using animated avatars.

Task:

- Design various animated avatars and evaluate how they look in a crowd, OR
- Design/Program ways of grouping or abstracting large crowds of avatars, OR
- Program ways to control the avatars, OR
- Program atmospheric elements such as background color or aggregate sound effects based on audience mood

Contact:
Tomáš



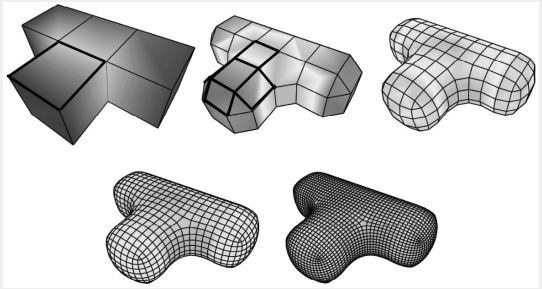
ImGUI Builder

1. XML based integration for ImGUI
   - Bc./Mgr. theses possible
2. Visual Studio (Code) integration
   - Bc./Mgr. theses possible

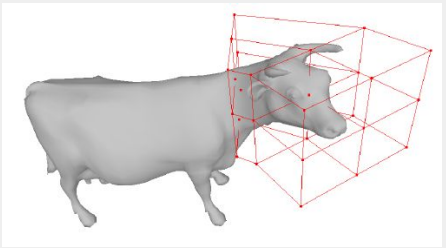
Contact: Jan

Practical Assignments for PA010

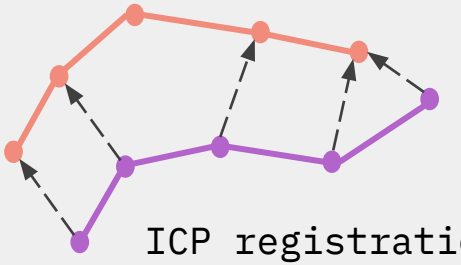
- Assignment = task implementation in C++ framework.
- Available tasks:



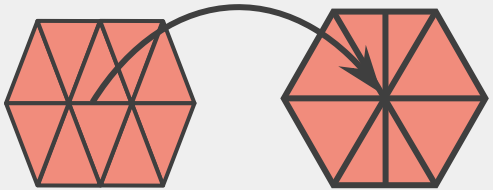
Doo-Sabin Subdivision



Mesh deformation



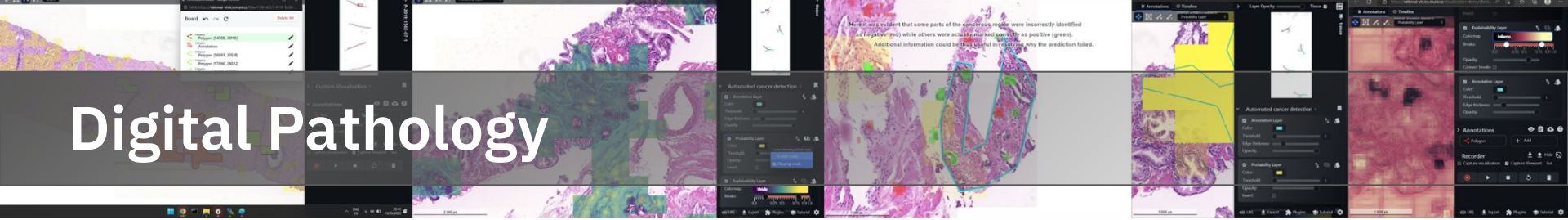
ICP registration



Edge collapse simplification

And more...

Contact: Katka



Digital Pathology

Contribute to a WSI viewer

Masaryk Memorial Cancer Institute

RationAI

- viewing gigapixel images realtime
- deployed for hospital & AI research
- international-level impact (European Biobank and more)
- possible Bc./ Mgr. thesis, part of BioMedAI **project**
- arbitrary level of engagement: no prior knowledge required, (JavaScript is advantage), both simple and advanced tasks

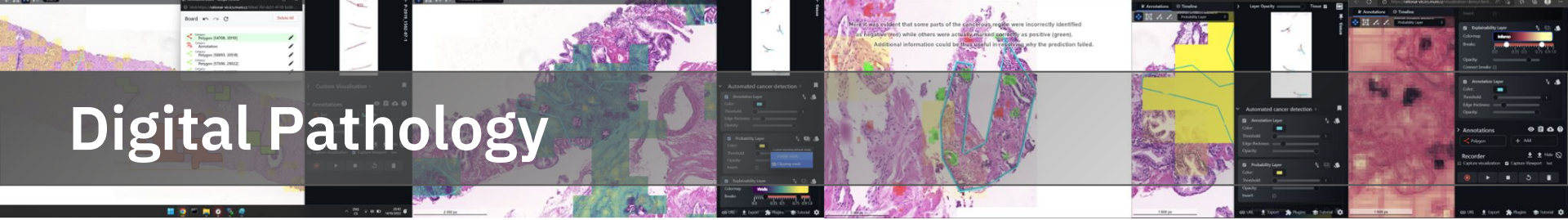
JS

node.js

WebGL

GraphQL

Contact: JH



Digital Pathology

(Some) Possible Tasks:

Masaryk Memorial Cancer Institute

RationAI

- Modular WebGL renderer for OpenSeadragon
  - contribute to a well-known and popular library
- Annotation system improvements
  - HCI with pathologists, UI improvement, rotation, layers, IO..
- History system design
  - Undo & Redo across the plugins
- Node.js server
  - Simpler runs on a localhost, integration with computational notebooks
- Real-time user collaboration
  - just like in google docs

More tasks available! Contact: JH

Unity interactive data visualizations

Interacting with data visualizations playfully can increase their understandability.

Your task will be to develop interactive versions of four visualization types - Line chart, Area chart, Stacked area chart, and Stream graph. The implementation will be done using the Unity game engine, focusing on interactivity and user experience. Implemented features should allow users to zoom, pan, and view specific data points or time frames.

Contact: Megi

3D Printing - HCI accessories

```
while(not success):

{

    1.  Real-life measurements
    2.  3D design
    3.  3D print
    4.  Real-life usage test

}
```

Contact: Jirka

Motion Capture Usage

Get familiar with Motion Capture technology. Design and create a short demonstration of capabilities of this technology

- Capture 3D data and video footage
- Perform basic clean-up of MoCap data
- Use MoCap data in, e.g.:
  - blender
  - Unity engine
  - Unreal engine

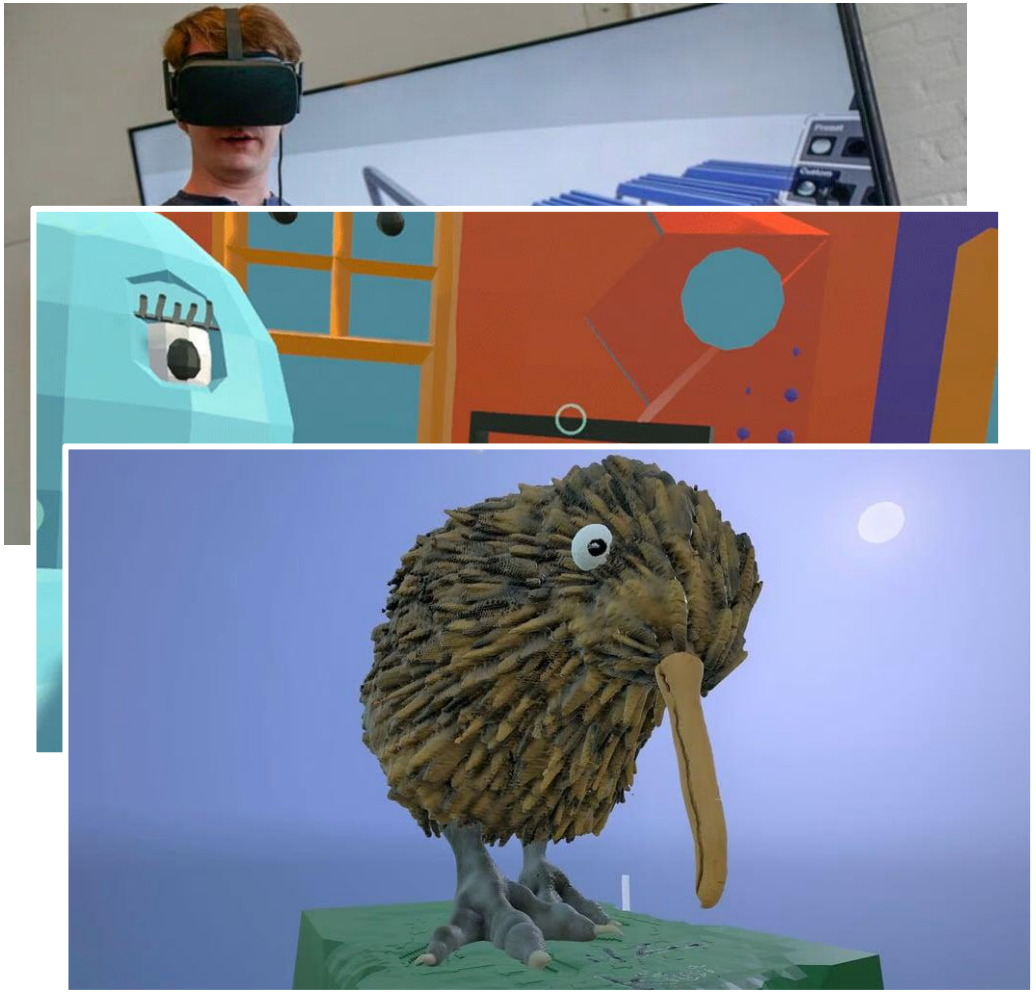
Contact: Jirka

3D Modeling in VR - survey

Explore and compare existing SW solutions for creating 3D models directly in VR.

- Gravity Sketch,
- SculptrVR,
- Medium,
- Blocks,
- Packages for Unity,
- etc.

Contact: Jirka

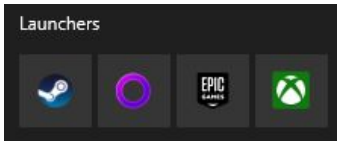


Students Games Launcher

Design and implement an application for easy launching titles from growing library of students games.

The launcher will be used at promotion events, such as Game Access conference or Open Days.

- Get inspired by existing launchers.
- Design representative visuals.
- Extensible, open-source implementation.
- Games data will be provided.



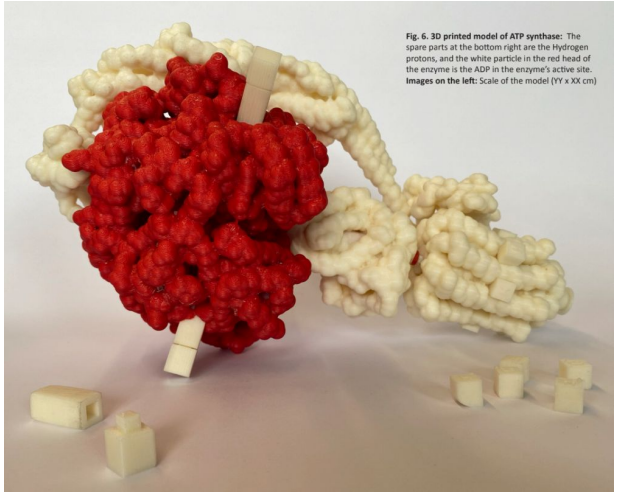
Contact: Jirka and Adam

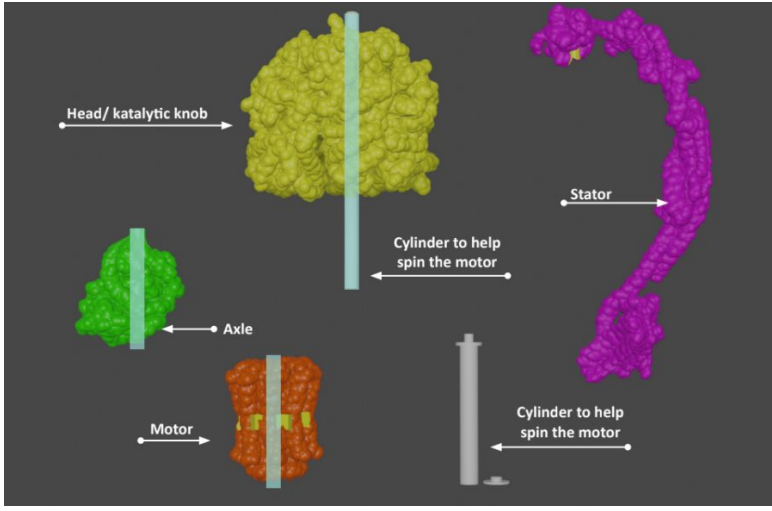
Assembling ATP enzyme in VR and desktop app

Create an app to assemble enzyme that moves afterwards; VR (1 student) desktop app (1 students).

- Based on 3D printed model of enzyme
- To be used in study for modality comparison

Contact: Hana and Jirka





Designing protein for 3D printing

Application to bring in protein channels, hinges, etc… to create an .stl object that can be exported and 3D printed for use in lab.

- UX/UI
- .stl export
- Collaboration with Beata the Protein Lady

Contact: Hana and Bara

Geovisto – A Geovisualisation Authoring Tool

- **Background:** Geovisto is a TypeScript mapping library for generic geospatial data visualizations created by FI & FIT.
- **Tasks:**
  - Extend the functionality based on current requirements
  - Design and conduct replicability study
- **Deliverable:** An interactive web application showcasing Geovisto's features.
- **Note:** Extendable to *Bc/Mgr thesis*

Contact: Vítek

Gamifying Cybersecurity Education

- **Background:** For educational activities regarding usable security at MUNI, we aim for creating interactive activities that augment the seminars.
- **Task:** Design and prototype a gamified activity on some topic related to cyber- or information security
- **Deliverable:** An interactive web application
- **Note:** Extendable to *Bc/Mgr thesis*

Contact: Vítek

Educational Activities for PV182

- **Background:** We want to enhance lectures of the Introductory HCI course (PV182).
- **Task:** Pick a topic, find/design an activity and create the support materials for both students and the teacher.
- **Deliverable:** An interactive web application/pen&paper activity/
- **Note:** Also for teams;
- Extendable to *Bc/Mgr theses*

Contact: Vítek

FI MUNI in Minecraft... Now for real!

Background
We are working on the official FI MUNI Minecraft server to help with publicity.

Topics
Several possibilities:
- Minigames (programming, events…),
- Minecraft UI plugin,
- Generative entities (similar to)
- …

Technology
Minecraft server plugins (Java)

Suitable for multiple people

Contact: Vojta, Tomáš

Game about Climate Change/Sustainability (Geo)

Background
In cooperation with The Spatial Lab from University College Dublin.

Technology
Godot/Unity/Java(Minecraft)/Web/…

Goal
Support teachers in engaging discussion about the topic.

Deliverable
An interactive experience
(a game or a visualization).

Contact: Vojta

Contacts:

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Questions?

Now it’s time for your questions, comments, own topics, and individual discussions with supervisors of individual topics …

Deadline for choosing a topic - including discussion with supervisor:

Friday, 1 March 2024, 11:59 AM