PV160
HCI Lab + Visit Lab

Semester Kickoff Meeting,
Autumn 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 device

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, October 4**), 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...

Application for the English Autonomously course

- **Task:** Create an application for autonomous study of English, containing the following functionality:
  - Individual study sessions (intro, modules, learning journal, …)
  - Chatbot (answering typical questions)
  - Calendar
  - Tips for other activities
  - …

- Possibly suitable as **Bc. thesis**

Contact: Eva Rudolfova

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

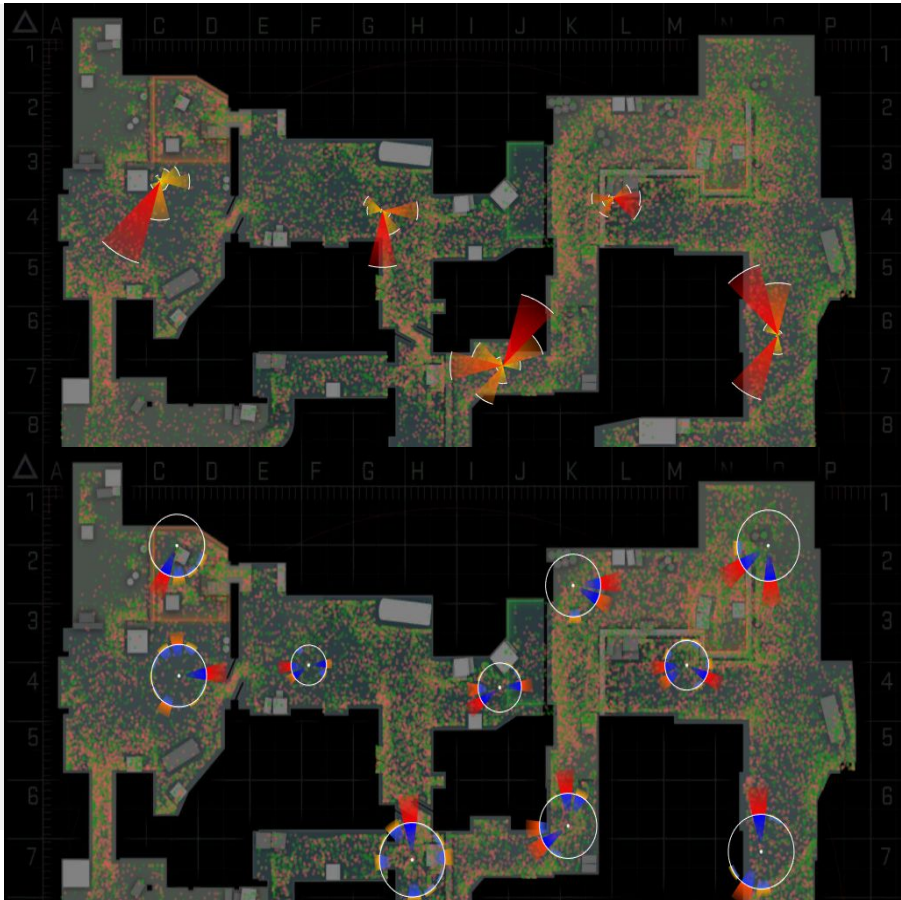
Rose diagrams are useful for visualizing both magnitude and direction values at the same time. As such they can also serve as a valuable visualization for level designers to, for instance, visualize the amount of hits coming from a particular direction. Insights gained can then, in turn, inform the design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

Visual + Art

Symposium on Visual Information Communication and Interaction (VINCI'24) - international forum for researchers and industrial practitioners to discuss the state of the art in visual communication theories, designs, and applications

Art track serves as a link between arts, design, technology, and science by offering creative views and artistic applications. They are especially interested in the submissions that demonstrate tangible and artistic ways of visual information communication and address information aesthetics. Topics can be e.g.:

- Creative visualization
- Critical visualization
- Tangible visualization
- Visual storytelling
- Data art
- Information aesthetics
- Interactive graphics
- Creative applications of scientific illustration

I am looking for someone who is interested:

- Art + Visualization
- Evaluation
- Academic writing

Contact: Simone

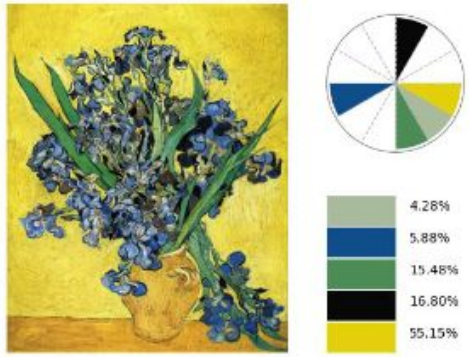


Figure 7: Color infographic for a painting

Paper: Visual exploration of color usage in Vincent van Gogh's Paintings - VINCI 23

Table 1: Preliminary mapping relationship in MOONMENT

Music(acoustic)	Gesture	Light(optical)
Timbre	Left & Right	Color
Pitch	Up & Down	Brightness
Tonal	Front & behind	Hue

Figure 2: Model of MOONMENT

Figure 3: Scenarios during testing

Paper: MOONMENT: Designing Gesture-based Interaction with Acousto-Optic Feedbacks - VINCI 23

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

Mobile Augmented Reality (MAR)
Game detecting physical markers

Contact: Vinaya

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: Development of a MAR game scanning physical markers in the real world. We will conduct usability testing of this game with users to understand the engagement and immersion of the game-play.

Mobile Augmented Reality (MAR) Game: Rūḥ

We have developed the 1st iteration of a MAR game by co-designing with children, psychologist and designers. The game uses interactive markers (lego, puzzles, foam shapes) to help users unlock clues.

Aim and task: Development of the 2nd iteration of the game based on the feedback received from the co-developers and conducting a small user testing to validate the feedback.

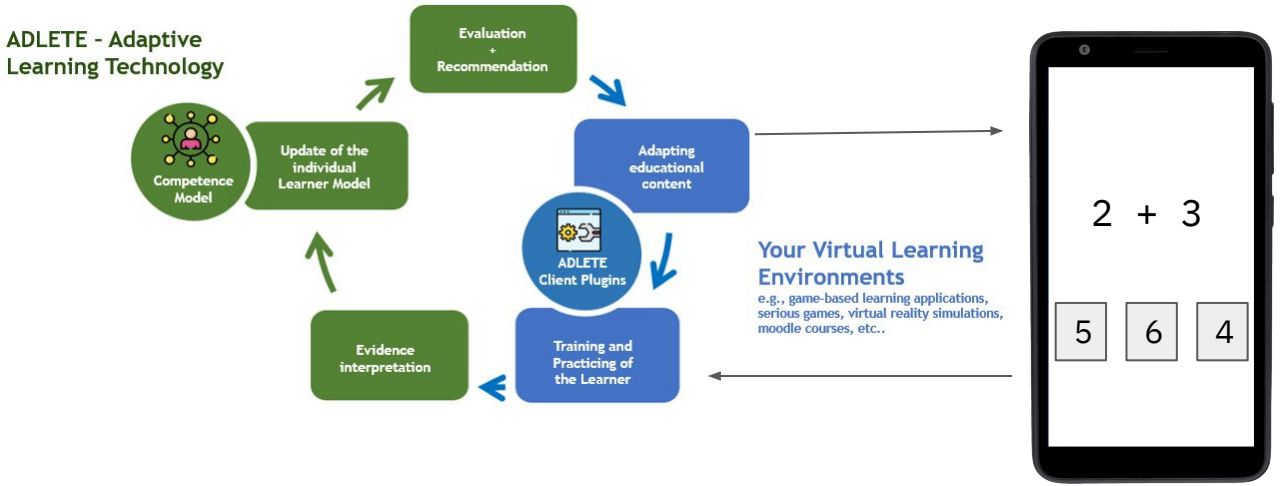
Contact: Vinaya

Video: https://youtu.be/-zXH1abV2go?si=9q-9zHmmIrzKXv5l

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

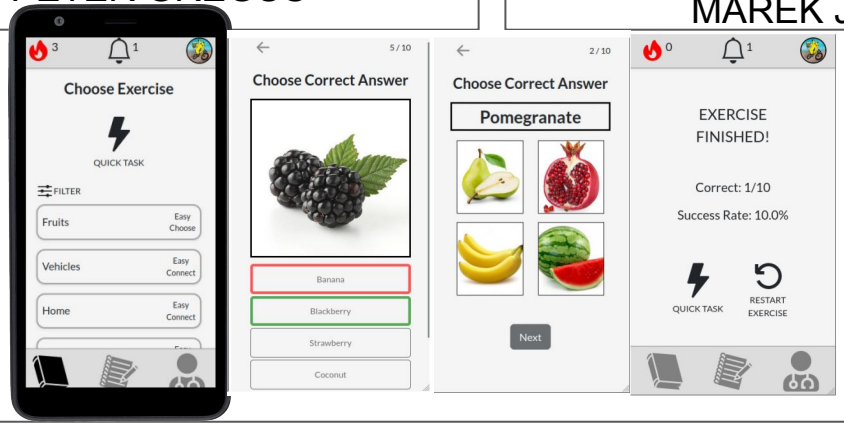
Aphasia Rehabilitation APP (Web-App)

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

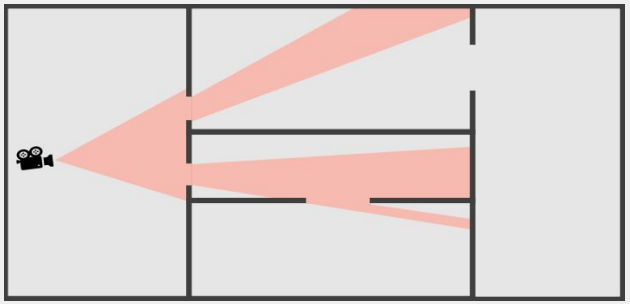
ImGUI Builder

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

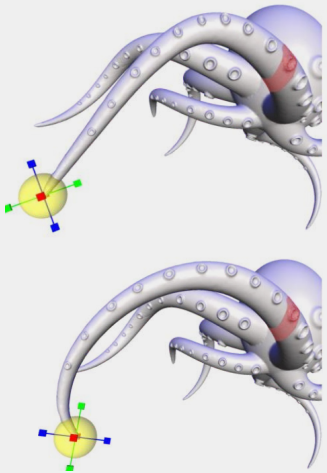
Contact: Jan

Practical Assignments for PA010

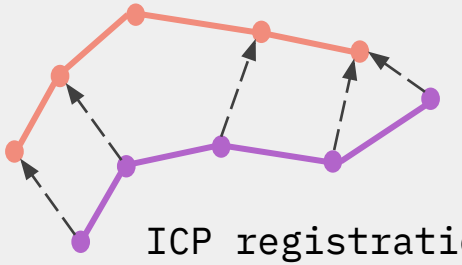
- Assignment = task implementation in C++ framework.
- Available tasks:



Portal culling



Mesh deformation



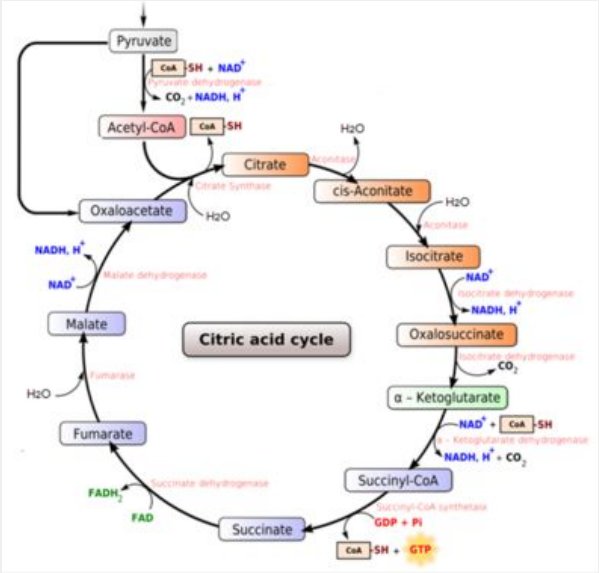
ICP registration

And more...

Contact: Katka

Game for Learning Metabolic Pathways

- In collaboration with Faculty of Science
- The game should support:
  - Building of metabolic pathways
  - 3D visualization
  - Test mode for students



Contact: Bára

Constructing data visualizations - mini game

Interacting with data visualizations playfully can increase their understandability.

Your task will be to create mini game for constructing one/or more of the visualization techniques - Line chart, Area chart, Stacked area chart, and Stream graph.

- Unity game engine
- Interactivity and user experience
- Features allowing users to zoom, pan, and view specific data points

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: Jakub, Jirka

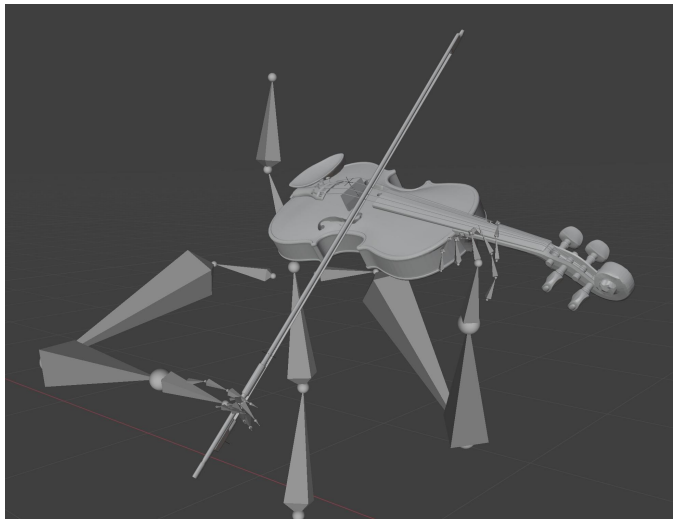
Motion Capture with Hand Pose Estimation

Do you play a musical instrument and want to explore motion capture? Or do you have any other creative idea for using hand pose estimation with motion capture?

Choose one (or more) of the following:

- Enhance the current workflow and tools for recording hand poses
- Record a musical performance and turn it into an animation
- Develop any other project that involves tracking hand poses with motion capture

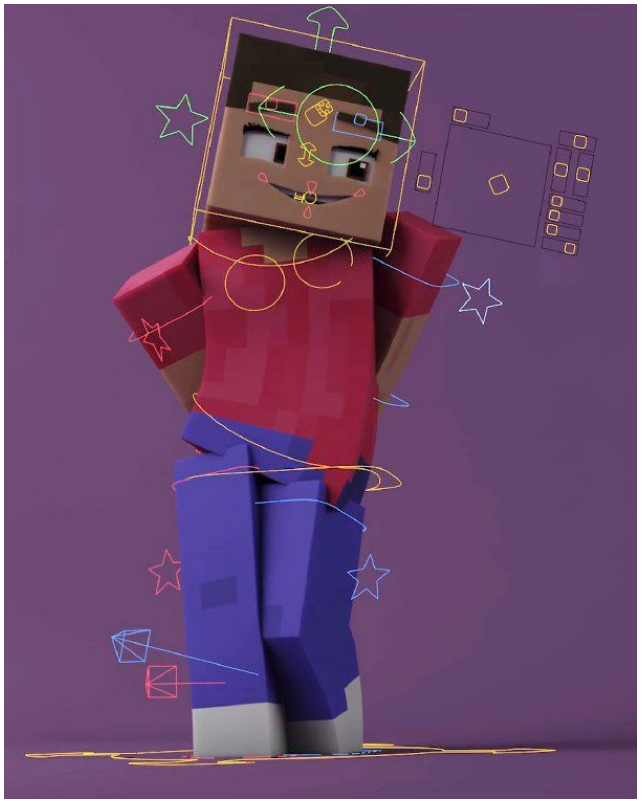
Contact: Jakub, Jirka



Motion Capture in Minecraft

Are you interested in MoCap and Minecraft and do not know what to choose? Let’s try to create a cutscene plugin, that supports MoCap data.

- Create Minecraft plugin (in Java)
- It accepts recording (or optionally real time) MoCap data
- Show a modified skeleton to the players
- All in Vanilla Minecraft
- Go wild



Contact: Jonáš, Jakub, Jirka

Haptic pen resurrection

Have you seen the thing in the corner behind you? It’s a **haptic pen** - it is very cool, but runs on Windows 95 and no one can use it anymore.

Are you brave enough to dive into the **C++**es and **OpenGL**s of the world and try to make it work on modern hardware? Maybe with VR?

Out of stock

Contacts: Jonáš, Jirka

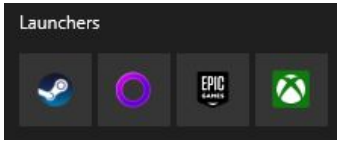
Site-specific Generated Object

Can the location be crucial in how the form of a 3d object looks like? Can we create something unique by using specific data for specific place?

- **Input:** Coordinates, Altitude, Population data, Environmental data, …
- **Output:** 3D models, that might be 3D printed or turned into glass sculpture
- **Technology:** Blender nodes / OpenSCAD / Three.JS geometry nodes / *something you would like to try*

Contacts: Jonáš, Jirka, Jelena

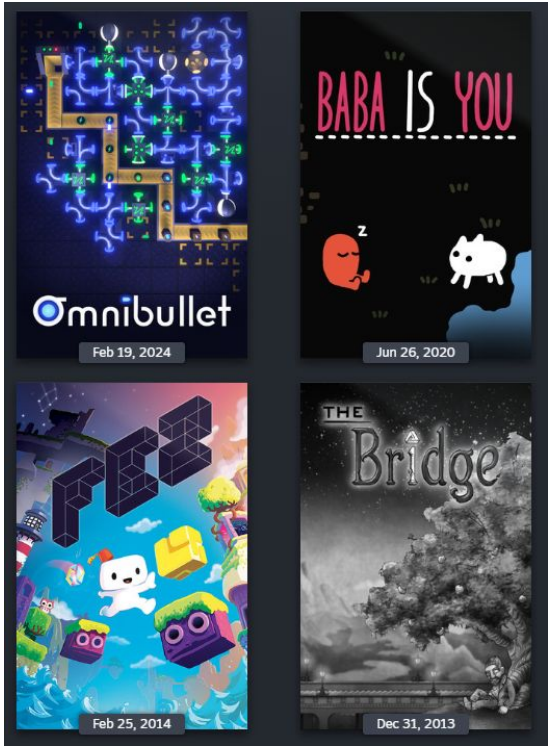
Students Games Launcher



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

Big Brother is Watching You

Visual Analysis of (Your) Network Traffic

- Everyone leaves traces when using Eduroam, VPN or other university network services. Let's explore your own.
- **Tasks:**
  - Get familiar with the data and the existing Jupyter Notebook
  - Extend its functionality with (interactive) visualizations of different characteristics from the data
- **Deliverable:** An extension to existing Jupyter notebook (Python) providing interactive visualizations.

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

Advanced GFX effects for Age

- Age is a game engine for teaching gamedev courses.
  - In early stage of development.
- The goal is to implement **some of** the following to Age:
  - Instanced rendering
  - Real-time shadows
    - Shadow maps
    - Screen-space shadows
  - Occlusion culling
    - HW occlusion query
    - Sector-portal-occluder
  - LOD
  - ...

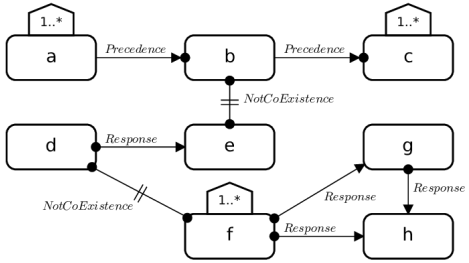
Requirements:
- C++, CMake
- Git

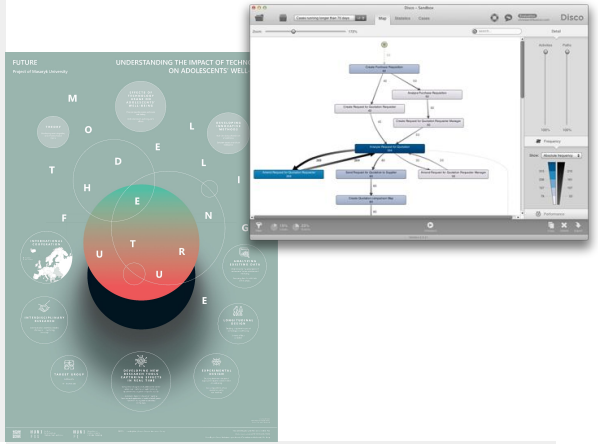
Multiple students can enroll this topic.

Contact: Marek

Declarative Process Mining Visualizations

- **Background:** Classic imperative process models (Activity diagram, BPMN, …) are limited. Declarative approach enhances the visualization with more interesting rules between the actions in a process (if A occurs then B occurs; A and B never occur together, A occurs 4x, …)
- **Task:** Design and implement useful visualizations of these rules, integrated into the imperative models.
- Possibly suitable as **Bc./Mgr. Thesis**
- Possible collab with **DigiWELL** or **SAP** :)





Contact: Adam + Martin

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, October 4 2024, 11:59 AM