

# AI Agents for Computer Games

## Description

Artificial intelligence for game playing has become a powerful research playground for understanding learning, decision-making, and autonomous behavior. Modern environments such as Super Mario and Pokémon provide rich, interactive testbeds for developing human alike AI agents. The goal is to create agents that can understand game states, make real-time decisions, adapt strategies, and improve through experience. Some related work:[1, 2, 3]

What we expect from you:

- Very good academic performance and strong hands-on experience.
- Experience with deploying or fine-tuning open-source LLMs/VLMs (e.g. Qwen)
- Basic understanding of reinforcement learning
- Understanding of how to build AI agents
- High motivation to learn missing knowledge and to build something fun

What we provide:

- Computational resources
- Thesis supervision
- Possibility for scientific publication

For application please send me an email with title "Master Thesis Application: AI Game Player ". Please also attach your resume and transcript of records in the email. An motivation letter is NOT required.

This topic is open on a long-term basis. The specific scope of each thesis, including the choice of game and the technical direction, will be defined in discussion with Mr. Pan.

## Tasks

- Literature review on AI Agents.
- Data collection and model training.
- Agent system design and evaluation.

## References

- [1] Sihao Hu, Tiansheng Huang, Gaowen Liu, Ramana Rao Kompella, Fatih Ilhan, Selim Furkan Tekin, Yichang Xu, Zachary Yahn, and Ling Liu. A survey on large language model-based game agents, 2025.
- [2] Kun Shao, Zhentao Tang, Yuanheng Zhu, Nannan Li, and Dongbin Zhao. A survey of deep reinforcement learning in video games, 2019.
- [3] Weihao Tan, Xiangyang Li, Yunhao Fang, Heyuan Yao, Shi Yan, Hao Luo, Tenglong Ao, Huihui Li, Hongbin Ren, Bairen Yi, Yujia Qin, Bo An, Libin Liu, and Guang Shi. Lumine: An open recipe for building generalist agents in 3d open worlds, 2025.



Technische Universität München



TUM School of Computation,  
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### Supervisor:

Prof. Dr.-Ing. Alois Knoll

### Advisor:

Fengjunjie PAN, M.Sc.

### Research project:

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### Type:

MA

### Research area:

AI Agents, LLM, VLM, LLM  
Training, Reinforcement Learning

### Programming language:

Python

### Required skills:

Python Transformers, LLM  
Training/Finetuning,  
Reinforcement Learning, Ubuntu,  
Virtualization

### Language:

English or German

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**For more information please  
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