

LIFE PROJECT PORTFOLIO

Opsis Emotion Recognition AI Phase I:

- **Team 1** (Denis Chernov, Artjom Varbla, Marti Suvorov, Richard Rõõm, Marja-Liisa Põldre, Seiran Mamedov, Irina Orehova, Muhammad Umair, Ratibor Rusakov)
- **Team 2** (Karolin Martinson, Angelika Švedova, Ekaterina-Loren Teekond, Marion Pajumets)

Terms of reference and goals of the project

The Opsis Emotion Recognition AI project is a collaborative effort between Tallinn University's LIFE course and Opsis, a Singaporean tech startup. The project was set up in order to gain an overview of Estonia's social and healthcare sector with regards to the sectors' and their workers' acceptability of integrating advanced AI-based digital solutions. The focus group for the project was elderly care patients and their caretakers who could benefit from AI-technologies. Applying such technologies in the social sector has proven successful in Singapore's case, which similarly to Estonia is experiencing an ageing population and a lack of careworkers to look after them. The project therefore sought to test Estonia's readiness for integrating such technology into its social services and possibly offer a solution to enhance the effectiveness and efficiency of social services, particularly in elderly care.

The goal of the project was to train students to be able to use the Opsis AI-technology in their individual computers in order for them to eventually go and conduct observation sessions with elderly care patients. These sessions would consist of using the AI-technology that would analyse the patient's facial emotions and help with diagnosing the well-being of their mental state. In addition to the sessions, a survey is given out to the healthcare workers whose patients are being observed, for them to fill out their perception of such technologies. The group was divided into two teams:

- **Team 1** was responsible for conducting a literature review to explore existing studies on AI-based facial recognition systems, particularly in social services and healthcare
- **Team 2** was responsible for contacting elderly care institutions and booking appointments for the observation sessions, and writing the application for Tallinn University's ethics committee

With regards to time constraints and an initial rejection of the ethics committee proposal, the project tasks were altered midway through. With Team 2 not being able to reach the state of field work the task was replaced with conducting interviews with specialists in the field of social work, healthcare and technology. The end goal of the project remained the same, which was to be able to give an overview of Estonian social sector's acceptability of AI-technologies.

The importance of the problem, its description and choice of methods

The OPSIS project focuses on exploring the potential of AI-based Emotion Recognition (AI-ER) tools in improving mental health assessments for elderly care services in Estonia. The prevalence of depression, anxiety, and stress in the elderly population, combined with a lack of efficient emotional monitoring tools, highlights the importance of this project. The project specifically aims to evaluate

the acceptance, usability, and effectiveness of AI-ER technology in Estonian social services through a thorough review of research papers.

The project is grounded in the **Technology Acceptance Model (TAM)** to understand how Estonian social service providers, including managers and frontline workers, adapt to AI-ER technologies. By synthesizing existing research, the project aims to determine whether such tools can improve the identification of mental wellness issues while addressing any legal, ethical, or practical challenges.

The need for this project arises from gaps identified in the literature on AI-ER applications in healthcare:

1. **Historical practices:** Emotional assessments in elderly care have traditionally relied on subjective observations or standardized questionnaires. These methods are time-intensive, prone to error, and often fail to capture real-time emotional fluctuations.
2. **Challenges in elderly care:** Research shows that caregivers struggle with limited resources and tools, while elderly individuals face stigma or cognitive limitations that prevent open discussions about their mental health.
3. **Global advances:** Studies from countries like Singapore and Japan reveal the growing adoption of AI-ER tools to supplement caregiver efforts, improve emotional monitoring, and enhance care quality.

The project focuses on reviewing relevant research to bridge the gap between these global innovations and Estonia's elderly care services.

The project methodology is based entirely on a review and synthesis of research papers. Research papers were reviewed to understand the effectiveness, challenges, and ethical implications of AI-ER tools. Reviewing research papers proved to be an effective method for this project, as it allowed the team to gather insights without conducting primary data collection. Studies provided valuable

evidence on the benefits of AI-ER tools, such as improved emotional monitoring and early detection of mental health issues. At the same time, the review highlighted challenges, including cultural biases in AI models, privacy concerns, and barriers to adoption.

By focusing on existing research, the project effectively identified key factors influencing the implementation of AI-ER tools in Estonia, offering a strong foundation for future applied studies or policy recommendations.

Project overview: addressing challenges through evidence-based methods

A little more than 25% of Estonian population is aged 60 or above [*Link*](#). This number indicates that in upcoming years more and more people will probably need some kind of care, because age takes its toll.

Opsis project aimed to address the lack of possibilities to monitor emotional state(s) of elderly people while being cared for by a social worker or a healthcare worker. Traditional methods are time consuming, inaccurate, and don't capture real time emotional states. Due to the fact that Estonian social services have yet to adopt FER, the project wanted to explore the possibility of adopting such a device.

Regarding activities - Our team was split into two smaller teams, 1 and 2. Team 1 was responsible for literature review to comb through a wide range of research papers and gather data on aspects like: How are AI-based Facial Emotion Recognition systems being utilized in elderly care?; What clinical benefits or drawbacks have been identified when using FER with elderly people?; What ethical considerations are relevant in applying FER to elderly care, including privacy, bias, and consent? In

short - Team 1 needed to find out everything about the usage of FER. Team 2 on the other hand was tasked to be the public relation side of the project, contacting the Ministry of Social Affairs, ethics committee.

The focus on existing research proved to be rewarding and effective. Many issues that would have come up during assessments and interviews with social workers were tackled beforehand. Such as concerns of privacy and data collection, the fears of social workers/healthcare workers on adopting a technologie like OPSIS, the main rejections of earlier mentioned individuals, the need to communicate that OPSIS is just a tool and people handling it are in charge of it. In addition issues like depersonalization, inaccuracy of the device, questions on integration of the device.

Activity overview and stakeholder engagement

The project activities aim to leverage FER (Facial Emotion Recognition) technology to assist elderly people and improve the quality of care provided by caregivers and medical personnel. This technology is designed to identify emotional states in elderly individuals, particularly those who may struggle to express their feelings due to cognitive decline or other health-related challenges.

Direct stakeholders:

- **Elderly individuals:** This group forms the target audience for the project. By identifying their emotions accurately, the technology helps address their physical and mental health needs more effectively.

- **Medical personnel and caregivers:** Doctors, nurses, and professional caregivers benefit from enhanced tools to assess the emotional and physical well-being of the elderly, enabling more precise and timely interventions.
- **Families of the elderly:** Families indirectly benefit by gaining insights into their loved ones' emotional state, contributing to better communication and understanding.

Indirect stakeholders:

- **Developers and AI researchers:** This project contributes to advancing AI technologies by providing practical applications and expanding the use cases for FER systems.
- **Healthcare institutions:** Hospitals, nursing homes, and elder care facilities can integrate this technology into their workflows to improve efficiency and patient care.
- **The broader society:** This project represents a step forward in integrating AI into everyday life, creating ripple effects in healthcare innovation and societal well-being.

Demographic breakdown:

- The elderly population targeted primarily includes individuals with no particular age restriction, but who are residents of nursing homes (approximately individuals of age 65 and older, but also depending on health related issues). The gender distribution is assumed to reflect the general demographic balance within elder care facilities, although this project is designed to be universally applicable regardless of gender.

Planned activities:

- Although field tests were not conducted during this semester, future activities include:
 - Testing FER technology in elder care facilities to evaluate its effectiveness in real-world conditions.
 - Training medical personnel and caregivers in the use of the technology to ensure seamless integration into their workflows.
 - Collecting feedback from stakeholders to refine and adapt the technology based on their needs.

While specific quantitative data on the number of stakeholders impacted is not yet available, the project has the potential to benefit thousands of elderly individuals, caregivers, and healthcare professionals in Estonia and beyond as it scales. By empowering stakeholders with innovative tools, the project seeks to contribute to the broader development of AI and its applications in healthcare.

Sustainability of OPSIS AI project

The sustainability of the Opsis AI program has been carefully planned to ensure its long-term impact and continued use in Estonian elderly care houses. The main parts of this plan include the following:

Sustainability of project activities

- Opsis AI will be implemented as a helpful tool for caretakers, so they can better understand and respond to the emotions of elderly patients.

- Training for caretakers and other workers will be provided to make sure they are confident in using the AI. Regular refresh courses will also be scheduled.
- Frequent technical support and updates will be provided to keep the system reliable.

Responsible unit or organization

The responsible organization will be Opsis AI, in collaboration with the Estonian elderly care network. A dedicated project coordinator will manage right implementation and monitor the system's performance.

Ownership of project outcomes

Ownership of Opsis AI and its outcomes will rest with the elderly care houses where it is implemented, under the more broader guidance of the Estonian Ministry of Social Affairs.

Cooperation with stakeholders

Cooperation with stakeholders has been planned through:

- Regular feedback to make sure that tool helps caretakers
- Collaboration with developers for program improvements.
- Collaboration with academic institutions to analyze data and update the system further.

Main goal of OPSIS AI is to be implemented carefully and for a long term, without causing any damage to caregivers and elderly. Because of the caregiver crisis in Estonia we want to help caregivers to take some weight off their shoulders and eliminate unnecessary hassle to make their work much easier.

Summary of the results and annexes

- Ethics and documentation: an ethics committee form has been completed and submitted to ensure that the project complies with ethical principles.
- A letter of support from the Ministry of Social affairs received.
- To improve the accessibility of the DASS21 questionnaire and appendices (1-6) to participants and stakeholders, it was translated into English, Estonian and Russian languages.
- Literature review (Team 1): A thorough review of the study was conducted. The results are summarized in a literature review that provides insight into how people perceive and use AI in healthcare.
- Team 2 interviewed healthcare workers. The results of the interview provide first-hand knowledge that will help improve the project and make it more practical. An interview about how artificial intelligence technologies can be used in social services and healthcare, especially how systems that recognize emotions from facial expressions can be useful in caring for older people.

Project action plan - For more detailed information, please check the file "ELU OPSIS".

Activity and short description	Timeframe (which month)	Stakeholders	Person (name + study field) or team responsible
Initial project setup	September	-	Zsolt Bugarszki (supervisor)
Mini assignments (translation, updating time table, setting up deadlines, ect)	September-January	-	Everyone
Team 1 assignment (Literature review, research synthesis, context evaluation)	October-November	-	Every Team 1 member
Team 2 assignments (Institution outreach, appointment booking, ethics application)	October-December	Tallinn University, Estonian Ministry of Social Affairs, Narva hospital, Lutso Health	Every Team 2 member
Team 1 individual report submissions	December-January	-	Every Team 1 member
Team 2 individual report submissions	December-January	-	Every Team 2 member
LIFE Project Portfolio	December-January	-	Everyone
LIFE Project Portfolio presentation	January	-	Angelika Švedova (Integrated Natural Sciences)(presentation maker/designer)

Communication to stakeholders

Our team's activity report on the LIFE project

- **1. Approval from the Ministry of Social Affairs**

Our team received official approval from the Estonian Ministry of Social Affairs to implement the project. This decision was confirmed by a letter of support, in which the ministry expressed its agreement with the project's goals and emphasized its significance in light of demographic changes and challenges in the social care sector.

- **2. Working with project participants**

Our team actively interacted with people who agreed to participate in the project. We ensured the transparency of the processes, including signing the necessary documents, so that all participants were fully aware of the goals and objectives of the project.

- **3. Using the team's linguistic skills**

We used our team's strengths, in particular their knowledge of languages, throughout the project. Some of the participants were engaged in translation of texts, which contributed to the creation of high-quality materials and facilitated interaction with international partners.

- **4. Compiling a legal report**

Our team developed a detailed legal report that covers legislative aspects related to the implementation of the project, including regulations in the European Union and Estonia. This report became the basis for ensuring legal security and compliance.

- **5. Analysis of scientific articles and sourcing**

To effectively achieve the project goals, our team was divided into groups.

- The first team analyzed 5 scientific articles per participant related to the project topic to identify common patterns and key ideas.
- Additionally, each participant searched for 5 more sources that could directly help in the development of the project.

- **6. Work of the second team**

The second team was engaged in preparing an application to the ethics committee, which included compliance with data protection and ethical standards. This team also interacted with service providers to ensure the integration of the necessary technologies into the project.