

## ABSTRACT

Explanatory note size – 126 pages, contains 22 illustrations, 6 tables, 3 appendices, 59 references.

**Topicality.** Examines the problem of heating control and heating expense optimization. Examines application of reinforcement learning to this problem, its benefits and drawbacks. It was determined that this approach needs improvements to simplify its practical application to this problem.

**The aim of the study.** The target of the study is to minimize building heating costs by creating an application, that controls heating panels.

The object of research: object control software.

The subject of research: approaches, methods and applications for object control using machine learning.

To achieve this goal, the **following tasks** were formulated:

- analyze application of reinforcement learning to the problem of heating expense optimization, analyze possible rewards in this approach, compare their effectiveness and choose the optimal one;
- develop an improved version of this approach, that uses a simplified physical model of environment, that is built from collected data without user intervention and can simplify practical usage;
- develop a software implementation of this approach to the given task and create a server application with web-client, that allows a user to control and monitor heating expenses.

**The scientific novelty** of the results of the master's dissertation is that a software architecture for managing heating costs using a modified reinforcement learning method has been proposed, in which a simplified room model is used, with parameters determined experimentally.

**The practical value** of the obtained results is that a heating control method was proposed, which allows to increase economic efficiency of building heating, taking into account daily price variation.

**Relationship with working with scientific programs, plans, topics.** Work was performed at the Department of Informatics and Software Engineering of the National Technical University of Ukraine «Kyiv Polytechnic Institute. Igor Sikorsky».

**Approbation.** The scientific provisions of the dissertation were tested at the Sixth International Scientific and Practical Conference of Young Scientists and Students “Software engineering and Advanced Information Technologies Softtech-2024” – Kyiv.

**Publications.** The scientific provisions of the dissertation were published in:

- 1) Kryshchal V.O. Reinforcement learning method for heating cost management // Proceedings of the Sixth International Scientific and Practical Conference of Young Scientists and Students “Software engineering and Advanced Information Technologies Softtech-2024” – Kyiv: NTUU “KPI them. Igor Sikorsky”, May 21-23, 2024.

**Keywords:** REINFORCEMENT LEARNING, DEEP LEARNING, CONTROL SYSTEMS, SIMULATION.