

Brief information about the project

Name of the project	AP19175674 "Development of a system for detecting and alerting dangerous events based on the audio analysis and machine learning"
Relevance	The use of neural networks in security and audio analytics is one of the current and promising tasks. The creation of decision support systems in the field of citizen security requires a lot of time or material costs. Further progress in the study of neural network data and their implementation in practice will make it easier for police officers to work, increase its throughput, and prevent criminal events. The potential of machine learning has been proven as a tool for classification tasks. Machine learning can help in providing faster and more accurate interpretation of results due to its ability to find patterns in the spatial feature space. Innovation today is a necessary condition for the economic prosperity of any state. And if we are talking about such a knowledge-intensive industry as the security of citizens, then the state could become more competitive if it expanded the scope of its innovation activities in this area.
Purpose	The aim of the project is to develop a hardware and software platform for recognizing sources of dangerous audio streams in real time using machine learning algorithms.
Objectives	<p>To achieve this goal, it is necessary to solve the following tasks:</p> <ol style="list-style-type: none"> 1. To analyze the literature on existing methods of automated processing of audio signals, both individually and in general. 2. Based on the analysis of literature on existing approaches and methods of processing and recognition of audio signals, considering the specifics of the received input data and the possibilities of using Machine Learning in the recognition task, to form a set of basic parameters and characteristics of the Machine Learning model. 3. Data collection of audio signals by event categories. It is planned to collect a data set that includes categories of dangerous sounds. 4. Development of the dataset. Primary processing of the collected data set. Manual distribution of audio signal data, by class membership. 5. Application of machine learning models to classify audio streams. 6. Development of a deep learning model for the task of classifying audio streams. 7. Conduct experimental studies and evaluate the methodology, the effectiveness of its functioning in the task of detecting dangerous sounds. 8. Development of an application for conducting to identify dangerous sound sources in real time.
Expected and achieved results	According to the results of the research, it is planned to publish 9 articles: - 2 articles in peer-reviewed scientific publications on the scientific direction of the project, indexed in the CiteScore percentile in the Scopus database of at least 50 (fifty) - 2 publications in foreign or domestic publications recommended by the Committee for Quality Assurance in Education and Science - 5 articles in international or Republican conferences It is supposed to be published in journals such as "IEEE Access", "Computers,

	<p>Materials & Continua”, “Sensors”, “PeerJ Computer Science”. The scientific effect is the introduction of artificial neural networks in the field of civil defense. This will give a big leap in the development of information technology and increase the effectiveness of the fight against crime. The expected socio-economic effect is that our invention is able to identify dangerous situations at an early stage, the application will help reduce potential dangerous cases and crimes. The results of this project, in turn, will reduce the number of deaths due to them among the most able-bodied segment of the population, reducing the material damage caused to the state. The above-mentioned product can be applied in the field of healthcare, and the invention will also be commercialized in three directions.</p> <p>1 Business to Business 2 Business to Customer 3 Business to Government</p> <p>Commercialization will increase the efficiency of examination rooms in medical institutions, identify pathological abnormalities at home, which will save time and resources for ordinary consumers..</p>
<p>Research team members with their identifiers (Scopus Author ID, Researcher ID, ORCID, if available) and links to relevant profiles</p>	<p>1. Altayeva Aigerim Bakatkalievna, PhD, Senior Lecturer, H index 10, ORCID: https://orcid.org/0000-0002-9802-9076 , Scopus Author ID: 56128042000</p> <p>2. Kulambayev Bakhytzhan Orazalievich, Candidate of Technical Sciences, ORCID: https://orcid.org/0000-0001-8387-3736 , Scopus Author ID: 5612804257753105200</p>
<p>List of publications with links to them</p>	<p>1. Models and Methods on Developing Smart Energy Based on MultiAgent Technologies. A.c. 19821 «Models and Methods on Developing Smart Energy Based on MultiAgent Technologies Altayeva A., Kuandykov A.; publ. 20.08.2021. – 2 p., Quartile Q2, Percentile 79%</p> <p>2. Intelligent Microclimate Control In Smart Building. Bulletin Satbayev University. The series “Technical Sciences”, No 1 (131) 2019, pp.105-110</p> <p>3. Энергияға Арналған Айқын Емес Логикаға Негізделген Контроллерді Жобалау. Bulletin Satbayev University. The series “Technical Sciences”, No 1 (131) 2019, pp.110-117</p> <p>4. Fuzzy Logic Based Controller for Maintaining Comfort Temperature With Minimizing Energy. Bulletin of D. Serikbaev University, The series “Technical sciences and Technologies”, No 4 (ISSN 1561-4212) 2019, pp.181-186</p> <p>5. Mathematical Model of Multi-Zoned Power and Comfort Management In Residential Buildings. Bulletin of S. Toraihyrov University, The series “Energy”, No 1, 2019, pp.438-446</p> <p>6. Microclimate Control Techniques Based Intelligent Agents. Bulletin Satbayev University. The series “Technical Sciences”, No 1 (137) 2020, pp.223-229</p>
<p>Patents</p>	<p>-</p>