

FALKE ALEKSANDRA VIKTOROVNA



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EDUCATIONAL INFO

Modeling of robotic systems	01.09.2023 – 31.08.2025
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Higher education Master's degree program:

the National Research Tomsk State University, Faculty of Physics and Engineering, Department of Applied Gas Dynamics and combustion, field of study 15.03.06 Mechatronics and Robotics

Educational program: Industrial and special robotics	01.09.2019 – 31.08.2023
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Higher education Bachelor's degree program red diploma:

the National Research Tomsk State University, Faculty of Physics and Engineering, Department of Applied Gas Dynamics and combustion, field of study 15.04.06 Mechatronics and Robotics

Autonomous navigation of mobile robots	14.09.2022 – 24.09.2022
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Additional professional program

Sirius University, Scientific Center for Information Technology and Artificial Intelligence, 108 academic hours.

WORK EXPERIENCE

Software engineer of 3 categories	18.01.2023-27.02.2023
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KAMAZ Scientific and Technical Center, Naberezhnye Chelny

Responsibilities:

- Creating road polygons
- Implementation of the movement of cars (ADAS)

Software engineer of 3 categories	30.06.2022-29.08.2022
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KAMAZ Scientific and Technical Center, Naberezhnye Chelny

Responsibilities:

- Creating a model for recognizing and classifying road signs (ADAS)
- To implement the transfer of a video stream from the camera to the device via WiFi

SCIENTIFIC PROJECTS

Speech synthesis with emotional coloring using machine learning (Tomsk, 2024)
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The purpose of the study: to develop an algorithm for synthesizing speech from text with emotional coloring.

At the moment, the following blocks are implemented: natural language processing, grapheme conversion into phonemes (neural network) and phoneme duration models (neural network). Currently, work is underway on an acoustic model to increase the naturalness of pronunciation and emotionality of speech
URL: <https://github.com/AleksandraFalke/Test2024>

The influence of feature extraction methods on the quality of breathing sound detection using machine learning methods 01.09.2021-30.06.2022

In this problem, the final solution is a binary classifier that receives a part of the audio recording as input and decides on the presence of an audio event. An important aspect of the algorithm is the elimination of the stage of selecting the weight window empirically and, as a result, saving time.

Presentation at the international conference (poster session) "Winter School of Robotics in Sirius-2022".
https://github.com/AleksandraFalke/Test01/blob/main/SF_final.ipynb

A human health monitoring system using technical hearing technology.

As part of the scientific group: Fayb S.V., Pavlov D.A. 2022

The device itself was developed on the basis of the STM32F4 microcontroller family, it also includes a digital MEMS microphone and a data transmission module over a Wi-Fi network. The work took place with a heartbeat and breathing. My task was to prepare a database together with Semyon Fayb, write a neural model and train it.

Presentation at the XLVIII International youth scientific conference "Gagarin Readings", where we took 3rd place in the section "Intelligent systems and aviation weapons". It was published in a collection of abstracts.

Fayb S.V., Pavlov D.A., Falke A.V. Scientific supervisor — Associate Professor, Doctor of Physical and Mathematical Sciences Borzenko E.I. TomSU, Tomsk Human health monitoring system using technical hearing technology: c. 423, 2022.URL: <https://gagarin.mai.ru/files/2022/abstracts2022.pdf>

Speech recognition using technical vision technology, namely lip reading 01.09.2022-30.06.2023

In the course of the work, the most popular methods of extracting features from images were considered and implemented, and neural networks operating with an acceptable error were compiled. The most effective methods of optimizing the learning process have been identified. As a result, it was possible to achieve almost 100% accuracy in the model for determining letters and a fairly minimal error in the model for determining the outlines of lips.

Falke A.V. Development of a speech recognition system using machine learning methods: graduate bachelor's thesis in the field of training: 15.03.06 - Mechatronics and Robotics / Falke, Alexandra Viktorovna – Tomsk, 2023.URL: <https://vital.lib.tsu.ru/vital/access/manager/Repository/vital:18042>

Team participation in the Digital Region hackathon (Tomsk, 2020), third place

We were working on an autonomous device (an agrometeorological probe) to collect data from sensors and send readings to the server. My task was to write a module for a pressure sensor and prepare material about the profitability of the project.

An autonomous greenhouse (Tomsk, 2021)

My task was to design a 3D layout of the greenhouse. But also, I have developed my own control unit, which implies the development of such peripherals as: UART, LCD, I2C, PWM, ADC, 1-wire, as well as sensors: DHT11, DS18B20, FC-28 and Servo motor. Automatic systems were implemented: watering, ventilation, turning on the lights, preparing and sending data to ESP07.

I attach a link to the bachelor's thesis in the notes. On pages 43-46 there are photos of the final 3d layout of the greenhouse. (My participation is indicated on page 43).

PROFESSIONAL SKILLS

- Knowledge of programming languages: C++, Python and their standard libraries
 - Good knowledge of algorithms and data structures (C++, Python)
 - Programming of MC (Atmega8, Atmega328) and their peripherals and sensors
 - English language proficiency: level A2
 - Chinese language proficiency: HSK level 1, at the stage of learning HSK 2
 - A confident user of MS Office (Excel, Word, PowerPoint), Jupiter Notebook, Visual Studio, Atmel Studio, PyCharm, KOMPAS-3D
 - Experience in Linux OS as a user
 - Good knowledge of neural networks (implemented through the Pith library) and machine learning algorithms, teacher training, reinforcement training, experience in implementing algorithms for technical vision and hearing
 - Good mathematical education, knowledge of disciplines: linear algebra, discrete mathematics, probability theory (Queueing theory) and mathematical statistics, mathematical analysis, differential equations, theory of functions of a complex variable, approximate calculations, fundamentals of calculus of variations, analytical geometry
 - Good communication and presentation skills – experience of speaking at a poster session, at scholarship programs with the presentation and defense of your project, speaking at conferences
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FURTHER PLANS (3-5 YEARS OLD)

Complete the Master's degree program. And start working in the domain of development and optimization of neural network models, learning algorithms and databases.

PERSONAL QUALITIES

I am ready to work 6 days a week, to master the necessary material during non-working hours. I am ready to read about 100 pages of professional text per day. I am diligent, responsible and inquisitive. I easily get along with a new team and work in a team.
