Timofey Belousov

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Embedded Developer

I am a highly skilled embedded developer with over **5 years of experience** in **microcontrollers**.

As a 3rd year student in *CT* department of *ITMO University* I am studying computer science.

With an experience with many popular platforms like AVR, ESP, STM and with single-board embedded linux computers, I've done **dozens** of full stack embedded projects from scratch in my freelance career. Some of my projects include *CV, real-time concurrency, networking* and many more technologies. Feel free to read through some examples of my projects. I've also included some embedded school and pet projects below.

Skills

Languages	:	C/C++, Python, Java, Kotlin, Rust, C#, Swift, Verilog, Clojure, Prolog, Haskell, JavaScript
Frameworks	:	PlatformIO, ROS, FreeRTOS, MQTT
Platforms	:	MCU: AVR (ATMega/ATTiny), ESP32, ESP8266, STM8, STM32. SBC: Raspberry/Orange Pi, NVIDIA Jetson
Dev Tools	:	JetBrains IDEs, VSCode, Arduino IDE, Postman, Git, LaTeX
Soft Skills	:	Time Management, Leadership, Public Speaking
Spoken Languages	:	Russian (Native), English (Fluent, C1)

Experience

Embedded Developer — Apr 2018 – Present
Freelance — *Remote*

DESIGNED AND DEVELOPED FROM SCRATCH:

- *CNC* machines using *C++* with controlling software written in *C#*
- *CAN* analyzing and statistics device for VW cars
- Concurrent cellular networks analyzer and logger with GPS tagging using *C++* and *FreeRTOS*
- *Ultra Low Power* GPS tracker with audio recording and online configuration features (*C++, PHP, MQTT, FreeRTOS*)
- Animated LED staircase with online configuration feature, modular hardware design (*RS485, C, C++, HTML/CSS/JS*)
- Autonomous hardware intrusion detection system (*C++*)
- Sensors communication libraries according to manufacturer datasheets

WORKED WITH:

- Many popular protocols: *UART, I^2C, SPI, CAN, RS232/485, etc.*
- Integration of *DL* models within *my own CV* stack for perception
- Linux-based servers and *single-board computers*
- *EDA* + *CAD* for hardware design
- *Full* hardware + software project support
- Real-time operating systems within multi-core *MCUs* for protocol implementation, raw audio/video stream processing
- Hardware debugging tools and different electronic test instruments

Teaching assistant — Sep 2023 – Present
ITMO University — *Saint Petersburg, Russia*

- Teacher's Aide at *Advanced Operating Systems* course
- Prepared and gave a lecture on topic "*Applied cryptography and hardware methods of providing the information security*" within the Advanced Operating Systems course

Education

ITMO University — Saint Petersburg, Russia
Bachelor of Computer Science - Applied Mathematics and Informatics — *Sep 2021 – Present*

Center of Teaching Excellence's School — Moscow, Russia
Computer Science — *Sep 2020 – Jun 2021*

Projects

ADAS + DMS transport complex *Python, CUDA, PyTorch, OpenCV, C++, Java, PostgreSQL, 3D Design, PCB Design* Website

- Designed for safe and efficient cargo transportation for freight companies
  Tracks:
  * Car and driver status and behaviour
  * Current road conditions and alerts the driver and operator when needed
  * Driver fatigue and attention
  * Car health via the *CAN* bus
  * Driving style via the acceleration G-sensor
  * Air conditions inside the driver's cabin
- Includes hardware intellectual property protection system

Chess board with an integrated chess computer *Python, C++, 3D Design, PCB Design* Project Files, Source Code

- Arduino as an MCU communicates with the board sensors and indicators
- Raspberry Pi implements the generic Chess game logic and runs *Stockfish* as choosable game opponent
- 3D Printed game figures with an integrated magnet for automatic figure position identification
- CNC Engraved chess board
- 3D Printed chess board's chassis to include all the electronics
- Custom PCB with individual LEDs at each board cell for indications and shift register ICs for addressing them

Smart Schoolbell *C#, ASP.NET, MVC* Project Files, Source Code

- A bunch of speakers mounted all over the school building (usually instead of old-fashioned schoolbells)
- A webserver connected to all the speakers is deployed in the server room
- Admin has the access to web interface. He can upload any audio file on each of the planned bells
- System support planned notification playback
- Flexible lessons schedule for the whole week
- Choosable playlist to play during the break

AwesomeVPN *Kotlin, Telegram, Bitcoin, Spring, PostgreSQL* Telegram Bot, Source Code

- Wireguard-based VPN platform
- Telegram bot UI
- Blockchain subscription model with acceptance of cryptocurrency payments

UAV as a weather station *C++, ROS, Python*

- Arduino-based weather sensing unit
- Fast data collection and analysis
- Autonomous data collection according to the prepared flight plan
- Capable of performing autonomous cargo delivery

Line following autonomous vehicle *Python, OpenCV*

- Robotic chassis with camera installed
- Uses CV to steer the vehicle along the line, solving the given task

Achievements

- Absolute winner of Intelligent Robotic Systems track in NTI Contest (SLAM, Python, ROS, OpenCV)
- Winner of Higher School's of Economics's electronics competition "Vishaya Proba" (Arduino, C++, Hardware Engineering)

Publications

- **USE OF UAVS FOR REMOTE AIR QUALITY MONITORING**: *COLLECTION OF ABSTRACTS OF THE PARTICIPANTS OF THE XIII ALL-RUSSIAN CONFERENCE OF STUDENTS "NATIONAL HERITAGE OF RUSSIA" VI ALL-RUSSIAN YOUTH FORUM "AGRO-INDUSTRIAL COMPLEX – YOUTH, SCIENCE, INNOVATIONS"*, p. 688, ISBN 978-5-4491-0262-1