Filled in if "Other" is selected in the field "Role of the performer under the program "UMNIK" in the application under the program "Start" :

Information about the applicant

Applicant:
Serov Daniil Vladimirovich

Date of registration of the enterprise:

Availability in the Unified Register of Small and Medium-sized Enterprises:

Applicant's region:
Moscow, Zelenograd

Revenue from sales of goods (works, services) for the last calendar year (rubles):
0

Average number of employees for the last calendar year, people:
0

Company activity profile:

Filled in if "Other" is selected in the "Business Profile" field:

Founders

List of founders:

Founder	Fraction

Created in accordance with Federal Law No. 217-FZ of August 2, 2009:
No

Founder of the company under Federal Law No. 217-FZ of August 2, 2009:

PROJECT INFORMATION

Project Information

General Information

Project Name:
intelligent data collection and analysis system for transport infrastructure, road and industrial facilities

Project name in English:
transport analytics platform

Description of the final product:
It is a software for monitoring and managing objects, intended for
use in industrial and transport enterprises, in particular for optimizing
traffic flows. Performs the function of displaying the current state of objects in
real time and archived data. The goal is to improve traffic flow management,
improve safety and optimize the efficiency of transport networks. There is an opportunity
to adapt the product in other areas. First of all,this is an architectural solution
aimed at quick and easy integration with third-party products. We plan to
provide a rich set of tools for operations and analysis of object states. Such
as: terrain position, speed, alarm states, and other metadata and properties.

Do I need to complete the 2nd stage (year) of R & D?:
Yes

Justification of the need for R & D of the 2nd stage (year):
** Functionality Expansion**: There are plans to add new detectors and analytics
using AI.

* * Performance and Scalability improvements**: Optimize
data processing algorithms and improve system performance, as well as make it more scalable to
work with large amounts of data and increase the number of connected objects.

* * Updating the technology stack**: Technological progress does not stand still, and with
the development of new tools and technologies, it becomes possible to improve
the functionality and performance of the product. The second stage of R & D will allow you to use
the latest technologies and development techniques to achieve better results.

The main focus of the START program is:
H1. Digital technologies

Subdirectories:
10. Information processing and storage systems. Tools for big data analysis
.
Focus area:
Tools for Big Data analysis (Big Data)

Priority areas:
Information and telecommunication systems

End-to-end digital technology:
Internet of Things

Priority software class:
Software-05.02 Software-05.02 Domain-specific information Databases (EDWs)

Functional characteristics / capabilities of the developed IT solution:
PO-05.02.08 PO-05.02.08 collection, analysis and visualization of heterogeneous data from various
sources, including the Internet (ETL)

Direction within the framework of the Strategy of Scientific and Technological development :
Transition to advanced digital, intelligent manufacturing technologies,
robotic systems, new materials and construction methods, creation
of big data processing systems, machine learning and artificial intelligence

Project technologies:
2.03.12 Distributed databases and file systems

Project Branch:
11.06 Development of hardware and software complexes

Keywords:
object monitoring, data visualization, alarm states, data analysis, archived
data, geographic routes, system integration, object management, traffic optimization
, traffic situation analysis, traffic forecasting, traffic
jam reduction, travel time reduction, improving the efficiency of transport infrastructure

Project completion time:
12

Project Summary

Project Summary:
The project aims to create an intelligent transport
infrastructure monitoring platform that combines data collection and analysis for
traffic optimization.

The goal is to develop an innovative solution for efficient management of transport
infrastructure using analytics and artificial intelligence.
The project is relevant due to the growing load on the road network and the need
to improve road safety.

Relevance of R & D - testing of technologies, improvement of the existing backlog,
integration between the components of the project. At the end of this R & D phase
, we will have a platform with a scalable architecture, where you can quickly and
easily add new innovative solutions.

The expected results from the implementation are improved road patency, reduced
traffic jams and accidents, and optimized use of transport resources. The product
will be used in urban transport management.

Consumers will be city administrations, road services and transport
companies. Perhaps search and rescue services, developers of anti-theft
systems, mobile operators. The product can also be used by developers
of various devices and software.

Scientific and technical part of the project

Novelty of the solutions offered in the innovative project:
Our project involves the development of an integrated system for monitoring traffic
conditions using modern analytical methods and artificial intelligence. We
focus on integrating unique intelligent modules for data collection and analysis
, as well as on the scalability of the existing monitoring infrastructure. In
the future, you should get a system that serves any/a large number of objects.
It can be adapted not only for analyzing transport problems.

The solution can be used as an extension for other products in the form of a module
for working with geospatial data and states. A module with a simple and
open API. Companies that provide geospatial data and other related
information will be able to integrate our product by running it in Docker, sending it simple
JSON commands, and getting full functionality for monitoring and analysis.

Ways and methods of solving the assigned R & D tasks:

1. * * Collecting data on transport infrastructure and road features**
- * * Task**: Organize data collection from video cameras, motion sensors, or vehicle emulators.
- **Solution**: Development and integration of API for data acquisition, use of emulators for modeling.
- **Rationale**: Standard protocols and APIs provide flexibility and scalability to the system.

2. * * Data processing and storage**
- **Task**: Develop a system for reliable storage and fast processing of large amounts of data.
- **Solution**: Designing the database architecture on MongoDB, deploying the system in Docker.
- **Rationale**: MongoDB provides high performance, Docker-flexibility and scalability.

3. * * Data visualization**
- **Task**: Create an interface for real-time data visualization.
- **Solution**: Developing a frontend using React and Leaflet for visualization on the map.
- **Rationale**: React and Leaflet provide powerful tools for creating an interactive interface.

4. * * Integration and API**
- **Task**: Ensure that the system can be integrated with other products.
- **Solution**: Implement a RESTful API and gRPC for interacting with external systems via JSON commands and Dapr for inter-service communication.
- **Rationale**: RESTful API and gRPC provide ease of use and broad compatibility, Dapr-convenient orchestration of microservices.

The choice of methods is determined by the need to ensure high performance, flexibility, and scalability of the system. Modern technologies such as MongoDB, Docker, React, Leaflet, gRPC, and Dapr allow you to work efficiently with large amounts of data and create user-friendly interfaces, which contributes to the achievement of project goals.
At the same time, all these technologies are simple, which will certainly help you complete tasks.

Backlog on the project topic:
The backlog includes developed software for displaying and visualizing
moving objects on the map. This software allows us to monitor the state of the road network
and other transport infrastructure objects in real time. In addition, we have created
a mechanism for storing object characteristics in the database, which includes their positions,
metadata, and other information. This provides us with access to historical data for
analysis and use in future traffic management. You can view
videos of how the system works here:
https://www.youtube.com/@TreeAlarm-wr7fs
The work was carried out here:
https://github.com/treealarm/Square

There is no patent yet. We participated in the LTC hackathon and used these developments to solve the problem
of optimizing scooter routes. We were among the top ten solutions. The fight in the final
was abandoned due to lack of time.
It is currently an OpenSource project.

Prospects for commercialization

Competitive advantages of the created product, comparison of technical and economic characteristics with the main analogues, including global ones:

1. * * Advanced analytical functionality:** It assumes a set of analytical tools, including real-time data analysis, analysis of past events, and predicting the development of the situation. This allows operators to gain a deeper understanding of what is happening and make informed decisions based on the data.

2. * * Integration with artificial intelligence:** Integrates with artificial intelligence technologies to automatically detect anomalies, predict events, and optimize processes.

3. * * Integration with existing systems:** Easily integrates with existing information systems and equipment. This allows users to use the product as a stand-alone solution or as an add-on to existing systems.

4. **Customer support and updates:** The development team provides active customer support and regular product updates. This ensures stable operation of the system and compliance with modern security and functionality requirements.

Comparison with analogs. The product partially overlaps with the following systems: Eclipse SUMO, Zabbix, Google Maps Platform, ArcGIS Online, and Carto. In theory, you can build a similar or similar solution based on these products. Their disadvantage is their versatility and focus on meeting mass needs. In addition, it is difficult to add these technologies to your project without special training. Our product can serve as an integration core or extension for other systems. At the same time, solve only the tasks that the customer needs. Good but foreign developments are listed here.

Of thelocal products, megapolis-it is the closest (https://www.megapolis-it.ru However, despite the claimed rich functionality, they do not have their own analytics and the product is essentially reduced to intelligent traffic light management. This is a closed platform.

Yandex is also a competitor. We do not consider Yandex as a direct competitor , as it is supposed to occupy the niche of semi-custom software "for the project". Yandex also provides services for the mass user.

There are other companies that provide similar functionality, but focus on other niches and therefore do not pay enough attention to monitoring and scaling the solution. We see these companies not as competitors, but as potential partners that we can help increase the performance of their systems.

Thus, the advantages are as follows:
1) Platform independend software
2) The ability to quickly refine it for a specific task
3) Can be used for your own tasks. (We deploy the image and work with our own data)
4) There is a free version
5) Open source.
6) Simple API
7) Horizontal scaling.

Generally speaking, the idea to make such a product was not born from scratch. The fact is that

working in several companies, we have noted the fact that many products easily display
object states received from several hundred devices. However, the problem arises
if the company wants to enter a serious project such as "Safe City". In this case
, the product can no longer serve as a monitoring and analysis platform due
to architectural shortcomings. And I have to settle for the role of a data provider. At
the same time, the problem is solved by splitting the system into unrelated clusters, which
in fact does not solve the problem of integration into a single whole. Our product is designed to solve
this problem.

In addition, now foreign manufacturers have left the local market, in particular Schneider, which
provided data center monitoring with their product. Our development will eventually be able to
close this niche as well. In particular, there are already such attempts:
https://datark.ru/ - a company that monitors data centers their solution:
https://datark.ru/resheniya/datcheck/
This is an interesting decision, and we will have a similar one in this area.

We have a request from a real business on this topic. There is no email from them, because we have not
yet decided on the main direction of system development, but as an option, data center monitoring is
a popular feature.

Target consumer segments (markets) of the created product, their volumes, dynamics and development potential:
** Transport companies and logistics operators:** These companies are interested in
optimizing routes, managing vehicle fleets, and reducing
delivery times. The market for transport and logistics services is constantly growing, especially in the context
of the development of e-commerce.

* * City and regional authorities:** City and regional administrations are interested in
improving the management of transport infrastructure, reducing traffic jams and reducing
accidents on the roads. This helps to improve the overall safety and comfort of
citizens ' lives.

* * Hardware and Software Manufacturers:** Quickly visualize the status of your device.

The volumes and development potentials of these segments are high, as the demand for technological
solutions for transport management and production processes is constantly growing.
These solutions help increase efficiency, reduce costs, and improve overall
productivity, which is a priority for many organizations.

In particular, it is known from open sources that the revenue of Megapolis IT is
400 million rubles for 2023. Which is not bad for a company founded in 2021.

Description of the project's business model and product promotion strategy:
1. * * Software Licensing:** A subscription or one-time license model for using the software. This will allow companies to access the
functionality of the system and use it in accordance with the needs of their business.

2. **Consulting services:** Providing consulting services on integration and configuration of the system for specific customer needs. Advice on optimizing and adapting the system to maximize the effectiveness of data monitoring and analysis.

3. * * Cloud service:** Offer cloud storage for data synced
with the system. This will allow users to store and analyze large amounts of data in the cloud, ensuring the availability and security of information.

4. * * Additional modules and integrations:** Offer additional modules and integrations to extend the functionality of the system.

* * Product promotion strategy for the market:**

1. **Direct sales:** Active direct sales of the product to enterprises with industrial facilities. This includes product presentations and demos, conducting pilot projects, and providing test versions for review.

2. **Partnerships:** Establish partnerships with technology
developers and system integrators. Partners can offer the system
as part of their end-to-end solutions or integrate it into existing systems.

3. * * Marketing activities:** Conduct marketing activities, such as participation in exhibitions and conferences.

4. * * Training and Certification:** Providing training courses and certification programs for system users. This will help increase the level of expertise and trust in the product.

5. **Network Effect:** Stimulating the growth of the user base and spreading product information through the network effect. Active implementation of the system at one industrial site can lead to recommendations from one user to another,
increasing the popularity and attractiveness of the product.

DRAFT TERMS OF REFERENCE FOR IMPLEMENTATION NIOKR

Draft R & D terms of reference

R & D goal:

** Data collection and analysis:** Develop methods for collecting traffic data using various sources, such as cameras, sensors, GPS and other devices and algorithms.

* * Processing large amounts of data:** Testing effective technologies for processing and analyzing large amounts of data collected from transport / industrial infrastructure to identify patterns, trends, and anomalies.

* * Data visualization and presentation:** Create a user interface and visualization of traffic data that provides convenient access to information and analysis tools for operators and administrators.

* * Scalability and flexibility:** Develop a system architecture that can scale and adapt to different types of transport infrastructure and data volumes.

* * Routing **: Integration of routing algorithms into the system.

Note that at this stage, R & D involves the integration of information collection systems, including those obtained as a result of the work of AI. In the future, we plan to develop our own detectors and analytics modules with AI. It is planned to start doing this at the next level.

Purpose of a scientific and technical product (product, etc.):

1. **City Transport Department:** The product can be used by city administrations to monitor and manage public transport, including buses, trams, and minibuses. It will help you optimize routes and traffic schedules, improve the quality of passenger service, and reduce waiting times at bus stops.

2. **Transport companies:** The product will be useful for transport companies that manage logistics and cargo transportation. It will provide monitoring of road conditions and optimization of delivery routes, which will reduce fuel costs and increase operational efficiency.

3. * * Road and emergency services:** The product will provide road services with information about the current state of roads and road objects, which will help them quickly respond to emergencies, eliminate traffic jams and ensure traffic safety.

4. * * Industrial facilities:** The product can be used in industrial facilities, such as factories, warehouses and ports, for control and management in production.

5. **Transport infrastructure:** The product will be useful for monitoring and managing the state of transport infrastructure, including roads, bridges, and tunnels. It will help you identify bottlenecks and problematic road sections, as well as plan repairs and infrastructure upgrades.

Technical requirements for a scientific and technical product (prototype, prototype) to be developed as part
of the current stage of R
& D Main technical parameters that determine the functional, quantitative (numerical) and qualitative characteristics of a scientific and technical product obtained as a result of
the current stage of R & D

Functions that should be performed by the developed scientific and technical product:

* * Data acquisition system:**

- Capture data about moving objects on the road using cameras and sensors/or emulate these processes.
- Real-time data transmission.

* * Visualization system:**

- Visualization of traffic situation data on the map.
- Displays the current state of the road network, taking into account traffic data.

* * Integration:**

- A simple and intuitive algorithm for integrating new functional modules into the system.

Quantitative parameters that determine whether a scientific and technical product fulfills its functions:

** Throughput:* *

- 10 million state changes per minute. States are defined as the geographical location of an object and its metadata, such as speed, color, and car brand.

* * Archive capacity:* *

- 500 million states.

* * Time to search for states or objects:**

- No more than 1 second.

* * Displaying objects on the client:**

- At least 1000 objects at a time. This means visualizing individual entities. If their number exceeds the specified number, they should be combined into logical clusters. For example, using the k-means method.

Input actions required for the scientific and technical product
to perform the specified functions:

1. * * Camera Videos:**

- Video recordings from surveillance cameras that contain information about traffic,
vehicle behavior, and other objects on the road.

2. * * Sensor logs:**

- Records data from sensors, including information about the movement and condition
of vehicles.

3. * * Vehicle Traffic Emulator:**

- Vehicle traffic simulation to test the system in various scenarios.
The emulator provides input data about the movement of objects, their speed, and other
characteristics.

Output reactions provided by a scientific and technical product as a result
of performing its functions:

1. **Real-time data visualization: * *

- Displays data about traffic conditions, traffic flows, and other parameters on
the map or in the event log.

2. * * Record data in the archive:**

- Save archived data about the traffic situation, traffic flows and events for
later analysis and use.

3. * * Alerts:**

- Generate alerts about detected anomalies, emergencies and other
important events on the road.

Design requirements for a scientific and technical product that should be obtained as a result of the current stage of R & D

Requirements for the design and components of a scientific and technical product:

1. * * Programming languages:* *
- C# and C++.
- Purpose: backend development.

2. **Database:* *
- MongoDB.
- Purpose: storing and processing large amounts of data about object states and events.

3. **Containerization:* *
- Docker.
- Purpose: To provide an isolated application runtime environment for easier deployment and scaling.

4. **Framework for the user interface:* *
- React.
- Purpose: development of an interactive and responsive user interface.

5. * * Operating System:**
- Ubuntu.
- Purpose: Ensuring compatibility with the selected operating system on which the product will be deployed.

6. * * Backend:**
- Written in C++, C# using .NET Core.
- Purpose: query processing, database interaction, business logic.

7. * * Client side:**
- Written in React using JavaScript/TypeScript.
- Purpose: data display, interactive user interface.

8. **Database in a Docker container:**
- MongoDB container.
- Purpose: Deploy the database in a Docker environment to ensure its availability and manageability.

These specific technologies and tools will provide the required functionality and performance of the product, as well as its compatibility with the surrounding infrastructure.

Requirements for the weight and size characteristics of a scientific and technical product:

Type of execution, product forms: