**Project Name/ Principal Investigator\_\_\_\_\_\_\_\_Pavel Osinenko\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| **1/ Problem & Solution &Product**  At the moment, we have a prototype of a mobile platform, self-designed and self-manufactured, with a confirmed TRL-5, for greenhouse monitoring. We also have a prototype of a computer vision system for crop detection and disease recognition, that passed preliminary testing with data sets from a Ludinovo greenhouse complex. Our problem statement emerged from a request from industry, namely, Agroinvest company group. Our solution will primarily consist of: a robot with a mast and cameras, a software for computer vision, a web-platform for the use by greenhouse staff. According to the study by Agroinvest CG, there is currently no available analogue on the market that may cover the needs of greenhouse monitoring, partly due to trading restrictions. Moreover, the analogues on the international market are significantly more expensive than ours. We need a financial aid to reach a TRL-6, achieve product maturity to sell it the customers such as Agroinvest. We also plan to launch a mini-series production line. |
| **2/ Deliverables & Intellectual property**  If we get a grant, after the program, we will deliver:   * An improved robotic platform with a confirmed TRL-6, extensively tested in Ludinovo greenhouses of Agroinvest. * A computer vision system, also with TRL-6, tested along with the robot. * A patent application on the platform for greenhouse monitoring. |
| **3/ Competitors & Market analysis**  The main competitors of the proposed solution are Berg Hortimotive and Arugga Ltd. They are strong, established companies, but they do not sell their platforms, not to mention that there is currently no direct way to even get their products on license. Furthermore, the solutions by these companies mainly rely on multiple specialized cameras, have twice as much servomotors as ours, and are slow in terms of the locomotion.  Our advantages:   1. versatility of the platform: it could be easily adopted to the considerable share of the modern greenhouse facilities. 2. readiness of the onboard systems to modification and integration of novel sensors, powerful onbboard PC. 3. huge margins in the carrying capabilities of the shassis, in internal volume, and in power supply capabilities. 4. the product is easy to deploy and pretty much self-contained: no special charging station required, external Wi-Fi network is not necessary.   The main prospective sales market consists of the major players in the field of the domestic agricultural production. The friendly states, such as the members of the Unity of the Independent States, are also considered. |
| **4/ Commercialization &Development Plan**  If we get the grant, we immediately start improving the platform, installing the mast with cameras etc. to be able to get to the field tests in Ludinovo. We need to purchase some new equipment for that. We will gather datasets directly via the robots and train our computer vision systems. By the end of the first year, we plan to get a solid TRL-6. In the second year we will move towards establishing a mini-series production pipeline. At first, some parts of manufacturing robotic platforms will be done at Skoltech, Fablab, and some parts – at the workshop of our mechanical engineer. Agroinvest are interested in getting a mini-series of 20 pieces. We thoroughly calculated the costs of such a mini-series. This will be a big move forward. Eventually, we plan to establish a separate manufacturing facility and make it to a reputable agricultural robotics & AI system manufacturers in Russia. |
| **5/Team and partners**  Our main industry partner is Agorinvest CG, with which we actively cooperate. For instance, just recently they delivered a small data set for disease detection on crop, on which we tested our computer vision system. We provided a letter of support in our grant application. If we get the grant, we will push our solution to TRL-6, while testing on the Agorinvest’s Ludinovo greenhouse complex, followed by its selling to Agorinvest and other customers.  Our team at Skoltech so far is: Pavel Osinenko (PI), Ilya Osokin (lead engineer), Mikhail Patrikeev (mechanical engineer), Ilya Ryakin (computer vision engineer), Emilia Novikova (computer vision engineer). |