

«EXPRESS PROSTHETICS»

W.E.A.S.
ROBOTICS &
CAN-TOUCH.RU
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Онлайн-сервис 3D-печати

PROJECT SUMMARY

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Project Stage

Stage 0: development of the technological process of preparing prosthesis elements for 3D-printing. Manufacturing, installation and testing of the prototype of the mechanical prosthetic fingers.

Development dynamics of the Project

Mechanical prosthetic fingers have been tested. Complete manufacturing chain is elaborated: from taking arm parameters to the installation of the prosthesis. Feasibility analysis is completed, the key partners for the rapid development of the Project are found.

Description of the Project

The project is to solve the problem of the availability of the cheap functional upper limb prostheses both in the Russian and foreign markets. The essence of the project is to develop an electromechanical prosthetic wrist and arm with a control system by reading the muscle contractions. During the development we actively use 3D-printing that significantly reduces the cost of the development phase. Prosthesis should be as functional as real hand to return people to a productive life.

Current tasks:

- Develop technological design for quick manufacturing of the wrist prosthesis elements by means of 3D-printing;
- Develop the most ergonomic and functional mechanical prosthetic fingers and wrist (0 phase) and prepare a sample for the certification.

Prosthesis installation features

Prosthesis is pre-assembled and checked all the connections, final assembly takes place already on the patient's arm. The prosthesis is mounted on a sleeve from special medical thermoplastic which, when heated in hot water, becomes flexible and it is easy to impart the desired shape, after a few minutes it solidifies again and acts as a rigid frame, which the prosthesis is attached to. Tong carried by the movement of the wrist up / down (for mechanical of the prosthesis fingers).

Example of the prosthesis can be found here:
<http://www.youtube.com/watch?v=E2W2leA-cwc>

PROJECT SUMMARY

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Project Stages

- 0 Development of the mechanical fingers and wrist prosthesis (the current stage).
- 1 Development of electromechanical wrist prosthesis.
- 2 Development of electromechanical forearm prosthesis.
- 3 Development of electromechanical full hand prosthesis.
- 4 Development of the prosthetic control system based on neural interface.

Current state

Technology of the prosthesis manufacturing using 3D printing has been tested. Three mechanical prosthesis fingers were installed to the patients. More than 30 applications from the new patients are received.

Weight of the current prototype - from 150 to 300 g, the force range - from 0.5 to 4 N. Key Project partners: MPO "Metalist" (RosTech), G. Albrecht Institute of Prosthetics (St. Petersburg), business-incubator Ingria (St. Petersburg), Autodesk. We completed the preliminary research for Stage 1. We have started the development of the design and control system of electromechanical prosthetic wrist. Developing a process chain for serial production.

Prospects for the development

The project started in August, 2013, commercial implementation of the stage 0 is scheduled for III-IV quarter of 2014 .

The final cost of the electromechanical prosthetic wrist: from \$600 to \$5.000. Price will depend on the functionality of the prosthesis. Technical parameters: from 4 to 20 species of tongs and gestures, hand weight not exceeding 500 g, remote control system with wireless communication, the ability to install (or presence in the basic version) of various functional modifications.

The peculiarity of our prosthesis will be the possibility of quick change removable additional functional modules (modules for different types of fixing phones, tablets and etc., removable or embedded tools for technical works, and many more).

TARGET MARKET & COMPETITORS 2

Patients needs

Current quality solutions are expensive or simply unavailable in Russia. Patients need more affordable prosthesis. Globally, the situation is similar.

Development of similar products

The most advanced prosthesis now are manufactured using carbon fiber or expensive polymers that provides them with lightness and strength as well as a very high cost. 3D printing application will allow to make more ergonomic and, the most important , cheap prosthesis by reducing costs at the development stage. Now 3D printing technology is beginning to be applied for these purposes and it is not widespread in orthopedic industry.

In Russia this project is the only one carried out and proven feasibility and effectiveness of prostheses made using 3D printing technology .

The product being made will be in demand due : low price, fast manufacture, functionality and ergonomics, generally available.

The existing solutions* on the market

Company Name	Mass, g (wrist)	Numbers of tongs and gestures	Availability in Russia	Price, \$
Can-Touch (our product)	500	4-20	+	2 000
SPR Stepper (England)	550	10	-	30 000
Touch Bionics (Scotland)	500	8	-	20 000
RSC Energia (Russia)	600	4	+	6 000
Otto Bock (German)	450	4	+	8 000

* considered electromechanical prosthetic wrist

TARGET MARKET & COMPETITORS 2

Commercialization scheme

- Sales to specialized medical institutions (the main buyer).
- Sales of the manufacturing licenses to the partner companies.
- Sales of the accessories and modifications for the prosthesis directly to users.
- Sales of individual electromechanical supplies (parts, the use of units in other areas and so on).

Types of markets and countries

Geography promotion: Russia, CIS countries, Middle East, Europe, Asia and Africa.

Markets: biotechnology, orthopedic products, medical and rehabilitation equipment.

Potential consumers of the product of the Project

The end consumer is the patient. Also the elements of the Project's product can be used by companies which are developing of humanoid robots.

Market assessment

markets		2013
World	demand	2 mln. p.
	In monetary	\$3 billion
Russian	demand	8 000 p.
	In monetary	\$6 million

The dynamics of the upper limbs prosthetic global market is 4-5% per year. We plan to take up to 20% of the world market by 2020 and to 70% of the Russian market. By 2013 market providing products is 60% worldwide and 80% in Russia.

TECHNOLOGY AND INTELLECTUAL PROPERTY

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Expected International patents

- Patent for mechanical finger prosthesis made using 3D-printing.
- Patent for an electromechanical prosthesis wrist, forearm and hand.
- Patent for a remote control system for myo-prosthetic devices.

Description of the technological innovation

In Russia mechanical and electromechanical prosthesis devices have almost not being developed, and those which are still produced, are unreasonably expensive and not being improved. The novelty lies in the involving of 3D printing technology in the development process of the prosthesis, it significantly reduces the cost and allows to design more ergonomic device. Also novelty is a remote control system for myo-prosthetic arm. This type of control has not been used in such products, yet .

Key advantages

Orthopedic products of our company will be more than 50 % cheaper than the closest analogues, will be capable of remote control, time of the manufacture and installation more than halved (7 days). According to medical specialists, our prosthesis will be more comfortable, functional and psychologically more acceptable than the existing analogues on the market. Global competitiveness is average, because the development of prosthesis in the world are being held for long time and have profound funding
In Russia competitiveness is on the high level.

PROJECT TEAM

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Key participants

Ilya Chekh, CEO

- Ideological and technological project inspirer.
- Master's degree in the Mechatronics.
- Experience on implementing technological venture projects. Was the lead project engineer docking systems for small spacecraft. He took an active part in designing the layout of the private lunar robot. Extensive experience in developing mechatronic devices for different purposes.

Vasiliy Khlebnikov, CMO

- Marketing Specialist and work with partners.
- Co-founder of several successful companies, including international: can-touch.ru, rizzoma.com, BetCourt. 10 years of experience in business, developing and implementing marketing strategies.
- Specialist in 3D-printing, manages production tasks in the Project.

Vadim Danshin, CTO

- Specialists in the field of robotics and electronics.
- A graduate student in the National Nuclear Center, where he manages projects in laboratory robotics and teaches a course on microprocessor systems.
- Experience in implementing technical projects is more than 7 years.

ROAD MAP

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Project development plan

Commercialization plan

- One-off sale at the start of the project (up to 10 prostheses per month)
- Supplying medical institutions and regional distributors with prosthesis.
- Entry into market of Europe, Middle East, Asia and Africa by 2016.

Plan to attract investment

- Public funds investing (Skolkovo, etc.).
- Private and VC funds investing.
- The investments from relevant private and public research institutions, medical institutions and social funds.

Investment comes in several tranches to achieve designated KPI.

Plan R & D work stages 0 and 1 :

Goal	Date
Mechanical fingers prosthesis finalization	Up to 06.14
The prototype electromechanical prosthesis wrist development	Up to 09.14
Certification and market entry of the mechanical prostheses	06.14 – 10.14
Finalization, certification and market entry of electromechanical prosthesis wrist	09.14 – 07.15
Patenting of the developed products	07.14 – 11.14

FINANCIAL PLAN

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Expenses Project at the stage 0

Costs	Costs, \$.000
Payroll and taxes	55
Setting up the manufacturing chain	17
Outsource (certification, patenting)	18
Direct costs (marketing, prototypes Manufacturing etc.)	37
Up-front expenses (15%)	23

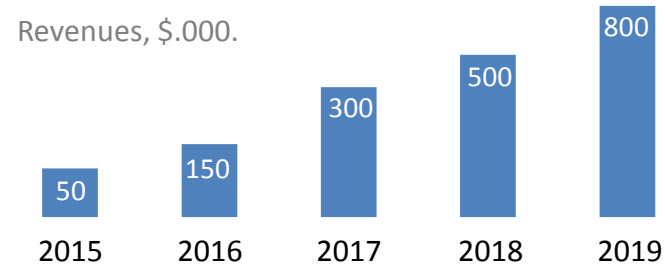
TOTAL: \$150.000

Key Financial Indicators

Necessary investments

Stage 0 - \$150.000
 Stage 1 - \$300.000
 Stage 2 - \$500.000
 Stage 3 - \$500.000
 Stage 4 - \$500.000

More than 1,500 prostheses of various classes are planned to be installed by 2019. Breakeven point is planned to be reached by the end of the Phase 1 of the Project (market entry of the electromechanical prosthesis wrist - III quarter of 2015).



Possible risks

- Bureaucratic delays in certification of products.
- Conservatism of prosthetics market in Russia.
- Limited capacity of entering the U.S. and European markets due to the political situation.
- Cost supplement of imported components causing the direct costs increasing.