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ECHORD++ Experiment Booster Proposal Affordable and Advanced LINear Experiment full name Experiment Acronym LINarm++ device for ARM rehabilitation Building on the experience acquired within the LINarm++ experiment, a new and promising Variable Stiffness Actuator (VSA) is being developed, in order to overcome Excellence (thresh: 3/5) drawbacks arose during the experimental phase. By addressing the most relevant scientific and technical aspects of VSAs, the aim was to optimize the actuator itself without focusing on a specific application field of robotics. A lot of literature states the benefits of employing VSAs in robot interacting scenarios but, marketable and costeffective solutions are still poorly available. The proposed device aims at filling this gap, by addressing the most important technical issues in a way actually exploitable by industry. The combined use of a newly-designed flexural spring and of a non-trivial gearbased differential mechanism allowed to design an energy-efficient, compact, decoupled and infinite-turn rotary actuator, set of characteristics not available in any commercial device on market up to now **Current Product TRL** 4 Ability to Benefit from the Programme and Scalability of Enterprise Eager to fill their gap toward the market, the proponents will exploit the program in different ways: to finance a supporting incubation program, to manufacture more advanced prototypes embedding the new technology, to file a patent application, and to advertise the technology in scientific conferences and trade fairs. In particular, the incubation program is considered extremely important by the proponents, firmly

determined to do their best to bring the invention to commercialization, but aware of their limits in non-technical and management areas.

The enterprise have the potentialities to be scalable in two ways, both supported by a constantly growing rate of the market of collaborative robotics in medium-long term. In the medium term, the proponents aim at developing and commercialize a family of smart and compliant actuators able to facilitate the growth of robotic devices and applications characterized by a close human-robot physical interaction. In the long term, the commercialization of complete smart robotic devices will be possible, by verticalizing in specific markets starting from the medical one, current research sector of the proponents.

Additional Resources Committed

Resources by ongoing projects: by BRIDGE (by Italian non-profit Cariplo Foundation) development and integration in an assistive exoskeleton (55k€); by FHfFC (by Italian Lombardy Region) prototype integrated in a rehabilitation device (44k€). It is currently ongoing the proposal to constitute a spinoff company of the CNR.

No personnel relocation is foreseen.

Implementation (thresh: 3/5)



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Alternate Programme Description			
Start Date	Sept 2018	End Date	Dec 2018
Programme Nature and Content			

The incubation program will consist of services aimed at achieving specific project targets and necessary to meet the needs that typically arise in the first periods of life of a company. The entrepreneurial team will be involved by I3P in the supporting activities, so as to act on the motivation and development of an entrepreneurial awareness, through innovative methods based on the approaches proposed by Steve Blank, Eric Ries and Alexander Osterwalder. The support activities are form with tools to give internal visibility (evaluation tool for performance) and external visibility (presentation events with feedback collection) in particular about the ability to achieve the targets.

The support programme envisage achieving of targets in sequence. This program makes available to the entrepreneur, tools (method, information, network) to track and verify the progress and eventually to integrate the team's skill without replace the role of the entrepreneur.

The course will therefore include 4 basic phases, preparatory to the realization of the entrepreneurial project:

- 1. Expression of the entrepreneur's vision in the Business Model Canvas(BMC) During this phase, after the target market identification there will be a series of brief to collect all the ideas on the products to propose. A verify on the existent markets and on the possible channels will be conducted. A model of the customer relationship will be defined and an evaluation on the resources will be conducted. Possible partners will be identified. The final BMC will be prepared.
- 2. Formalization of a customer discovery plan Most valuable information, sources of information and stakeholders will be defined during this phase.
- 3. Testing the existence of need Exploiting the network given by I3P, will be a first contact with the possible customers and with them it will discuss about their needs and problems.
- 4. Testing the fit between the identified needs and the solution proposed by the team Finally a general evaluation on the solution proposed for the identified problems will take place, considering the possibility to make profit from the proposed solutions. The BMC will be reviewed given the results from every phase.

For each phase will correspond a series of meetings, face-to-face or remotely. In between meetings a back-office work, functional to the success of the next meeting, will be held. Moreover, during the phases and according to the needs of entrepreneurs, training sessions on the following topics will be activated:

- Market identification and commercial strategy
- Financial and economic planning •
- Legal aspects concerning the start-up of a business and the relationship with internal and external stakeholders
- Fundraising
- Verification and protection of intellectual property •

The support program will be provided by the i3p (<u>https://www.i3p.it/</u>).

i3p is the Incubator of Innovative Companies of the Politechnic of Turin (Italy). The service will be provided through meetings held both in person and remotely. Between the foreseen meetings, back office activities will be carried out to maximize the outcome of meetings to be held.