POLITECNICO DI MILANO

PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 38th cycle

Research Area n. 3 - Engineering Design and Manufacturing for the Industry of the Future

PARTENARIATO PNRR Research Field: SMART TECHNOLOGIES FOR VERTICAL AND PRECISION FARMING

Monthly net income of PhDscholarship (max 36 months)
€ 1400.0
In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	The evolution of engineering disciplines and their implementation in agriculture has led in recent years to the development of systems and techniques for food production that could help to solve some of the main problems in this sector. In this scenario, the rising of "vertical &precision farming" concepts were favored by the need to find a solution to the problems related to the exploitation of natural resources (soil and water), to have local production, to minimize the use of pesticides and pesticides and to optimize production. The final objective of the research is therefore to formalize the problem associated with vertical farming techniques, propose and develop specific technologies for the sector, optimize processes and create a living lab in which experimentation can be carried out for the validation of the defined models. The research activity is financed and developed within the National Centre of Research AGRITECH - Agricultural Technologies (*Centro Nazionale di Ricerca AGRITECH - Agricultural Technologies*) - Spoke 3 (Enabling technologies and sustainable strategies for the smart management of agricultural systems and their environmental impact), in the framework of the National Plan for Recovery and Resilience (*PNRR - Piano*

POLITECNICO DI MILANO

	Nazionale di Ripresa e Resilienza, Missione 4 Componente 2 - Dalla ricerca all'impresa - Investimento 1.4), funded by the European Union - Next GenerationEU. Norms of reference: CUP D43C22001350001 - D.D. 1032 del 17/06/2022 D. D. 3138 del 16/12/2021 rettificato con D.D. 3175 del 18/12/2021 - Avviso pubblico per presentazione di proposte di intervento per il Potenziamento di strutture di ricerca e creazione di "campioni nazionali" di R&S su alcune Key Enabling Technologies da finanziare nell'ambito del Piano Nazionale di Ripresa e Resilienza, Missione 4 Componente 2 Investimento 1.4 "Potenziamento strutture di ricerca e creazione di "campioni nazionali di R&S" su alcune Key Enabling Technologies" - finanziato dall'Unione Europea - NextGenerationEU.
Methods and techniques that will be developed and used to carry out the research	The methods implemented in the research will be theoretical (numerical and analytical) and experimental. The research will develop along two main research lines closely related to each other and which will concern: the design and implementation of a sensorized and automated modular layout for vertical and precision farming; the development and optimization of automation and product handling systems (e.g. soft picking) and environmental control during the growth phases, also through the development of machine learning algorithms for analyzing data relating to conditions of plant growth and their properties.
Educational objectives	PhD graduate will be able to: - have a full knowledge of topics related to precision farming and vertical farming - develop a completely automated module for vertical and precision farming

POLITECNICO DI MILANO

	- develop automatic solutions to perform operations in a closed environment (eg. Seeding, monitoring, harvesting, etc.).
Job opportunities	Our last survey on MeccPhD Doctorates highlighted a 100% employment rate within the first year and a 35% higher salary, compared to Master of Science holders in the same field.
Composition of the research group	2 Full Professors 2 Associated Professors 1 Assistant Professors 1 PhD Students
Name of the research directors	Prof. Simone Cinquemani

Contacts
Phone: +39.02.2399.8454   *Email:* simone.cinquemani@polimi.it phd-dmec@polimi.it

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Financial aid is available for all PhD candidates (purchase of study books and materials, funding for participation in courses, summer schools, workshops and conferences) for a total amount of euro 5.707,13. Our candidates are strongly encouraged to spend a research period abroad, joining high-level research groups in the specific PhD research topic, selected in agreement with the Supervisor. An increase in the scholarship will be applied for periods up to 6 months (approx. 700 euro/month- net amount). Teaching assistantship: availability of funding in recognition of supporting teaching activities by the PhD candidate. There are various forms of financial aid for activities of support to the teaching

practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.