Giovanni Carabin

Curriculum Vitae

Personal details

Name Giovanni Carabin

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Work experience

July 2021 – present **Assistant Professor (RTD a) in "Agricultural Machinery and Mechanization – Meccanica Agraria" (SSD AGR/09)**, *Free University of Bolzano – Faculty of Science and Technology, Bolzano (Italy)*.

- Biosystems technologies in the agricultural, livestock, forestry and food sectors, with particular focus on the problems of mountainous contexts:
  - Development of technological solutions to ensure adequate safety and comfort standards for operators in agro-forestry sector, especially in sloping areas context.
  - Development of new prototypes designed to implement product or process innovations with a strong focus on aspects of energy efficiency and environmental protection.
  - Information technologies application to the agro-forestry, livestock or food sectors, ranging from monitoring to process automation (precision agriculture and forestry, Industry 4.0 solutions to food processing).
  - Studies and models for the proposal of new forms of certification (with tests in the field and in controlled environments) for various biosystems technologies to be used in the different application domains of the sector.

Nov 2019 – July 2021 **Assistant Researcher (assegnista di ricerca) in "Applied Mechanics" (SSD ING-IND/13)**, *Free University of Bolzano – Faculty of Science and Technology, Bolzano (Italy)*.

- Team member of the SPRUCE-ROBOT project (see the "Research Project participation" section for more information). The activity focuses on the design and development of a tree climbing robotic prototype with pruning capabilities, in particular for spruce trees (Publ. [35]).
- Team member of the FiRST Lab project (see the "Research Project participation" section for more information). The activity focuses on the evaluation and testing different mobile robotic platform for field activities (e.g. Clearpath Husky wheeled robotic platform, Mattro Rovo 2 tracked platform).

Nov 2014 – Nov 2016 **Assistant Researcher (assegnista di ricerca) and Collaborator/Contract Researcher (contratto di ricerca commissionata) in "Applied Mechanics" (SSD ING-IND/13)**, *Free University of Bolzano – Faculty of Science and Technology, Bolzano (Italy)*.

- Team member of the ARTI project (see the "Research Project participation" section for more information). The activity focused on the study and development of a dynamic model for non-conventional kinematic articulated mobile robotic systems in order to evaluate the stability upon different conditions. A robotic emulator has been then designed and prototyping to validate the model through experiments. Finally, a mechatronic system able to actively control the system stability and to predict insecure configurations and conditions has been designed and implemented (publ. [12], [44], [46], [47], and [50]).
- Team member of the GRASPS project (see the "Research Project participation" section for more information). The work focused on the installation and programming of Adept Quattro s650H parallel robot, the development of mechanical parts, and measure systems (e.g. gripping force sensors) in order to characterize the different non-conventional grippers able to manipulate soft/fragile objects (publ. [41] and [43]).
- Team member of the NOISEVIB-GEARS project (see the "Research Project participation" section for more information). Participation in the design and realization of a test bench for vibration and acoustics analysis of a Bonfiglioli low-backlash planetary gearbox; implementation of a control and acquisition software to conduct the vibration and acoustic experiments, programmed in Labview and Matlab languages; measurement and analysis of vibration and noise generated by the gearbox (publ. [**??**]).
- Participation in the development and prototyping of mechatronic devices for efficiency and automation improvement in agriculture field, in particular for monitoring operation (e.g. proximal sensing, Lidar, NDVI) (publ. [42] and [45]).

Education and Professional Qualification

2023 **National Scientific Qualification**, *Italian national scientific qualification university professor of second rank in the concurrent field 07/C1 SSD AGR/09 - Agricultural Mechanics*.

2021 **National Scientific Qualification**, *Italian national scientific qualification university professor of second rank in the concurrent field 09/A2 SSD ING-IND/13 - Applied Mechanics*.

2016–2019 **Ph.D. in Sustainable Energy and Technologies**, *Free University of Bozen-Bolzano – Faculty of Science and Technology, Chiang Mai University (Thailand) – Department of Mechanical Engineering*.
Thesis title: Advanced Techniques for Energetic Performance Enhancement in Mechatronic Systems.
Supervisor: Prof. R. Vidoni.
Final mark: excellent.

2012–2014 **Master's degree in Mechanical Engineering (LM-33)**, *University of Udine – DIEGM*.
Thesis title: "Studio, modellazione e validazione sperimentale della stabilità di un sistema robotico articolato a 4 ruote" ("Stability study, modeling and experimental validation of a 4 wheels articulated robotic system").
Supervisor: Prof. A. Gasparetto).
Final mark: 110/110.

2008–2012 **Bachelor's degree in Mechanical Engineering (L-9)**, *University of Udine – DIEGM*.
Thesis title: "Progetto ed implementazione di un dispositivo per test dinamici su meccanismi" ("Design and implementation of a device for dynamic tests on mechanisms").
Supervisor: Prof. A. Gasparetto.
Final mark: 108/110.

2003–2008 **Industrial Technical Institute Diploma in electrotechnical and automation, with "chief technician" qualification.**, *ITIS "E.Fermi" of Pieve di Cadore.*.
Final mark: 100/100.

Experience in academic teaching

Didactic activity

2023–2024 Lecturer of the course 'Food processing equipment" (Master in Food Sciences at UniBZ). Hours: 30. Teaching language: English.

Lecturer of the course 'Information and dss in fruit production" (International master in Horticultural Science (IMaHS) at unibo/UniBZ). Hours: 30. Teaching language: English.

Lecturer of the course 'Forest harvesting and logistics" (Master in Environmental Management of Mountain Areas at UniBZ). Hours: 30. Teaching language: English.

2022–2023 Lecturer of the course 'Technologies for low input agricultural systems" (Master in Environmental Management of Mountain Areas at UniBZ). Hours: 60. Teaching language: English.

2021–2022 Lecturer of the course 'Utilizzazioni forestali, prima lavorazione e procedure di tracciabilitá del legno" (Bachelor in Wood Engineering at UniBZ). Hours: 60. Teaching language: Italian.

2020–2021 Contract lecturer of the course "Meccanica delle Macchine Automatiche" (Bachelor in Industrial Mechanical Engineering at UniBZ). Hours: 14. Teaching language: Italian.

Teaching Assistant of the course "Meccanica Applicata alle Macchine" (Bachelor in Industrial Mechanical Engineering at UniBZ). Hours: 16. Teaching language: Italian.

Teaching Assistant of the course "Industrial Automation and Mechatronics - Module I" (Master in Industrial Mechanical Engineering at UniBZ). Hours: 10. Teaching language: English.

2019–2020 Contract lecturer of the course "Meccanica delle Macchine Automatiche" (Bachelor in Industrial Mechanical Engineering at UniBZ). Hours: 14. Teaching language: Italian.

Teaching Assistant of the course "Meccanica Applicata alle Macchine" (Bachelor in Industrial Mechanical Engineering at UniBZ). Hours: 8. Teaching language: Italian.

Teaching Assistant of the course "Industrial Automation and Mechatronics - Module I" (Master in Industrial Mechanical Engineering at UniBZ). Hours: 18. Teaching language: English.

2018–2019 Teaching Assistant of the course "Meccanica Applicata alle Macchine" (Bachelor in Industrial Mechanical Engineering at UniBZ). Hours: 22. Teaching language: Italian.

Teaching Assistant of the course "Industrial Automation and Mechatronics - Module I" (Master in Industrial Mechanical Engineering at UniBZ). Hours: 18. Teaching language: English.

2017–2018 Teaching Assistant of the course "Meccanica Applicata alle Macchine" (Bachelor in Industrial Mechanical Engineering at UniBZ). Hours: 22. Teaching language: Italian.

Teaching Assistant of the course "Industrial Automation and Mechatronics - Module I" (Master in Industrial Mechanical Engineering at UniBZ). Hours: 18. Teaching language: English.

2016-2017 Teaching Assistant of the course "Electric Power Conversion Equipment" (Master in Energy Engineering at UniBZ). Hours: 24. Teaching language: English.

Teaching Assistant of the course "Industrial Automation and Mechatronics - Module I" (Master in Industrial Mechanical Engineering at UniBZ). Hours: 16. Teaching language: English.

2015–2016 Teaching Assistant of the course "Electric Power Conversion Equipment" (Master in Energy Engineering at UniBZ). Hours: 24. Teaching language: English.

Research activity

Scientific records

The candidate is author, or co-author, of more than 41 scientific publications, 14 of them are published on international scientific journal, whereas the others in international conferences proceedings. The total number of citations is 548 by 432 documents and the H-Index is 15 (Scopus indexing – January, 29th, 2024).

Main research areas/activities

The research activity covers fundamental and applied topics of dynamics of machines, mechatronics and robotics. In particular:

1. **Study, modeling, experimental validation and control of high-performance (energy, vibration) multi-body systems.** Vibration and noise measurements and vibration analysis on high-efficiency planetary gearboxes (publ. [10] and [**??**]).
2. **Kinematic study, simulation and trajectory planning of industrial robotic systems.** Research activity mainly carried out during the doctorate period. The objective is the study and investigation of methods, techniques and technologies able to reduce the energy consumption of generic mechatronic multi-body systems (e.g. robotic axis, cranes, elevators, manipulators, etc.), without affecting their performances (publ. [11]). A first methodology regards the energy consumption reduction in a generic 1-DoF system performing a point-to-point task, obtained through an optimization of the trajectory solved analytically (publ. [36] and [39]). A further approach methodology has been developed to reduce the energy consumption in industrial robotic systems performing a fixed cyclic trajectory task by introducing optimized conventional compliant elements in parallel to the actuators and by exploiting regenerative devices (publ. [2], [4], [7], [8] and [37]).
3. **Agro-forestry applications of robotics and mechatronics.** Study, design and prototyping of a tree climbing robot for pruning operations on spruce trees (publ. [35]). Study and evaluation of the stability of agricultural tractors (publ. [14]) and of 4-wheel articulated platform for activities on slope terrains (publ. [12], [44], [46], [47] and [48]); design and realization of a mechatronic device able to actively control the platform stability and to predict insecure configurations and conditions (publ. [50]). Study and evaluation of non-conventional robotic grippers able to manipulate soft/fragile objects – e.g. fruits, vegetables, etc. (publ. [41] and [43]). Evaluation and design of special grippers for the automation of pizza topping. Development of sensors for agro-forestry application (publ. [9]). Participation in the development and prototyping of mechatronic devices for the efficiency and the automation improvement in agricultural field, in particular for monitoring – e.g. proximal sensing, Lidar, NDVI (Publ. [13] and [42], [45]).

The candidate is moreover a research member of the Agro-forestry Innovation Lab (unibz) and of the Field Robotics Laboratory (unibz).

Research project participation

- **AI4FOREST** (An Artificial Intelligence approach for Forestry Robotics in Environment Survey and Inspection). Project type: PRIN2022. Start date: 28/09/2023. End date: 27/09/2025. PI: Dr. Giovanni Carabin. Co-PI: Prof. F. Mazzetto. Role: PI.
- **SESTOSENSO** (Physical Cognition For Intelligent Control And Safe Human-Robot Interaction). Project type: RIA/IA/CSA. Start date: 01/10/2022. End date: 30/09/2022. PI: Prof. R. Vidoni. Co-PI: Prof. E. Rauch. Role: team member.
- **RECOARO** (REconfigurable COllaborative Agri-RObots). Project type: UniBZ CRC competitive call 2020, TN2291. Start date: 01/10/2020. End date: 31/12/2022. PI: Prof. K. Von Ellenrieder. Co-PI: Prof. R. Vidoni. Role: team member.
- **SPRUCE-ROBOT** (Smart PRUning and Climbing treEs ROBOT): study, design and development of robotic applications in forestry field for efficient, safe and low waste timber production. Project type: UniBZ CRC competitive call 2018, TN200L. PI: Prof. R. Vidoni. Role: team member.
- **FiRST Lab** (Field Robotics South Tirol Laboratory): study, design and development of robotic applications in forestry field for efficient, safe and low waste timber production. Project type: EFRE-FESR 2014–2020. Start date: 01/01/2018. End date: 30/06/2021. PI: Prof. R. Vidoni. Co-PI: Prof. K. Von Ellenrieder. Role: team member.
- **E-EDU4.0** (Engineering Education 4.0): the aim of the project is creating the necessary networks of actors who have skills in training programs, carry out activities and provide the tools and equipment necessary to strengthen the learning processes both locally and transnationally.. Project type: INTERREG I-A 2014–2020. Start date: 01/05/2018. End date: 30/04/2021. PI: Prof. D. Matt. Role: team member.
- **SME 4.0** (Industry 4.0 for SMEs): the goal of the project is creating an international and interdisciplinary research network aimed at bringing up the adoption of the Industry 4.0 technologies by small and medium enterprises. Project type: European Union's Horizon 2020 RISE programme under the Marie Skłodowska-Curie grant agreement No 734713. PI: Free University of Bolzano. Role: team member for the WP 3.3. and 6.3.
- **PizzaROBOT**: functional mechanical design of an innovative vending machine for pizzas. Project type: contract for research project funded by Fraunhofer Italia (2017–2018), TN2342C. PI: Prof. R. Vidoni. Role: team member.
- **GRASPS** (Grasping And Soft-bodies Picking Systems): characterization of different non-conventional grippers able to manipulate soft/fragile objects. Project type: UniBZ CRC competitive call 2014, TN2025. Start date: 06/10/2014. End date: 30/11/2017. PI: Prof. D. Matt. Co-PI: Prof. R. Vidoni. Role: team member.
- **NOISEVIB-GEARS**: noise and vibration evaluation of high-efficiency planetary gears. Project type: contract for research project funded by Bonfiglioli Mechatronics dept. (2015). PI: Prof. L. Cortese. Role: team member.
- **ARTI**: stability and control of articulated robotic autonomous systems for field activities. Project type: UniBZ CRC competitive call 2014, TN2024. PI: Prof. R. Vidoni. Role: team member.

Conference participation with oral presentation

- 49th International Symposium "Actual tasks on Agricultural Engineering" (ATAE 2023), Februray 28 - March 3, 2023, Opatija, Croatia. Presented paper [20].
- 2022 IEEE International Workshop on Metrology for Agriculture and Forestry (MetroAgriFor 2022), November 3-5, 2022, Perugia, Italy. Presented paper [22].
- 12th AIIA Conference - "Biosystems engineering towards the green deal", September 19-22, 2022, Palermo, Italy.. Presented papers [24] and [25]
- The 4th IFTOMM ITALY Conference, IFIT 2022, September 7-9, 2022, Napoli, Italy. Presented paper [31].

- 23rd CISM IFToMM Symposium on Robot Design, Dynamics and Control, ROMANSY 2020, September 21-24, 2020, Sapporo, Japan - held online. Presented paper [35].
- ASME International Mechanical Engineering Congress & Exposition, IMECE 2018, November 9-15, 2018, Pittsburgh, Pennsylvania, USA. Presented paper [40].
- The 50th International Symposium on Robotics, ISR, June 20-21, 2018, Munich, Germany, Presented paper [41].
- Conference on Robotics in Alpe-Adria-Danube Region, RAAD 2017, June 21-23, 2017, Torino, Italy. Presented paper [43].
- The 1st IFTOMM ITALY Conference, IFIT 2016, December 1-2, 2016, Vicenza, Italy. Presented paper [44].

Awards

- **Best Poster Award**. 2022 IEEE International Workshop on Metrology for Agriculture and Forestry (MetroAgriFor 2022). – Publ. [22].
- **Best Application Paper Award**. 23rd CISM IFToMM Symposium on Robot Design, Dynamics and Control (ROMANSY2020) – Publ. [35].
- **Best Paper Award sponsored by Hitachi Ltd**. 23rd CISM IFToMM Symposium on Robot Design, Dynamics and Control (ROMANSY2020) – Publ. [35].
- **Best Application Paper Award**. 28th International Conference on Robotics in Alpe-Adria-Danube Region (RAAD2020) – Publ. [36].
- **First prize - outstanding paper award**. IEEE International Conference on Industrial Engineering and Management 2018 – Publ. [38].

Abroad research periods

- Visiting researcher at the Mechanical Engineering Department of the Chiang Mai University (Thailand). April 2nd, 2018 to May 4th, 2018 and August 1st, 2019 to October 1st, 2019.
- Visiting researcher at the Mechanical Engineering Department of the Worcester Polytechnic Institute (Massachusetts, USA). November 16th, 2018 to December 1st, 2018.

Reviewer activity for:

- Biosystems Engineering, Elsevier
- Applied Sciences, MDPI
- Sensors, MDPI
- Journal of Marine Science and Eng., MDPI
- Robotics, MDPI
- Agronomy, MDPI
- Energies, MDPI

Publications

Journal papers in refereed academic journals

[1] R.A. Saeed, G. Tomasi, G. Carabin, R. Vidoni, K.D. von Ellenrieder. **Conceptualization and Implementation of a Reconfigurable Unmanned Ground Vehicle for Emulated Agricultural Tasks.** *Machines. 2022, volume 10, issue 9, n° 817.* `https://doi.org/10.3390/machines10090817`.

[2] G. Carabin, R. Vidoni. **Energy saving optimization method for point-to-point trajectories planned via standard primitives in 1-DoF mechatronic systems.** *International Journal of Advanced Manufacturing Technology. 2022, volume 116, issues 1-2, pages 331–344.* `https://doi.org/10.1007/s00170-021-07277-y`.

[3] G. Carabin, E. Wehrle, V. Renato. **Smart Mechanical Systems for Manufacturing in the Era of Industry 4.0: Condition-Based Predictive Maintenance and Dynamic System Modification for Small and Medium-Sized Enterprises.** *Chiang Mai University Journal of Natural Sciences. 2021, volume 20, issues 2, pages 1–11.* `https://doi.org/10.12982/CMUJNS.2021.028`.

[4] G. Carabin, L. Scalera, T. Wongratanaphisan, R. Vidoni. **An energy-efficient approach for 3D printing with a Linear Delta Robot equipped with optimal springs.** *Robotics and Computer-Integrated Manufacturing. 2021, volume 67, n° 102045.* https://doi.org/10.1016/j.rcim.2020.102045.

[5] G. Carabin, L. Scalera. **On the trajectory planning for energy efficiency in industrial robotic systems.** *Robotics. 2020, volume 9, issue 4, n° 89.* https://doi.org/10.3390/robotics9040089.

[6] I. Palomba, E. Wehrle, G. Carabin, R. Vidoni. **Minimization of the energy consumption in industrial robots through regenerative drives and optimally designed compliant elements.** *Applied Sciences. 2020, volume 10, issue 21, pages 1–18, n° 7475.* https://doi.org/10.3390/app10217475.

[7] L. Scalera, P. Boscariol, G. Carabin, R. Vidoni, A. Gasparetto. **Enhancing energy efficiency of a 4-DOF parallel robot through task-related analysis.** *Machines. 2020, volume 8, issue 1.* https://doi.org/10.3390/machines8010010.

[8] L. Scalera, G. Carabin, R. Vidoni, T. Wongratanaphisan. **Energy efficiency in a 4-DOF parallel robot featuring compliant elements.** *JoMaC - International Journal of Mechanics and Control. 2019, volume 20, issue 2, pages 49–57.*

[9] R. Gallo, G. Carabin, R. Vidoni, P. Sacco, F. Mazzetto. **Solutions for the automation of operational monitoring activities for agricultural and forestry tasks.** *Bodenkultur, Walter de Gruyter, 2018, volume 69, issue 3, pages 131–140.* https://doi.org/10.2478/boku-2018-0012.

[10] F. Concli, L. Cortese, R. Vidoni, F. Nalli, G. Carabin. **A mixed FEM and lumped-parameter dynamic model for evaluating the modal properties of planetary gearboxes.** *Journal of Mechanical Science and Technology, 2018, volume 32, issue. 7, pages 3047–3056* https://doi.org/10.1007/s12206-018-0607-9.

[11] G. Carabin, E. Wehrle, R. Vidoni. **A review on energy-saving optimization methods for robotic and automatic systems.** *Robotics, 2017, volume 6, issue 39.* https://doi.org/10.3390/robotics6040039.

[12] G. Carabin, A. Gasparetto, F. Mazzetto, R. Vidoni. **Design, implementation and validation of a stability model for articulated autonomous robotic systems.** *Robotics and Autonomous Systems, 2016, volume 83, pages 158–168.* https://doi.org/10.1016/j.robot.2016.05.008.

[13] M. Bietresato, G. Carabin, R. Vidoni, A. Gasparetto, F. Mazzetto. **Evaluation of a Lidar-based 3D-stereoscopic vision system for crop-monitoring applications.** *Computers and Electronics in Agriculture, 2016, volume 124, pages 1–13.* https://doi.org/10.1016/j.compag.2016.03.017.

[14] M. Bietresato, G. Carabin, R. Vidoni, F. Mazzetto, A. Gasparetto. **A parametric approach for evaluating the stability of agricultural tractors using implements during side-slope activities.** *Contemporary Engineering Sciences, 2015, volume 8, no. 28, pages 1289-1309.* http://dx.doi.org/10.12988/ces.2015.56185.

Papers in international conference proceeding

[15] G. Carabin, S. Leitner, F. Mazzetto, R. Vidoni, M. Bietresato. **Cutting systems evaluation for a tree-pruning robot.** *IEEE International Workshop on Metrology for Agriculture and Forestry (MetroAgriFor 2023). November 6-8, 2023, Pisa, Italy.*

[16] M. Manzardo, G. Carabin, L. Gualtieri, R. Vidoni. **Cycle Time Reduction Through Redundancy Optimization in Industrial Robotic Tasks.** *16th International Federation of Theory of Machines and Mechanisms World Congress (IFToMM WC 2023), November 5-9, 2023, Tokyo, Japan. Published in Mechanisms and Machine Science. 2023, volume 148, pages 540–550.*

[17] R.A. Saeed, G. Carabin, R. Vidoni, K. Von Ellenrieder.. **Numerical and experimental evaluation of an enhanced boundary node path-planning method for agri-robots in dynamic environments.** *ASME International Mechanical Engineering Congress and Exposition (IMECE2023), October 29-November 2, 2023, New Orleans, LA, USA.*

[18] A. Mandler, F.F. Nicolosi, L. Becce, F. Mazzetto, G. Carabin. **Innovative engineering education in the wake of smart agriculture. Revision of the agricultural engineering curriculum.** *51st Annual Conference of the European Society for Engineering Education: Engineering Education for Sustainability (SEFI2023), September 11-14, 2023, Dublin, Ireland.*

[19] G. Carabin, L. Becce, A. Mandler, F.F. Nicolosi, F. Mazzetto. **Experimental validation of the influence of obstacles on tractor rollover stability.** *VII International Conference on Safety, Health, and Welfare in Agriculture and Agro-food Systems (Ragusa SHWA 2023), September 6-9, 2023, Ragusa, Italy.*

[20] G. Carabin, L. Becce, A. Mandler, F. Mazzetto. **Integrated determination of tractor centre of gravity and lateral rollover angle.** *Proceedings of the 49th International Symposium "Actual tasks on Agricultural Engineering" (ATAE 2023), Februray 28 - March 2, 2023, Opatija, Croatia. Pages 23–32.* `https://atae.agr.hr/49th_ATAE_proceedings.pdf`.

[21] L. Becce, G. Carabin, F. Mazzetto. **Evaluation of air flow influence on sprayer nozzle performance by shadowgraphy.** *Proceedings of the 49th International Symposium "Actual tasks on Agricultural Engineering" (ATAE 2023), Februray 28 - March 2, 2023, Opatija, Croatia. Pages 23–32.* `https://atae.agr.hr/49th_ATAE_proceedings.pdf`.

[22] G. Carabin, L. Becce, A. Mandler, F. Mazzetto. **Primary Production Prediction from Aerial Spectrographic Survey.** *IEEE International Workshop on Metrology for Agriculture and Forestry (MetroAgriFor 2022). November 3-5, 2023, Perugia, Italy. Proceedings, pages 350–355.* `https://doi.org/10.1109/MetroAgriFor55389.2022.9964747`.

[23] L. Becce, G. Carabin, S. Amin, F. Mazzetto. **Preliminary spray nozzle characterization activities through shadowgraphy at the AgroForestry Innovation Lab (AFI-Lab).** *IEEE Workshop on Metrology for Agriculture and Forestry, MetroAgriFor 2022. Proceedings, pages 136–140.* `https://doi.org/10.1109/MetroAgriFor55389.2022.9965106`.

[24] G. Carabin, L. Becce, F. Mazzetto **Development and experimental evaluation of a tractor roll-over stability model.** *12th AIIA Conference - "Biosystems engineering towards the green deal", September 19-22, 2022, Palermo, Italy. Published in Lecture Notes in Civil Engineering. 2023, volume 337, pages 429–436*

[25] G. Carabin, R. Vidoni, F. Mazzetto **A tree climbing-robot for spruce pruning operations.** *12th AIIA Conference - "Biosystems engineering towards the green deal", September 19-22, 2022, Palermo, Italy.*

[26] F. Mazzetto, L. Becce, G. Carabin, A. Mandler, P. Sacco **Technological solutions for implementing sustainable cereal-based value-chains in high mountain areas.** *12th AIIA Conference - "Biosystems engineering towards the green deal", September 19-22, 2022, Palermo, Italy. Published in Lecture Notes in Civil Engineering. 2023, volume 337, pages 733–741*

[27] L. Becce, G. Carabin, F. Mazzetto **Agroforestry innovation lab activities on sprayer performance and certification.** *12th AIIA Conference - "Biosystems engineering towards the green deal", September 19-22, 2022, Palermo, Italy. Published in Lecture Notes in Civil Engineering. 2023, volume 337, pages 305–313*

[28] P. Sacco, D. Don, L. Becce, A. Mandler, G. Carabin, F. Mazzetto **Sustainability performance of mountain food value chains.** *12th AIIA Conference - "Biosystems engineering towards the green deal", September 19-22, 2022, Palermo, Italy. Published in Lecture Notes in Civil Engineering. 2023, volume 337, pages 901–908*

[29] A. Mandler, G. Carabin, L. Becce, S. Liberatori, H. Bernhardt, M. Treiber, C. Paulus, A. Gronauer, A. Herlin, F. Mazzetto **LLL strategies for new educational approaches in smart agriculture from an agricultural engineering perspective in Italy.** *12th AIIA Conference - "Biosystems engineering towards the green deal", September 19-22, 2022, Palermo, Italy. Published in Lecture Notes in Civil Engineering. 2023, volume 337, pages 697–704*

[30] S. Leitner, E.M.A. Perez, G. Carabin, M. Renzi, F. Mazzetto, R. Vidoni **Requirements and challenges in the design and potential of smart and efficient winch assisted forestry machinery.** *12th AIIA Conference - "Biosystems engineering towards the green deal", September 19-22, 2022, Palermo, Italy. Published in Lecture Notes in Civil Engineering. 2023, volume 337, pages 657–666*

[31] M. Manzardo, G. Carabin, R. Vidoni **Design of a Path Planning Method for a Robotized Optimal Trimming.** *4th International Conference of the IFToMM Italy, IFIT 2022. Published in Mechanisms and Machine Science. 2022, volume 122, pages 718–726.* https://doi.org/10.1007/978-3-031-10776-4_83.

[32] G. Carabin, I. Palomba, M. Stimpfl, R. Vidoni. **Mechatronic Handling Solution for a Robotized Pizza-Chef Assistant.** *1st International Symposium on Industrial Engineering and Automation, ISIEA 2022. Published in Lecture Notes in Networks and Systems. 2022, volume 525, pages 15–25.* https://doi.org/10.1007/978-3-031-14317-5_26.

[33] G. Carabin, F. Mazzetto, R. Vidoni. **Design and evaluation of a branch sensing system for a climbing and pruning robot.** *IEEE Workshop on Metrology for Agriculture and Forestry, MetroAgriFor 2021. Proceedings, pages 454–459.* https://doi.org/10.1109/MetroAgriFor52389.2021.9628768.

[34] L. Scalera, P. Boscariol, G. Carabin, R. Vidoni, A. Gasparetto. **Optimal Task Placement for Energy Minimization in a Parallel Manipulator.** *MTM&Robotics 2020, October 14-16, 2020, Timișoara, Romania - held online. Published in Mechanisms and Machine Science. 2021, volume 88, pages 12–22.* https://doi.org/10.1007/978-3-030-60076-1_2.

[35] G. Carabin, D. Emanuelli, R. Gallo, F. Mazzetto, R. Vidoni. **Development of a Climbing-Robot for Spruce Pruning: Preliminary Design and First Results.** *ROMANSY 2020, September 21-24, 2020, Sapporo, Japan - held online. Published in ROMANSY 23 - Robot Design, Dynamics and Control, 2020, volume 601, pages 100-108.* **Best application paper award and best paper award sponsored by Hitachi Ltd.** https://doi.org/10.1007/978-3-030-58380-4_13.

[36] L. Scalera, G. Carabin, R. Vidoni, A. Gasparetto. **Minimum-Energy Trajectory Planning for Industrial Robotic Applications: Analytical Model and Experimental Results.** *RAAD 2020. Published in Advances in Service and Industrial Robotics, 2020, volume 84, pages 334–342.* **Best application paper award.** https://doi.org/10.1007/978-3-030-48989-2_36.

[37] G. Carabin, I. Palomba, E. Wehrle, R. Vidoni. **Energy Expenditure Minimization for a Delta-2 Robot Through a Mixed Approach.** *ECCOMAS Multibody Dynamics Conference 2019, July 15-18, 2019, Duisburg, Germany. Published in Computational Methods in Applied Sciences, 2019, volume 53, pages 383–390.* https://doi.org/10.1007/978-3-030-23132-3_46.

[38] L. Gualtieri, R. Rojas, G. Carabin, I. Palomba, E. Rauch, R. Vidoni, D. Matt. **Advanced Automation for SMEs in the I4.0 Revolution: Engineering Education and Employees Training in the Smart Mini Factory Laboratory.** *IEEM 2018 - IEEE International Conference on Industrial Engineering and Engineering Management 2018, December 16-19, 2018, Bangkok, Thailand, pages 1111–1115.* https://doi.org/10.1109/IEEM.2018.8607719.

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Personal skills

Languages

Italian First language

English

Understanding	Writing	Speaking
C1	C1	C1

Job-related skills Multi-task, identification analysis and solution of problems, determination, team working and taking initiative.

Technical skills

- Industrial robotic platforms: *Adept Quattro s650H, Adept Cobra s600, ABB irb120, Universal Robot UR, Kuka KMP, Kuka iiwa.*
- Mobile robotic platform: *Clearpath Husky, Mattro Rovo 2.*
- Mechanical machining (e.g. turning, milling, 3D printing, CNC machining etc.).
- Electronic: *analog, digital, realization of Printed Circuit Board (PCB), Microchip PIC microcontrollers, Arduino, Raspberry Pi.*

Computer skills

- Operative systems: *GNU/Linux (Ubuntu), Microsoft Windows*.
- Office suites: *Microsoft Office, LibreOffice*.
- Mechanical design software: *AutoCAD, SolidEdge, SolidWorks, ANSYS, MSC Adams*.
- Electronic design software: *KiCad*.
- Scientific software: *Matlab*, *QGIS*
- Programming languages: *C, C++, C#, Python, Matlab, LabView, Adept V+, ROS2*.
- Others: *LaTeX, GIMP, Inkscape*.