# Ron Berenstein

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## Education

2017–2019 **Post-doctorate**, *UC Berkeley*, Berkeley, CA.
Developing robotic algorithm, components, and procedures toward smart-precision irrigation. Advisor: Prof. Ken Goldberg.

2010–2016 **PhD**, *Ben-Gurion University of the Negev*, Beer-Sheva.
Developing a human-robot collaborative robotic sprayer. Advisor: Prof. Yael Edan.

2007–2009 **MSc**, *Ben-Gurion University of the Negev*, Beer-Sheva.
Developing a machine vision algorithms to detect grape clusters in vineyards. Advisor: Prof. Yael Edan.

2003–2006 **BSc**, *Ben-Gurion University of the Negev*, Beer-Sheva.
Mechanical engineering track.

## PhD thesis

*A human-robot cooperative vineyard selective robotic sprayer*

Advisor: Prof. Yael Edan

In this work we developed a human-robot collaborative agriculture robotic sprayer. The specific research objectives were to develop a wheeled robotic platform suitable for the spraying of vineyards, machine vision algorithms for foliage and grape detection, a framework in which a human and robot collaborate in performing the spraying task, and a smart spraying device for pesticide application.

## Experience

2008–Current **Research engineer**, *Institute of Agricultural Engineering, Israeli Ministry of Agriculture (Volcani Center)*, Rishon-lezion, Israel.
Responsible for managing ongoing research and the research group, and applying for research grants.
Detailed achievements:

- Applying to and winning two research grants to develop a safety device for greenhouse workers working in heights (Ministry of Agriculture).
- Developing a robotic sprayer for greenhouses and components, including navigation along the row based on machine vision and LIDAR.
- Developing two small robotic platforms designed for off-road usage (agricultural uses).

2012–2014 **CEO**, *M.T.V*, Beer-Sheva.
Managing our family-owned company providing maintenance services for electo-mechanical equipment. I ran the company following my father's sudden passing and until a successful acquisition.

2007–2015 **Teaching assistant**, *Ben-Gurion University of the Negev*, Beer-Sheva, Israel.
Teaching mechanical engineering courses for industrial engineers, and computer-integrated manufacturing.

## Computer skills

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|---|---|---|---|
| Programing languages | c#, python, Matlab, c/c++, Visual basic, Java, Labview | IDE | Visual studio, Matlab, Eclipse, Arduino, Android studio |
| CAD | Solidworks, SolidEdge (Siemens) | OS | Windows, Linux |
| Applications | Machine vision, visual servoing, communication protocols, robot OS development | Other | ROS development, Git, Arduino implementations, Raspberry Pi implementations |

## Professional skills

- Machine vision development - Irrigation emitter detection; grape clusters detection algorithms; distance-dependent multimodal image registration; detection of artificial targets using RGB camera.
- Algorithm development and implementation - robot navigation along vineyard rows, human-robot collaboration techniques, and robot and base station communication.
- Robotic applications - irrigation emitter detection, grasp using robotic gripper, and adjustment; four-wheeled robot with skid-steer, control, and kinematics; conversion of an industrial, human-operated greenhouses sprayer to a robotic greenhouse sprayer; conversion of a toy human operated car (Tamiya TXT1) to a robotic platform for preliminary experiments in greenhouses.
- Human-robot collaboration - developing human robot collaboration techniques, develop human target marking methods for human-robot collaboration, designing and implementing an integrative human-robot site specific sprayer.
- Design and implementation of control systems - mobile robot motion control, pan-tilt unit control, greenhouse climate control algorithms.
- Design and manufacture of agricultural machinery - developing plant seeding machine for use in highly irrigated soil, sorting and cutting machine for the safari sunset flower, 30m referencing device for aerial multi-spectral imaging.

## Book Chapter

Berenstein, Ron (2019). "Robotics and automation for improving agriculture". In: ed. by Prof. John Billingsley. Chap. Use of agricultural robots in crop spraying fertiliser application. (accepted for publication).

Carpin, Stefano et al. (2019). "Robotics and automation for improving agriculture". In: ed. by Prof. John Billingsley. Chap. Use of intelligent/autonomous systems in crop irrigation. (to appear).

## Journals Publications

Berenstein, Ron, Ohad Ben Shahar, et al. (2010). "Grape clusters and foliage detection algorithms for autonomous selective vineyard sprayer". In: *Intelligent Service Robotics* 3(4), pp. 233–243.

Berenstein, Ron, Marko Hočevar, et al. (2015). "Distance-dependent multimodal image registration for agriculture tasks". In: *Sensors* 15(8), pp. 20845–20862.

Berenstein, Ron and Yael Edan (2017). "Human-robot collaborative site-specific sprayer". In: *Journal of Field Robotics* 34(8), pp. 1519–1530.

Berenstein, Ron and Yael Edan (2018). "Automatic Adjustable Spraying Device for Site-Specific Agricultural Application". In: *IEEE Transactions on Automation Science and Engineering* 15(2), pp. 641–650.

## Conferences Publications

Adamides, George et al. (2012). "User interface design principles for robotics in agriculture: The case of telerobotic navigation and target selection for spraying". In: *Proceedings of the 8th Asian Conference for Information Technology in Agriculture, Taipei, Taiwan*. Vol. 36.

Berenstein, Ron, Idan Ben Halevi, and Yael Edan (2012). "A remote interface for a human-robot cooperative vineyard sprayer". In:

Berenstein, Ron and Yael Edan (2012a). "Evaluation of marking techniques for a human-robot selective vineyard sprayer". In: vol. 45. 22, pp. 799–804.

Berenstein, Ron and Yael Edan (2012b). "Human-robot cooperative precision spraying: Collaboration levels and optimization function". In: Elsevier.

Berenstein, Ron and Yael Edan (2012c). "Robotic precision spraying methods". In:

Berenstein, Ron, Marko Hočevar, et al. (2014). "Image registration for agriculture tasks". In:

Berenstein, Ron, Roy Fox, et al. (2018). "Robustly Adjusting Indoor Drip Irrigation Emitters with the Toyota HSR Robot". In:

Berenstein, Ron, Averell Wallach, et al. (2018). "An Open-Access Passive Modular Tool Changing System for Mobile Manipulation Robots". In: