

# 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 electro-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

Programming 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. (to appear).
- Carpin, Stefano, Ken Goldberg, Stavros Vougioukas, Ron Berenstein, and Joshua Viers (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, Amir Shapiro, and Yael Edan (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, Tone Godeša, Yael Edan, and Ohad Ben-Shahar (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, Ron Berenstein, Idan Ben-Halevi, Thanasis Hadzilacos, and Yael Edan (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, Tone Godeša, Yael Edan, and Ohad Ben-Shahar (2014). "Image registration for agriculture tasks". In:
- Berenstein, Ron, Roy Fox, Stephen McKinley, Stefano Carpin, and Ken Goldberg (2018). "Robustly Adjusting Indoor Drip Irrigation Emitters with the Toyota HSR Robot". In:
- Berenstein, Ron, Averell Wallach, Pelagie Elimbi Moudio, Peter Cuellar, and Ken Goldberg (2018). "An Open-Access Passive Modular Tool Changing System for Mobile Manipulation Robots". In: