

Research Topics & Ideas: Robotics

About this document

This PDF contains 50 **robotics research topics** for dissertations and theses, organized into 10 areas of robotics, from autonomous vehicles and field robotics to soft robotics and novel materials. Each topic is written as a researchable question and linked to a completed dissertation (2022–2026, 25 universities), so you can see how it was studied in practice. Use it to shortlist robotics dissertation topics and thesis ideas, then narrow one down to your own population, setting and timeframe.

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Autonomous vehicles and field robotics

1. How does a robot navigate a cornfield once the canopy closes over it?

See it in a real dissertation: [In-Row and Under-Canopy Autonomous Navigation System for Agricultural Mobile Robots in Cornfields](#) · K S Kim · Purdue University · 2026

2. What do a drone and a ground robot each contribute to a search?

See it in a real dissertation: [Autonomous Search and Rescue: Real-Time Drone and Robotic Dog Integration](#) · Robert Alexander · Chapman University · 2025

3. How far can a robot get on vision alone, with no other sensor?

See it in a real dissertation: [Probabilistic Vision Only Localization in Single and Multiple Mobile Robot Systems](#) · Sarah Brent · University of Rhode Island · 2022

4. How do you perceive in three dimensions where light barely travels?

See it in a real dissertation: [Underwater 3D Visual Perception and Generation](#) · Tianyi Zhang · Carnegie Mellon University · 2025

5. How should a robot team plan around the need to recharge?

See it in a real dissertation: [Multi-Robot Collaboration and Planning with Energy Replenishment](#) · Li-Fan Wu · Purdue University · 2025

Ethics, safety and the future of work

6. Who is responsible when an autonomous system makes a decision in a power network?

See it in a real dissertation: [Autonomous Shipyard Robots; Ethical Issues with Using AI in Power Systems](#) · Philip Fitz-Gerald · University of Virginia · 2026

7. Can you formally prove a robot working near people is safe?

See it in a real dissertation: [Safety Verification Using Reachability Analysis: Application to Formal Methods and Cyber-physical-human Systems](#) · Joonwon Choi · Purdue University · 2026

8. Should a robot account for how its own presence changes what a person does?

See it in a real dissertation: [Influence-Aware Safety for Human-Robot Interaction](#) · Ravi Pandya · Carnegie Mellon University · 2026

9. What changes ethically once a robot looks convincingly human?

See it in a real dissertation: [The Ethics of Humanoid Robots](#) · Cindy Friedman · Utrecht University · 2025

10. Do AI systems carry consistent preferences about risk and delay?

See it in a real dissertation: [Heuristics, Biases, and Preferences of AI: Time and Risk Preferences Among Generative AI Systems](#) · Wangsuk Suh · University of Rhode Island · 2025

Human-robot interaction

11. What is still hard about telling a robot what you want?

See it in a real dissertation: [Lowering barriers to human-robot communication](#) · Vidhi Jain · Carnegie Mellon University · 2025

12. How should a robot plan around a person who is reacting to the robot?

See it in a real dissertation: [Interaction-Aware Safe Planning for Human-Robot and Multi-Robot Systems](#) · Haoyi Wang · Washington University in St. Louis · 2026

13. Can a robot companion change a child's daily habit, and for how long?

See it in a real dissertation: [Brush-E Bot: Exploring the Benefits of a Robot Companion to Improve Children's Oral Hygiene Habits](#) · Maisey Toczek · University of Denver · 2025

14. Can a robot read a person's movement well enough to work beside them?

See it in a real dissertation: [Adaptive robot collaboration using robotic skin and motion similarity](#) · Jordan Dowdy · University of Louisville · 2024

Industrial automation and manufacturing

15. Can an operator control an industrial robot with their hands alone?

See it in a real dissertation: [Markerless Motion Capture for Dual-handed Teleportation of Industrial Robots](#) · Michael Vallaro · University of Rhode Island · 2024

16. How does a mobile manipulator work at the scale of a factory floor?

See it in a real dissertation: [Control and Planning for Mobile Manipulators Used in Large Scale Manufacturing Processes](#) · Joshua Nguyen · Louisiana State University · 2022

17. How do you coordinate mixed robot fleets in a harvest with size constraints?

See it in a real dissertation: [Heuristic Approaches for Coordination of Heterogeneous Robotic Systems in Harvesting Automation with Size Constraints](#) · H. Y. Lee · Michigan Technological University · 2025

18. What does it take to combine printing and machining on one platform?

See it in a real dissertation: [Design, evaluation, and control of nexus: a multiscale additive manufacturing platform with integrated 3D printing and robotic assembly](#) · Danming Wei · University of Louisville · 2022

19. How do you assemble something too small to grip?

See it in a real dissertation: [A Flexible Automated Magnetic Microrobot Assembly System](#) · Oliver Jonah Shindell · Purdue University · 2026

Learning for robotics

20. What makes reinforcement learning sample-efficient enough to use on hardware?

See it in a real dissertation: [Trust-region Based Policy Optimization for Efficient Reinforcement Learning](#) · H. Li · University of Rhode Island · 2023

21. Can a swarm learn a collective behavior by watching one demonstration?

See it in a real dissertation: [Imitation Learning for Swarm Control using Variational Inference](#) · Hafeez Olafisayo Jimoh · West Virginia University · 2023

22. How do robots with different bodies learn to cooperate?

See it in a real dissertation: [Heterogeneous Robots Cooperation via Multi-Agent Reinforcement Learning](#) · Rehab Uddin Shawon · Missouri State University · 2026

23. How should a fleet of robots decide when to ask a human for help?

See it in a real dissertation: [Diffusion Policy for Interactive Fleet Learning with Scalable Human Supervision](#) · Weiran Shen · University of Virginia · 2026

24. What does a snake robot have to learn that a wheeled one does not?

See it in a real dissertation: [Reinforcement learning-based model matching in COBRA, a slithering snake robot](#) · Harin Kumar Nallaguntla · Northeastern University · 2024

Manipulation and grasping

25. Where should planning end and learning begin in contact-rich manipulation?

See it in a real dissertation: [Unifying planning and learning for contact-rich manipulation](#) · Jun Yamada · University of Oxford · 2025

26. Which problems does touch solve for a robot that vision cannot?

See it in a real dissertation: [Multimodal Tactile Sensing for Contact-rich Robotic Manipulation](#) · Sheeraz Athar · Purdue University · 2026

27. How does a limbless robot manipulate the world it is moving through?

See it in a real dissertation: [Loco-manipulation with non-impulsive contact-implicit planning in a slithering robot](#) · Kruthika Gangaraju · Northeastern University · 2024

28. Can one safety framework cover both reactive avoidance and deliberate contact?

See it in a real dissertation: [Reachable Sets for Control and Planning: from Reactive Safety to Contact-Rich Manipulation](#) · Simin Liu · Carnegie Mellon University · 2026

29. How much tactile detail does a simulated arm need before the skill transfers?

See it in a real dissertation: [Exploring the Design Space of Simulated Robotic Arms with Tactile Stimuli for Object Manipulation Using Reinforcement Learning Methods](#) · Alavi Ahmed Khan · San Jose State University · 2023

Motion planning and navigation

30. How does a drone hold a path underground with no satellite fix?

See it in a real dissertation: [UAV Path Planning and Multi-Modal Localization for Mapping in a Subterranean Environment](#) · Kieren Yoshiki Samarakoon · West Virginia University · 2022

31. How should a robot plan when it can barely observe its environment?

See it in a real dissertation: [Path Planning for Robot Navigation in Sparsely Observable Environments](#) · Kent Altobelli · University of Rhode Island · 2023

32. Where does a collaborative map break down with no central server?

See it in a real dissertation: [Robust Incremental Distributed Collaborative Simultaneous Localization and Mapping](#) · Daniel McGann · Carnegie Mellon University · 2026

33. Can a robot navigate from a map a person sketched by hand?

See it in a real dissertation: [Mobile robot localization and navigation in physical environments using hand-drawn maps](#) · Kevin Michael Robb · Northeastern University · 2023

34. How little communication does a swarm need to build a shared map?

See it in a real dissertation: [Minimalistic Communication-based Swarm Slam](#) · Felix Koch · University of Rhode Island · 2025

Prosthetics, exoskeletons and rehabilitation**35. Can muscle and ultrasound signals together decode a hand's intent?**

See it in a real dissertation: [Multimodal Deep Learning for Continuous Hand Motion Estimation Using Electromyography and Ultrasound Toward Dexterous Prosthetics and Adaptive Rehabilitation](#) · Sulav Bastola · Kennesaw State University · 2026

36. How do you build electronics that stretch with skin and keep measuring?

See it in a real dissertation: [Ultrasoft, Deformation-Unperturbed Stretchable Electronics for Wearable, Implantable, and Soft Robotic Applications](#) · Yang Li · University of Chicago · 2025

37. Can mapping techniques built for robots track a human body instead?

See it in a real dissertation: [BodySLAM: Feasibility of Tracking Human Kinematics with Simultaneous Localization and Mapping \(SLAM\)](#) · Sepehr Laal · Portland State University · 2023

38. Can you measure how stiff a joint is without pushing on it?

See it in a real dissertation: [Estimating Biological Stiffness Without Relying on External Joint Perturbations: A Musculoskeletal Modeling Framework](#) · Christopher P. Cop · University of Twente · 2023

39. What can a robotic leg teach us about how a real one senses load?

See it in a real dissertation: [Biologically – Plausible Load Feedback from Dynamically Scaled Robotic Model Insect Legs](#) · William P. Zyhowski · West Virginia University · 2023

Sensing, perception and localization**40. What does a robot need to feel shear as well as pressure?**

See it in a real dissertation: [Development of a Tactile Normal and Shear Force Sensor Enabled by 3D Printing and oCVD PEDOT](#) · Zachary William Didat · Purdue University · 2026

41. Can a cheap tactile sensor tell how hard something is?

See it in a real dissertation: [Mechanoreceptor inspired multi-class hardness classification approach using cost effective tactile sensor for robotic gripper](#) · Yash Sharma · Loughborough University · 2025

42. Can a network learn the calibration a robot arm loses as it wears?

See it in a real dissertation: [Robot Calibration Using Artificial Neural Networks](#) · Xiaolin Zhong · Edinburgh Napier University · 2026

43. How would you physically test what a self-driving car's sensors miss?

See it in a real dissertation: [A Physical Test Artifact for Evaluating Edge Cases of Individual and Fused Automated Driving Perception Sensors](#) · Colin Schaefer · Michigan Technological University · 2024

44. What does fusing sensors buy a robot mapping a moving environment?

See it in a real dissertation: [SLAM-based 3D mapping approaches using LiDAR-centric multi-sensor](#) · Bo Lü · University of the West of Scotland · 2026

Soft robotics and novel materials

45. Can a printed strain sensor survive being part of the thing it measures?

See it in a real dissertation: [Multimaterial, Core-Shell Direct Ink Writing of Flexible Strain Sensors for Pneumatically-Actuated Soft Robotic Hinge Joints](#) · John Burke · West Virginia University · 2023

46. What does a soft robot make possible at depth that a rigid one cannot?

See it in a real dissertation: [Advances in Deep-sea Imaging and Soft Robotics](#) · Russell Shomberg · University of Rhode Island · 2023

47. How do you actuate a soft robot without a pump or a motor?

See it in a real dissertation: [Novel Phase-Chance Soft Actuators Controlled via Peltier](#) · Daniel Cody Johnson · University of North Texas · 2023

48. How much of a walking robot's efficiency can come from its legs rather than its controller?

See it in a real dissertation: [Applying Biomimetic Passive Dynamics to a Quadruped Robot Leg](#) · Emma Krnacik · Portland State University · 2022

49. Can physics-guided learning model a soft robot that resists ordinary modeling?

See it in a real dissertation: [Physics Guided Deep Learning for Soft Robots Modeling and Analysis](#) · Sameh Ibrahim Ali Beaber · University of Virginia · 2025

50. What does folding buy a robot that has to climb and grip?

See it in a real dissertation: [Design of Origami-Inspired Climbing Robot and Dexterous Robotic Manipulator](#) · Harrison Scott Booker · Purdue University West Lafayette · 2025

How to turn a topic into your research question

A topic is a starting point, not something you can research yet. These four steps take you from a topic on this list to a focused question you can actually answer.

- 1. Shortlist three, not one.** Pick three topics from this list that genuinely interest you and fit the access you have to people and data.

Recommended reading: [How to find and choose a dissertation topic](#)

- 2. Read the dissertation behind each one.** Its literature review and its "recommendations for future research" section show you what is already known and what is still open.

Recommended reading: [How to find a research gap](#)

- 3. Narrow it to your setting.** Name one population, one setting and one thing you will measure or explore. That turns a broad topic into a question you can finish.

Recommended reading: [How to write a research question](#)

- 4. Line up your aims, objectives and questions.** Your committee will check that they agree.

Recommended reading: [Research aims, objectives and questions](#)

Work through these once and you will have a focused question rather than a broad topic, which is what the rest of your proposal is built on.