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Foldable Joints for Foldable Robots 3 R N s r
(a) Hinge joint h R w d N c (b) Prismatic
joint R N s ir o (c) Pivot joint Fig.2.
Sample fold patterns and folded states for
three basic joint types with input parameters
indicated The folds in a fold pattern divide
the original polygon Pinto a set of smaller
polygons that overlap only at the fold ...

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Research | MIT CSAIL

In this paper, we introduce fold patterns for
three basic joints commonly used in robots,

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and we show how the patterns can be changed to accommodate user-specified ranges of motion. The joints are composed with each other to produce joints with higher degrees of freedom and with rigid bodies to produce entire foldable linkage mechanisms.

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We have composed them into joints with higher degrees of freedom and into foldable mechanisms and found that they achieve the expected kinematics. We have also added actuators and control circuitry to our joints and mechanisms, showing that it is possible to print and fold entire robots with many different kinematics using a uniform process.

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Foldable Joints for Foldable Robots 3 R N s r
(a) Hinge joint h R w d N c (b) Prismatic joint R N s i r o (c) Pivot joint Fig.2.

Sample fold patterns and folded states for three basic joint types with input parameters indicated structure formed when all folds in the fold pattern are folded at an angle in their associated fold angle range.

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Foldable Joints for Foldable Robots Print-and-fold manufacturing has the potential to democratize access to robots with robots that

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are easier to fabricate using materials that are easier to procure. Unfortunately, a lack of understanding about how motion can be achieved by folding hinders the scope of print-and-fold robots.

Foldable Joints for Foldable Cynthia Sung Robots

Foldable Joints for Foldable Robots. Cynthia Sung, Daniela Rus. International Symposium on Experimental Robotics (ISER 2014) Abstract: Print-and-fold manufacturing has the potential to democratize access to robots with robots that are easier to fabricate using materials that are easier to procure. Unfortunately, a lack of understanding about ...

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We have composed them into joints with higher degrees of freedom and into foldable mechanisms and found that they achieve the expected kinematics. We have also added actuators and control circuitry to our joints and mechanisms, showing that it is possible to print and fold entire robots with many different kinematics using a uniform process.

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foldable robot foldable joint basic joint 3-d form single uniform process entire robot user-specified range many different kinematics rigid body print-and-fold robot fold pattern composed mechanism current effort control circuitry print-and-fold approach entire foldable linkage mechanism attached actuator expected kinematics

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“The Effect of Large Deflections of Joints on Foldable Miniature Robot Dynamics,” Journal of Intelligent and Robotic Systems, Springer, pp. 1-14, 2020, doi:

10.1007/s10846-020-01169-1. Lab News New members joined the lab!

TÜBİTAK 3001 Project: Joint Design in Foldable Robots ...

5 (1) An invention has been developed by South Korean scientists that will literally expand the reach of drones - a lightweight, foldable robotic arm. Inspired by the traditional Japanese folding technique origami, the arm can be equipped with a grab or a camera and allows access to tubes, chimneys or other narrow places. A [...]

Origami-Inspired Foldable Robot Arm Developed for Drones ...

Foldable Tables for Robotics Teams Aaraj and his helpers built and donated two tables to local robotics programs. The foldable, portable and lightweight tables were made out of durable and recyclable material to support the growing robotics programs at Floris Elementary school and Children’s Science Center of Northern Virginia.

Foldable Tables for Robotics Teams - Eagle Scout Project ...

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Folding Shelf Brackets 8 Inch with Install Screws, 2pcs Heavy Duty Stainless Steel 304 Collapsible Shelf Bracket Wall Mounted Triangle Brackets for DIY Table Work Bench, Max Load 300 lb. 4.5 out of 5 stars 22. 7% off. \$12.99 \$ 12. 99 \$13.99 \$13.99. 10% coupon applied at checkout Save 10% with coupon.

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the robot are investigated, and we discuss the motion planning and control strategies for its squirming locomotion. Our design and folding paradigm provides a novel approach for building reconfigurable robots using a range of lightweight foldable sheets. I. INTRODUCTION A. Origami Origami originally was a paper-craft that affords the

HexaMorph: A Reconfigurable and Foldable Hexapod Robot ...
The same principles used to make origami art can make self-assembling robots and tunable metamaterials—artificial materials engineered to have properties that may not be found in nature (see the Perspective by You). Felton et al. made complex self-folding robots from flat templates. Such robots could potentially be sent through a collapsed building or tunnels and then assemble themselves ...

A method for building self-folding machines | Science

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Reader

Did you know that any straight-line drawing on paper can be folded so that the complete drawing can be cut out with one straight scissors cut? That there is a planar linkage that can trace out any algebraic curve, or even 'sign your name'? Or that a 'Latin cross' unfolding of a cube can be refolded to 23 different convex polyhedra? Over the past decade, there has been a surge of interest in such problems, with applications ranging from robotics to protein folding. With an emphasis on algorithmic or computational aspects, this treatment gives hundreds of results and over 60 unsolved 'open problems' to inspire further research. The authors cover one-dimensional (1D) objects (linkages), 2D objects (paper), and 3D objects (polyhedra). Aimed at advanced undergraduate and graduate students in mathematics or computer science, this lavishly illustrated book will fascinate a broad audience, from school students to researchers.

The International Symposium on Experimental Robotics (ISER) is a series of bi-annual meetings which are organized in a rotating fashion around North America, Europe and Asia/Oceania. The goal of ISER is to provide a forum for research in robotics that focuses on novelty of theoretical contributions

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validated by experimental results. The meetings are conceived to bring together, in a small group setting, researchers from around the world who are in the forefront of experimental robotics research. This unique reference presents the latest advances across the various fields of robotics, with ideas that are not only conceived conceptually but also explored experimentally. It collects robotics contributions on the current developments and new directions in the field of experimental robotics, which are based on the papers presented at the 14th ISER held on June 15-18, 2014 in Marrakech and Essaouira, Morocco. This present fourteenth edition of Experimental Robotics edited by M. Ani Hsieh, Oussama Khatib, and Vijay Kumar offers a collection of a broad range of topics in field and human-centered robotics.

Recent advances in rapid fabrication technologies have given designers the ability to manufacture increasingly complex geometries with little increase in cost, making it easier than ever to build a robot. However, the process of designing a functional robot remains challenging. Robots are complex systems that tightly integrate mechanical, electrical, and software subsystems. As a result, traditional robot development often requires iterations of design and testing to ensure that the result is both functional and manufacturable. This thesis explores intuitive design tools for

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robot design and proposes composition as a design approach. We leverage a print-and-fold paradigm of manufacturing, which has been shown to enable functional robots to be created within a day. The main challenge in using composition is that in general, even if two modules function correctly individually, the combination of the two may not be a valid design. We therefore develop algorithms and systems for robot composition that guarantee validity of the design geometry and that check the resulting kinematics. Our main contributions include a database containing parameterized designs for printable joints and mechanisms, algorithms for composition of fold patterns and motion sequences that guarantee no self-intersection, automated generation of fabrication plans for multiple modes of print-and-fold fabrication, an interactive user interface in which users can compose custom robots and receive real-time feedback about their designs, and experimental verification in the form of functional mechanisms and robots. The results provide designers with a framework for rapid design exploration and bring us closer to a future of easy robot design and customization.

ISRR, the "International Symposium on Robotics Research", is one of robotics pioneering Symposia, which has established over the past two decades some of the field's most fundamental and lasting contributions.

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This book presents the results of the seventeenth edition of "Robotics Research" ISRR15, offering a collection of a broad range of topics in robotics. The content of the contributions provides a wide coverage of the current state of robotics research.: the advances and challenges in its theoretical foundation and technology basis, and the developments in its traditional and new emerging areas of applications. The diversity, novelty, and span of the work unfolding in these areas reveal the field's increased maturity and expanded scope and define the state of the art of robotics and its future direction.

Experimental Robotics XV is the collection of papers presented at the International Symposium on Experimental Robotics, Roppongi, Tokyo, Japan on October 3-6, 2016. 73 scientific papers were selected and presented after peer review. The papers span a broad range of sub-fields in robotics including aerial robots, mobile robots, actuation, grasping, manipulation, planning and control and human-robot interaction, but shared cutting-edge approaches and paradigms to experimental robotics. The readers will find a breadth of new directions of experimental robotics. The International Symposium on Experimental Robotics is a series of bi-annual symposia sponsored by the International Foundation of Robotics Research, whose goal is to provide a forum

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dedicated to experimental robotics research. Robotics has been widening its scientific scope, deepening its methodologies and expanding its applications. However, the significance of experiments remains and will remain at the center of the discipline. The ISER gatherings are a venue where scientists can gather and talk about robotics based on this central tenet.

This book describes the latest research advances, innovations, and visions in the field of robotics as presented by leading researchers, engineers, and practitioners from around the world at the 14th International Conference on Intelligent Autonomous Systems (IAS-14), held in Shanghai, China in July 2016. The contributions amply demonstrate that robots, machines and systems are rapidly achieving intelligence and autonomy, attaining more and more capabilities such as mobility and manipulation, sensing and perception, reasoning, and decision-making. They cover a wide range of research results and applications, and particular attention is paid to the emerging role of autonomous robots and intelligent systems in industrial production, which reflects their maturity and robustness. The contributions were selected by means of a rigorous peer-review process and highlight many exciting and visionary ideas that will further galvanize the research community and spur novel research

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directions. The series of biennial IAS conferences, which began in 1986, represents a premiere event in the field of robotics.

A concise survey of compliant mechanisms—from fundamentals to state-of-the-art applications. This volume presents the newest and most effective methods for the analysis and design of compliant mechanisms. It provides a detailed review of compliant mechanisms and includes a wealth of useful design examples for engineers, students, and researchers. Concise chapters guide the reader from simple to more challenging concepts—using examples of increasing complexity—eventually leading to real-world applications for specific types of devices. The author focuses on compliant mechanisms that can be designed using both standard linear beam equations and more advanced pseudo-rigid-body models. He describes a number of special-purpose compliant mechanisms that have use across a wide range of applications and discusses compliant mechanisms in microelectromechanical systems (MEMS) with several accompanying MEMS examples. Coverage of essential topics in strength of materials, machine design, and kinematics is provided to allow for a self-contained book that requires little additional reference to solve compliant mechanism problems. This information can be used as a refresher on the basics or as resource material for readers from other disciplines currently working in

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MEMS. Compliant Mechanisms serves as both an introductory text for students and an up-to-date resource for practitioners and researchers. It provides comprehensive, expert coverage of this growing field.

This book brings together some of the latest research in robot applications, control, modeling, sensors and algorithms. Consisting of three main sections, the first section of the book has a focus on robotic surgery, rehabilitation, self-assembly, while the second section offers an insight into the area of control with discussions on exoskeleton control and robot learning among others. The third section is on vision and ultrasonic sensors which is followed by a series of chapters which include a focus on the programming of intelligent service robots and systems adaptations.

This book constitutes the refereed proceedings of the 17th Annual Conference on Towards Autonomous Robotics, TAROS 2016, held in Sheffield UK, in June/July 2016. The 23 revised full papers presented together with 15 short papers were carefully reviewed and selected from 56 submissions. The overall program covers various aspects of robotics, including navigation, planning, sensing and perception, flying and swarm robots, ethics, humanoid robotics, human-robot interaction, and social robotics.

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The two volumes LNAI 11649 and LNAI 11650 constitute the refereed proceedings of the 20th Annual Conference "Towards Autonomous Robotics", TAROS 2019, held in London, UK, in July 2019. The 74 full papers and 12 short papers presented were carefully reviewed and selected from 101 submissions. The papers present and discuss significant findings and advances in autonomous robotics research and applications. They are organized in the following topical sections: robotic grippers and manipulation; soft robotics, sensing and mobile robots; robotic learning, mapping and planning; human-robot interaction; and robotic systems and applications.

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