

Popup: Automatic Paper Architectures from 3D Models

Xian-Ying Li¹ Chao-Hui Shen¹ Shi-Sheng Huang¹ Tao Ju² Shi-Min Hu¹

¹TNList, Department of Computer Science and Technology, Tsinghua University, Beijing

²Department of Computer Science and Engineering, Washington University in St. Louis



Figure 1: Given a 3D architectural model with user-specified backdrop and ground (left), our algorithm automatically creates a paper architecture approximating the model (mid-right, with the planar layout in mid-left), which can be physically engineered and popped-up (right).

Abstract

Paper architectures are 3D paper buildings created by folding and cutting. The creation process of paper architecture is often labor-intensive and highly skill-demanding, even with the aid of existing computer-aided design tools. We propose an automatic algorithm for generating paper architectures given a user-specified 3D model. The algorithm is grounded on geometric formulation of planar layout for paper architectures that can be popped-up in a rigid and stable manner, and sufficient conditions for a 3D surface to be popped-up from such a planar layout. Based on these conditions, our algorithm computes a class of paper architectures containing two sets of parallel patches that approximate the input geometry while guaranteed to be physically realizable. The method is demonstrated on a number of architectural examples, and physically engineered results are presented.

CR Categories: I.3.5 [Computer Graphics]: Computational Geometry and Object Modeling—Geometric algorithms, languages, and systems;

Keywords: paper architecture, pop-up, computer art, planar layout

1 Introduction

Paper architectures, also called *origami architectures*, are paper buildings created by folding combined with paper cutting. Originated in Japan by Masahiro Chatani [1987] in the 1980's, the craft has been popularized by artists around the world, in particular Bianchini, Siliakus and Ayta [2009]. Paper architecture appears in many forms, such as greeting cards and desktop decorations, and

can be “stunning realistic” [Chatani et al. 1987]. Some examples created by artists are shown in Figure 2. Further exhibits could be found from the online galleries of Ingrid Siliakus and Gerry Stormer.

A paper architecture is made from cutting and folding from a single piece of paper, and is stored by folding the two halves of the paper close. As the paper is opened, the 3D building “stands-up” or “pops-up”. While similar to pop-up books, a paper architecture is made with no gluing or splicing, which puts additional constraints to the design of cut and fold patterns on the paper (called a *planar layout*). What is even more challenging is to create layouts that would pop-up into a desired 3D look. Numerous books exist on the mechanism of designing pop-up crafts [Birmingham 1997; Carter 1999; Cheong et al. 2009], and a number of computer-aided tools have been developed to provide virtual design environments [Lee et al. 1996; Glassner 2002; Hendrix and Eisenberg 2006; Mitani and Suzuki 2004a]. However, the user is ultimately responsible for deciding where and how the cuts and folds should be placed on the 2D paper, and it remains a labor-intensive and highly skill-demanding task to generate 2D layouts that pop-up into realistically looking 3D buildings.

In this paper, we develop a completely automatic algorithm that produces paper architectures approximating user-given 3D models, which enables novice users to create realistic and complex crafts in an effortless way (see the example on Figure 1 right). Our algorithm is grounded on novel geometric formulations of planar layouts that can physically pop-up to paper architectures. In particular, regions in the layout should maintain rigid and non-intersecting when popping-up, and the architecture should be able to stably erect with no additional help from the user other than holding the two halves of the paper. Based on the formulation, we present sufficient conditions for a class of 3D surfaces, consisting of planar patches oriented in two directions, to be physically realizable by popping-up a planar layout. Guided by the conditions, we design a grid-based algorithm that produces 3D realizable paper architectures automatically from any input model given by the user, while requiring only the users to specify the paper location with respect to the model. An example is shown in figure 1.

Contributions To the best of our knowledge, our algorithm is one of the first automated methods for creating paper architecture that mimics a given 3D input. To achieve this goal, we make the following contributions:

Popup Automatic Paper Architectures From 3d Models

A Gutmann



Popup Automatic Paper Architectures From 3d Models:

Immerse yourself in heartwarming tales of love and emotion with is touching creation, **Popup Automatic Paper Architectures From 3d Models** . This emotionally charged ebook, available for download in a PDF format (PDF Size: *), is a celebration of love in all its forms. Download now and let the warmth of these stories envelop your heart.

https://crm.avenza.com/public/book-search/fetch.php/Sharp_El_1801v_Manual_Portugues.pdf

Table of Contents Popup Automatic Paper Architectures From 3d Models

1. Understanding the eBook Popup Automatic Paper Architectures From 3d Models
 - The Rise of Digital Reading Popup Automatic Paper Architectures From 3d Models
 - Advantages of eBooks Over Traditional Books
2. Identifying Popup Automatic Paper Architectures From 3d Models
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Popup Automatic Paper Architectures From 3d Models
 - User-Friendly Interface
4. Exploring eBook Recommendations from Popup Automatic Paper Architectures From 3d Models
 - Personalized Recommendations
 - Popup Automatic Paper Architectures From 3d Models User Reviews and Ratings
 - Popup Automatic Paper Architectures From 3d Models and Bestseller Lists
5. Accessing Popup Automatic Paper Architectures From 3d Models Free and Paid eBooks
 - Popup Automatic Paper Architectures From 3d Models Public Domain eBooks
 - Popup Automatic Paper Architectures From 3d Models eBook Subscription Services
 - Popup Automatic Paper Architectures From 3d Models Budget-Friendly Options
6. Navigating Popup Automatic Paper Architectures From 3d Models eBook Formats

- ePub, PDF, MOBI, and More
- Popup Automatic Paper Architectures From 3d Models Compatibility with Devices
- Popup Automatic Paper Architectures From 3d Models Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Popup Automatic Paper Architectures From 3d Models
 - Highlighting and Note-Taking Popup Automatic Paper Architectures From 3d Models
 - Interactive Elements Popup Automatic Paper Architectures From 3d Models
- 8. Staying Engaged with Popup Automatic Paper Architectures From 3d Models
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Popup Automatic Paper Architectures From 3d Models
- 9. Balancing eBooks and Physical Books Popup Automatic Paper Architectures From 3d Models
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Popup Automatic Paper Architectures From 3d Models
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Popup Automatic Paper Architectures From 3d Models
 - Setting Reading Goals Popup Automatic Paper Architectures From 3d Models
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Popup Automatic Paper Architectures From 3d Models
 - Fact-Checking eBook Content of Popup Automatic Paper Architectures From 3d Models
 - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
- 14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

Popup Automatic Paper Architectures From 3d Models Introduction

Free PDF Books and Manuals for Download: Unlocking Knowledge at Your Fingertips In today's fast-paced digital age, obtaining valuable knowledge has become easier than ever. Thanks to the internet, a vast array of books and manuals are now available for free download in PDF format. Whether you are a student, professional, or simply an avid reader, this treasure trove of downloadable resources offers a wealth of information, conveniently accessible anytime, anywhere. The advent of online libraries and platforms dedicated to sharing knowledge has revolutionized the way we consume information. No longer confined to physical libraries or bookstores, readers can now access an extensive collection of digital books and manuals with just a few clicks. These resources, available in PDF, Microsoft Word, and PowerPoint formats, cater to a wide range of interests, including literature, technology, science, history, and much more. One notable platform where you can explore and download free Popup Automatic Paper Architectures From 3d Models PDF books and manuals is the internet's largest free library. Hosted online, this catalog compiles a vast assortment of documents, making it a veritable goldmine of knowledge. With its easy-to-use website interface and customizable PDF generator, this platform offers a user-friendly experience, allowing individuals to effortlessly navigate and access the information they seek. The availability of free PDF books and manuals on this platform demonstrates its commitment to democratizing education and empowering individuals with the tools needed to succeed in their chosen fields. It allows anyone, regardless of their background or financial limitations, to expand their horizons and gain insights from experts in various disciplines. One of the most significant advantages of downloading PDF books and manuals lies in their portability. Unlike physical copies, digital books can be stored and carried on a single device, such as a tablet or smartphone, saving valuable space and weight. This convenience makes it possible for readers to have their entire library at their fingertips, whether they are commuting, traveling, or simply enjoying a lazy afternoon at home. Additionally, digital files are easily searchable, enabling readers to locate specific information within seconds. With a few keystrokes, users can search for keywords, topics, or phrases, making research and finding relevant information a breeze. This efficiency saves time and effort, streamlining the learning process and allowing individuals to focus on extracting the information they need. Furthermore, the availability of free PDF books and manuals fosters a culture of continuous learning. By removing financial barriers, more people can access educational resources and pursue lifelong learning, contributing to personal growth and professional development. This democratization of knowledge promotes intellectual curiosity and empowers individuals to become lifelong learners, promoting progress and innovation in various fields. It is worth noting that while accessing free Popup Automatic Paper Architectures From 3d Models PDF books and manuals is convenient and cost-effective, it is vital to respect copyright laws and intellectual property rights. Platforms offering free downloads often operate within legal boundaries, ensuring that the materials they provide are either in the public domain or authorized for distribution. By adhering to copyright laws, users can enjoy the benefits of free access to

knowledge while supporting the authors and publishers who make these resources available. In conclusion, the availability of Popup Automatic Paper Architectures From 3d Models free PDF books and manuals for download has revolutionized the way we access and consume knowledge. With just a few clicks, individuals can explore a vast collection of resources across different disciplines, all free of charge. This accessibility empowers individuals to become lifelong learners, contributing to personal growth, professional development, and the advancement of society as a whole. So why not unlock a world of knowledge today? Start exploring the vast sea of free PDF books and manuals waiting to be discovered right at your fingertips.

FAQs About Popup Automatic Paper Architectures From 3d Models Books

How do I know which eBook platform is the best for me? Finding the best eBook platform depends on your reading preferences and device compatibility. Research different platforms, read user reviews, and explore their features before making a choice. Are free eBooks of good quality? Yes, many reputable platforms offer high-quality free eBooks, including classics and public domain works. However, make sure to verify the source to ensure the eBook credibility. Can I read eBooks without an eReader? Absolutely! Most eBook platforms offer web-based readers or mobile apps that allow you to read eBooks on your computer, tablet, or smartphone. How do I avoid digital eye strain while reading eBooks? To prevent digital eye strain, take regular breaks, adjust the font size and background color, and ensure proper lighting while reading eBooks. What the advantage of interactive eBooks? Interactive eBooks incorporate multimedia elements, quizzes, and activities, enhancing the reader engagement and providing a more immersive learning experience. Popup Automatic Paper Architectures From 3d Models is one of the best book in our library for free trial. We provide copy of Popup Automatic Paper Architectures From 3d Models in digital format, so the resources that you find are reliable. There are also many Ebooks of related with Popup Automatic Paper Architectures From 3d Models. Where to download Popup Automatic Paper Architectures From 3d Models online for free? Are you looking for Popup Automatic Paper Architectures From 3d Models PDF? This is definitely going to save you time and cash in something you should think about.

Find Popup Automatic Paper Architectures From 3d Models :

sharp el 1801v manual portugues

[setswana memo paper 2 for grade 2013](#)

[setswana p3 memorandum 2014](#)

severed souls sword of truth book 14

setswana paper 1 final exam paper grade 10

sexy beast iv english edition

sharp al 1651cs digital multifunctional copier service repair manual

setswana puo gae hl p3 dbe ngwanaitseele 2013

~~setswana paper 2 grade 12 2015~~

~~sewing genie manual~~

sexlies and bondage tape english edition

~~seventeen magazine ultimate guide to style~~

sharepoint 2010 end user quick guide

seule agrave leacutetranger pour la premiegravere fois

~~shark vacuums owners manual~~

Popup Automatic Paper Architectures From 3d Models :

Standing Again at Sinai: Judaism from a Feminist Perspective A feminist critique of Judaism as a patriarchal tradition and an exploration of the increasing involvement of women in naming and shaping Jewish tradition. Standing Again at Sinai: Judaism from a Feminist Perspective by L Lefkovitz · 1991 — \$21.95. Standing Again at Sinai : Judaism from a Feminist Perspective is a book re- markable for its clarity and its comprehensive ... Standing Again at Sinai A feminist critique of Judaism as a patriarchal tradition and an exploration of the increasing involvement of women in naming and shaping Jewish tradition. Standing Again at Sinai: Judaism from a Feminist Perspective Read 36 reviews from the world's largest community for readers. A feminist critique of Judaism as a patriarchal tradition and an exploration of the increas... Standing Again at Sinai by J Plaskow · 2016 · Cited by 21 — Standing Again at Sinai: Jewish Memory from a Feminist. Perspective. Judith Plaskow. Tikkun, Volume 31, Number 3, Summer 2016, (Article). Published by Duke ... 6. Judith Plaskow, Standing Again at Sinai: Judaism from a ... 6. Judith Plaskow, Standing Again at Sinai: Judaism from a Feminist Perspective · From the book The New Jewish Canon · Chapters in this book (78). Standing again at Sinai : Judaism from a feminist perspective The author encourages the reader to rethink key Jewish issues and ideas from a feminist perspective. issues are addressed through the central Jewish ... Standing Again at Sinai: Judaism from a Feminist Perspective A feminist critique of Judaism as a patriarchal tradition and an exploration of the increasing involvement of women in naming and shaping Jewish tradition. Standing Again at Sinai: Judaism from a Feminist ... Feb 1, 1991 — A feminist critique of Judaism as a patriarchal tradition and an exploration of the increasing involvement of women in naming and shaping Jewish ... Standing Again at Sinai: Judaism from a

Feminist Perspective Citation: Plaskow, Judith. Standing Again at Sinai: Judaism from a Feminist Perspective. San Francisco: HarperSanFrancisco, 1991. Download Citation. BibTeX ... The Plain and Simple Guide to Music Publishing The Plain and Simple Guide to Music Publishing: What You Need to Know About Protecting and Profiting from Music Copyrights, 3rd Edition · Book overview. The Plain & Simple Guide to Music... by Wixen, Randall D. This book, written by expert and industry veteran Randall Wixen presents a clear, concise approach on how music publishing works today. It breaks down complex ... Plain & Simple Guide To Music Publishing Music Publishing Primer. The following is an excerpt from The Plain & Simple Guide To Music Publishing, 2nd Edition by Randall Wixen, president and founder of ... The Plain & Simple Guide to Music Publishing - 4th Edition This book, written by expert and industry veteran Randall Wixen presents a clear, concise approach on how music publishing works today. It breaks down complex ... The Plain & Simple Guide to Music Publishing - 4th Edition ... This book, written by expert and industry veteran Randall Wixen presents a clear, concise approach on how music publishing works today. It breaks down complex ... The Plain and Simple Guide to Music Publishing - 4th Edition This book, written by expert and industry veteran Randall Wixen presents a clear, concise approach on how music publishing works today. It breaks down complex ... The Plain and Simple Guide to Music Publishing Must reading for anybody invested in songs, lyrics, or recordings. Foreword by Tom Petty. Hardcover or Kindle ebook by Randall D Wixen. PLAIN & SIMPLE GUIDE TO MUSIC PUBLISHING, THE This book, written by expert and industry veteran Randall Wixen presents a clear, concise approach on how music publishing works today. It breaks down complex ... The Plain and Simple Guide to Music Publishing Industry expert Randall Wixen covers everything from mechanical, performing and synch rights to sub-publishing, foreign rights, copyright basics, types of ... English 9 Answer Sheet.docx - Student's Name Student's ID... Jul 21, 2023 — Please submit this answer sheet to The Keystone School for grading. Either write your answers neatly, clearly, and accurately on this Answer ... Keystone Exams: Literature This framework is organized first by module, then by Assessment Anchor, followed by Anchor Descriptor, and then finally, at the greatest level of detail, by an ... 2022-2023 Literature Item and Scoring Sampler This sampler includes the test directions and scoring guidelines that appear in the Keystone. Exams . Each sample multiple-choice item is followed by a table ... Career Online High School Course List Career High School Diploma Course List ; Physical Education. 0.5 ; Electives: 5 cr Required. Academic Success. 0.5 ; Personal Finance. 0.5 ; Essential Career Skills. Student Answer Sheet Instructions This guide will help you fill out your SAT® School Day answer sheet—including where to send your 4 free score reports. Be sure to record your answers to the ... Grades 9-12 Course Catalog ... 9. 2018-2019 Secondary Grades Course Catalog. Page 9 of 603. Keystone Exams. On ... -. The Literature Keystone is taken after completing English II in 10th grade. Clearfield AREA JUNIOR-SENIOR HIGH SCHOOL ... Grade 9; 1 Credit; Year - English I is designed to develop high school ... All 10th grade students will take the Keystone Exam in Literature at the conclusion of ... MS Program of Studies 2022 2023.docx Literacy Arts - The English Language Arts (ELA) curriculum in 6th

grade utilizes a balanced literacy approach, rich in meaningful student interactions with ... LEGISLATIVE BUDGET AND FINANCE COMMITTEE Our report, generated in response to Senate Resolution 2018-322 (SR. 322), defines the term “standardized test” and identifies the number and.