SIGraDi 2022
Critical Appropriations

Proceedings of the XXVI Conference of the Iberoamerican Society of Digital Graphics (SIGraDi) 2022

7-11 November, 2022
School of Architecture

EDITORIAL UPC
Universidad Peruana de Ciencias Aplicadas

Pablo C. Herrera
ORCID: 0000-0001-8535-2029

Cristina Dreifuss Serrano
ORCID: 0000-0001-6540-3167

Luisa Fernanda Arris Calderón
ORCID: 0000-0003-4561-5992

Paula Z. Gómez
ORCID: 0000-0003-3455-5445

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Edición:	Pablo C. Herrera, Cristina Dreifuss-Serrano, Luisa Fernanda Arris Calderón y Paula Gómez Z.
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Editado por:
Universidad Peruana de Ciencias Aplicadas S.A.C.
Av. Alonso de Molina 1611, Lima 33 (Perú)
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Edited by

Pablo C. Herrera
Cristina Dreifuss-Serrano
Luisa Fernanda Arris Calderón
Paula Gómez Zamora

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Welcome to SIGraDi 2022

Miguel Cruchaga Belaúnde, Dean
Universidad Peruana de Ciencias Aplicadas, Perú

17 years ago, we had the privilege of hosting a SIGraDi Conference. Both institutions were going through our founding years, and we had the privilege of sharing experiences with those who consolidated, for Architecture and Urbanism, the enormous contribution of new technologies that would take the development of graphic representation to great levels of improvement.

During those days, our campus was full of dynamism and students of all careers were equally interested in the themes and the promises of revitalization and opening of new horizons to the university world.

We promised to help them enter the Andean territory, and to spread their great value in the Subcontinent, as they had been doing and promoting with great success. Our relationship has grown stronger and our interest in the subject has kept us in touch.

We await the start of SIGraDi 2022 with expectation and enthusiasm. We want to know your progress, what your new goals are and what insights the fields of research and teaching offer us.

Welcome SIGraDi!

Bem-vindo a SIGraDi 2022

Miguel Cruchaga Belaúnde, Dean
Universidad Peruana de Ciencias Aplicadas, Perú

Durante 17 anos tivemos o privilégio de sediar um Congresso SIGraDi. Ambas as instituições atravessavam os nossos anos de fundação e tivemos o privilégio de partilhar experiências com quem consolidou, para a Arquitetura e o Urbanismo, o enorme contributo das novas tecnologias que levariam o desenvolvimento da representação gráfica a grandes níveis de melhoria.

Durante esses dias, nosso campus estava cheio de dinamismo e estudantes de todas as carreiras estavam igualmente interessados nos temas e nas promessas de revitalização e abertura de novos horizontes para o mundo universitário.

Prometemos ajudá-los a entrar no território andino e difundir seu grande valor no Subcontinente, como vinham fazendo e promovendo com grande sucesso. Nosso relacionamento se fortaleceu e nosso interesse pelo assunto nos manteve em contato.

Aguardamos o início do SIGraDi 2022 com expectativa e entusiasmo. Queremos conhecer seu progresso, quais são seus novos objetivos e quais insights os campos de pesquisa e ensino oferecem a você.
Bem-vindo SIGraDi!

Bienvenidos a SIGraDi 2022

Miguel Cruchaga Belaúnde, Dean
Universidad Peruana de Ciencias Aplicadas, Perú

Hace 17 años tuvimos el privilegio de ser anfitriones de un Congreso de SIGraDi. Ambas instituciones recorríamos nuestros años fundacionales y tuvimos el honor de compartir experiencias con quienes consolidaban, para la arquitectura y el urbanismo, el enorme aporte de las nuevas tecnologías que llevarían el desarrollo de la representación gráfica a grandes niveles de superación.

Durante esos días, nuestro campus estuvo lleno de dinamismo, y los estudiantes de todas las carreras se interesaron por igual en los temas y las promesas de revitalización y apertura de nuevos horizontes al mundo universitario.

Nos comprometimos a ayudarlos a introducirse en el territorio andino y a extender su gran valor en el subcontinente, tal como lo venían haciendo e impulsando con mucho éxito. Nuestra vinculación ha crecido cada vez más y nuestro interés por el tema nos ha mantenido en contacto.

Aguardamos el inicio de SIGraDi 2022 con expectativa e ilusión. Queremos conocer sus avances, saber cuáles son sus nuevas metas y qué intuiciones les suscitan los terrenos de la investigación y la enseñanza.

¡Bienvenido SIGraDi!

Preface

Pablo C. Herrera, Chair SIGraDi 2022
UPC, Perú

The School of Architecture of the UPC was created in 1994. In 1999 it participated in the initiative of the Virtual Workshop of the Americas directed by architects Guillermo Vásquez de Velasco and Antonieta Angulo from Texas A&M University. Thanks to Guillermo's interest in promoting SIGraDi, we began to participate in the congresses in 2003 in Rosario, Argentina. Since then and consecutively, 20 years have passed, and UPC has hosted the Congress of the Ibero-American Society of Digital Graphics in its IX version, in 2005, and this 2022 its XXVI edition.

Participating in the gestation process of different initiatives that SIGraDi has promoted allowed us to ensure technology implementation paths in our School of Architecture. From mandatory courses on BIM and digital fabrication starting at the fourth semester, to elective courses on photorealistic visualization, audio visual storytelling, infographics, and computational design. Precisely, living the differences of adopting computerized technologies and the evolution of the first computer workshops that we promoted in the region since 2006, together with the Homo Faber exhibitions on digital fabrication since 2015 and the edition of the book for the twenty-five years of SIGraDi, continues to motivate us to grow. This within a community and participatory culture that assimilates disruption and prepares us to coexist and appropriate technologies, understood as allies of our processes, which emerge from the context of exploration and curiosity to solve real problems.

Critical Appropriations, the theme that we promote at SIGraDi 2022, becomes a call to reflection on the origin and process of the actions of a transformative design and its possibilities, from the role of technology and its effect on the social, cultural, material, and educational spheres.

SIGraDi 2022. Critical Appropriations was organized into 7 topics and 30 subtopics: Programming Cultures (Agent-Based Systems, Data Analytics, Generative Design, Machine Learning, Parametric Analysis, Predictive Modeling and Shape Grammars); Manufacturing & Industry 4.0 (Robotics, Digital Fabrication, Internet of Things, Blockchain and Decision Making); Interactions & Collaborations (User Experience, Mixed Realities, Virtual Reality, Codesign, BIM Adoption and Interdisciplinary Design); Special Topics (Digital Heritage, Inclusive Design, Media Art and COVID-19); Life Long Learning and Digital Education (Hybrid Education and Online Learning);

Design, Nature and Ecosystems (Smart Cities & Environments, Sustainable Design, Building Performance, Bio-Inspired Design and Living Things).

These topics prompted the generosity of 20 instructors and their twelve connected workshops from 10 countries in a call for 170 participants, which take place between November 7 and 8.

Between November 9 and 11, Philip F. Yuan (China), Shelby Elizabeth Doyle, Daniel Cardoso, Sandra Manninger, Matias del Campo (USA), Felipe Ferrer and Benito Juárez (Peru) present their appropriations in Metaverse, Robotic Fabrication, Computational Feminism, Other Computations, Regenerative Manufacturing, Digital Biology, Neural Networks, Artificial Intelligence, Low-High Tech, and Glocalism.

In these three days, SIGraDi 2022 presents the research of 267 authors from Argentina (4), Brazil (40), Chile (8), China (2), Colombia (5), Costa Rica (1), Denmark (2), Germany (2), Hong Kong (1), Italy (1), Mexico (4), Peru (1), Portugal (4), Singapore (1), Taiwan (1), Turkey (5), United Kingdom (7), USA (13) and Uruguay (2). 19 countries with works in English (46), Portuguese (35) and Spanish (23) that make up this volume of 104 articles in 24 sessions organized by language.

SIGraDi 2022 shares different appropriations as triggers for dialogue with others, from which new reinterpretations will continue to create a digital culture that promotes its own agendas towards other geographies.

This XXVI SIGraDi 2022 Conference is inspired by the intensity of everyday life and society, with the enjoyment and appropriation of technologies in their different forms.

From Lima, Peru, we are immensely grateful to each of the local and international teams that allow us to be here, connected, sharing, and enjoying our appropriations with the hope of meeting in person very soon.

Welcome to SIGraDi 2022.

Prefacio

Pablo C. Herrera, Chair SIGraDi 2022
UPC, Perú

A Faculdade de Arquitetura da Universidade Peruana de Ciências Aplicadas (UPC) foi criada em 1994. Em 1999 participou da iniciativa do Workshop Virtual das Américas dirigido pelos arquitetos Guillermo Vásquez de Velasco e Antonieta Angulo da Texas A&M University. Graças ao interesse de Guillermo em divulgar a SIGraDi, começamos a participar dos congressos em 2003 em Rosário, Argentina. Desde então, e consecutivamente, 20 anos se passaram, e a UPC sediou o SIGraDi em 2005 e agora em 2022, o XXVI Congresso da Sociedade Ibero-Americana de Gráfica Digital.

Participar no processo de gestação das diferentes iniciativas que a SIGraDi tem promovido, permitiu-nos garantir caminhos de implementação da tecnologia na nossa Faculdade de Arquitetura. Desde cursos obrigatórios sobre BIM e fabricação digital do quarto ciclo, até cursos eletivos sobre visualização fotorrealista, narrativa audiovisual, infografia e projeto computacional. Precisamente, vivendo as diferenças da adoção de tecnologias computadorizadas e a evolução dos primeiros workshops de informática que promovemos desde 2006 na região, juntamente com as exposições Homo Faber sobre fabricação digital desde 2015 e a publicação do livro do vigésimo quinto ano da SIGraDi, continua nos motivando a crescer dentro de uma cultura comunitária e de participação. Isso assimila a disrupção e nos prepara para conviver e apropriar-nos das tecnologias, como aliadas de nossos processos, que emergem do contexto de exploração e curiosidade para resolver problemas reais.

Apropriações Críticas, tema que promovemos no SIGraDi 2022, torna-se um chamado à reflexão sobre a origem e o processo das ações de um design transformador e suas possibilidades, a partir do papel da tecnologia e seu efeito no social, cultural, material e educacional.

SIGraDi 2022. Apropriações Críticas foi organizado em 7 tópicos e 30 subtópicos: Programming Cultures (Agent-Based Systems, Data Analytics, Generative Design, Machine Learning, Parametric Analysis, Predictive Modeling e Shape Grammars); Manufacturing & Industry 4.0 (Robotics, Digital Fabrication, Internet of Things, Blockchain e Decision Making); Interactions & Collaborations (User Experience, Mixed Realities, Virtual Reality, Codesign, BIM Adoption e Interdisciplinary Design); Special Topics (Digital Heritage, Inclusive Design, Media Art e COVID-19); Life Long Learning and Digital

Education (Hybrid Education e Online Learning); Design, Nature and Ecosystems (Smart Cities & Environments, Sustainable Design, Building Performance, Bio-Inspired Design e Living Things).

Esses temas motivaram a generosidade de 20 instrutores e seus 12 workshops conectados de 10 países em um chamado para 170 participantes, que acontecerá entre 7 e 8 de novembro.

Entre 9 e 11 de novembro, Philip F. Yuan (China), Shelby Elizabeth Doyle, Daniel Cardoso, Sandra Manninger, Matías del Campo (EUA), Felipe Ferrer e Benito Juárez (Peru) apresentam suas apropriações em Metaverse, Robotic Fabrication, Computational Feminism, Other Computations, Regenerative Manufacturing, Digital Biology, Neural Networks, Artificial Intelligence, Low-High Tech, e Glocalismo.

Nestes três dias, o SIGraDi 2022 apresenta a pesquisa de 267 autores da Argentina (4), Brasil (40), Chile (8), China (2), Colômbia (5), Costa Rica (1), Dinamarca (2), Alemanha (2), Hong Kong (1), Itália (1), México (4), Peru (1), Portugal (4), Cingapura (1), Taiwan (1), Turquia (5), Reino Unido (7), EUA (13) e Uruguai 2). 19 países com trabalhos em inglês (46), português (35) e espanhol (23) que compõem este volume de 104 artigos em 24 sessões organizadas por idioma.

O SIGraDi 2022 compartilha diferentes apropriações como gatilhos para o diálogo com os outros, a partir das quais novas reinterpretações continuarão a criar uma cultura digital que promova suas próprias agendas para outras geografias.

Este XXVI Congresso SIGraDi 2022 é inspirado na intensidade do cotidiano e da sociedade, com a fruição e apropriação das tecnologias em suas diferentes formas.

De Lima, Peru, somos imensamente gratos a cada uma das equipes locais e internacionais que nos permitem estar aqui, conectados, compartilhando e desfrutando de nossas apropriações com a esperança de nos encontrarmos pessoalmente muito em breve.

Bem-vindo ao SIGraDi 2022.

Prefacio

Pablo C. Herrera, Chair SIGraDi 2022
UPC, Perú

La Facultad de Arquitectura de la UPC se creó en 1994. En 1999, participó en la iniciativa del Taller Virtual de las Américas, dirigido por los arquitectos Guillermo Vásquez de Velasco y Antonieta Angulo desde la Universidad de Texas A&M. Gracias al interés de Guillermo por promover SIGraDi, empezamos a participar en los congresos desde 2003 en Rosario, Argentina. A partir de entonces, y de forma consecutiva, han transcurrido 20 años, y la UPC ha sido sede de SIGraDi en 2005 y, en 2022, del XXVI Congreso de la Sociedad Iberoamericana de Gráfica Digital.

Participar en el proceso de gestación de las distintas iniciativas que SIGraDi ha promovido nos permitió asegurar caminos de implementación de tecnologías en nuestra Facultad de Arquitectura, desde cursos obligatorios sobre BIM y fabricación digital a partir del cuarto ciclo hasta cursos electivos en visualización fotorrealista, narración audiovisual, infografía y diseño computacional. Precisamente, vivir las diferencias de adoptar tecnologías computarizadas y la evolución de los primeros talleres computacionales que promovimos desde el 2006 en la región, junto a las exhibiciones Homo Faber sobre fabricación digital desde el 2015 y la edición del libro por el vigésimo quinto año de SIGraDi, nos sigue motivando a crecer dentro de una cultura comunitaria y de participación. Esta asimila la disrupción y nos prepara para convivir y apropiarnos de las tecnologías, como aliados de nuestros procesos, que emergen desde el contexto de la exploración y la curiosidad para resolver problemas reales.

Apropiaciones Críticas, el tema que impulsamos en SIGraDi 2022, se convierte en un llamado a la reflexión sobre el origen y proceso de las acciones de un diseño transformador y sus posibilidades, desde el rol de la tecnología y su efecto en el contexto social, cultural, material y educativo.

SIGraDi 2022. Critical Appropriations se organizó en 7 tópicos y 30 sub tópicos: Programming Cultures (Agent-Based Systems, Data Analytics, Generative Design, Machine Learning, Parametric Analysis, Predictive Modeling y Shape Grammars); Manufacturing & Industry 4.0 (Robotics, Digital Fabrication, Internet of Things, Blockchain y Decision Making); Interactions & Collaborations (User Experience, Mixed Realities, Virtual Reality, Codesign, BIM Adoption y Interdisciplinary Design); Special Topics (Digital Heritage, Inclusive Design, Media Art y COVID-19); Life Long Learning and Digital Education (Hybrid Education y Online Learning); Design, Nature and

Ecosystems (Smart Cities & Environments, Sustainable Design, Building Performance, Bio-Inspired Design y Living Things).

Estos tópicos impulsaron la generosidad de 20 instructores y sus doce talleres conectados desde 10 países en una convocatoria para 170 participantes, que tienen lugar entre el 7 y 8 de noviembre.

Entre el 9 y 11 de noviembre, Philip F. Yuan (China), Shelby Elizabeth Doyle, Daniel Cardoso, Sandra Manninger, Matías del Campo (EE.UU.), Felipe Ferrer y Benito Juárez (Perú) presentan sus apropiaciones en Metaverse, Robotic Fabrication, Computational Feminism, Other Computations, Regenerative Manufacturing, Digital Biology, Neural Networks, Artificial Intelligence, Low-High Tech, y Glocalismo.

En estos tres días, SIGraDi 2022 presenta las investigaciones de 267 autores de Argentina (4), Brasil (40), Chile (8), China (2), Colombia (5), Costa Rica (1), Dinamarca (2), Alemania (2), Hong Kong (1), Italia (1), México (4), Perú (1), Portugal (4), Singapore (1), Taiwan (1), Turquía (5), Reino Unido (7), EE.UU. (13) y Uruguay 2). 19 países con trabajos en idioma inglés (46), portugués (35) y español (23) que conforman este volumen de 104 artículos en 24 sesiones organizadas por idiomas.

SIGraDi 2022 comparte distintas apropiaciones como detonantes del diálogo con otros, a partir de los cuales nuevas reinterpretaciones seguirán creando una cultura digital que impulsa sus propias agendas hacia otras geografías.

Este XXVI Congreso SIGraDi 2022 se inspira en la intensidad de la vida cotidiana y la sociedad, con el disfrute y apropiación de las tecnologías en sus diferentes formas.

Desde Lima, Perú, agradecemos inmensamente a cada uno de los equipos locales e internacionales que permiten que estemos aquí, conectados, compartiendo y disfrutando de nuestras apropiaciones con la esperanza de reunirnos muy pronto de manera presencial.

Bienvenidos a SIGraDi 2022

SIGraDi President's greetings

Marcelo Bernal, President
Sociedad Iberoamericana de Gráfica Digital, SIGraDi

This Book of Proceedings gathers the body of work presented at the XXVI Congress of the Ibero-American Society of Digital Graphics, SIGraDi, organized by the UPC, Lima, Perú.

This year the call for "Critical Appropriations" questions the tension between the regional and the global research agendas. How do we cultivate our identity and originality while being influenced by global research trends? Or how do we influence back those trends from our regional experiences? This bidirectional question is particularly important considering the languages and territorial distribution of our international community. While actively connecting new researchers, educators, practitioners, and institutions within the boundaries of our territory, increasingly we attack members from all over the world that every year chose SIGraDi to share their work. Our challenge is not only the Iberoamerican integration but becoming a platform for global discussions.

This publication is possible thanks to the generous contribution of our members through different committees and roles, starting with our global community, who, for one more year, chose to submit their original work to SIGraDi.

The Local Organizing Committee, besides leading the overall organization of SIGraDi's major event, the international congress, organized two parallel events: "Homo Faber," an exhibition of the Latin American Fablabs, and the workshops on the first two days of the congress.

The Scientific Committee, including one hundred forty-seven members from twenty-five different countries, reviewed and validated the quality of the research endeavors presented here through a rigorous double-blinded peer review process.

The Executive International Committee during the last year has been focused on updating the internal procedures and platforms, developing the new venue handbook to guide new institutions in the process of organizing the annual congress, inviting new members to the scientific committee, working on the indexation of our proceedings, and editing two journals, the International Journal of Architectural Computing (IJAC) and Gestão & Tecnologia de Projetos (GTP) that publish extended versions of selected work of the SIGraDi members every year.

Finally, special thanks to the Leaders of the twelve workshops from Greece, Brazil, Japan, the United States, the UK, Chile, Peru, Argentina, Mexico, and Iran, who generously share their knowledge and expertise to move our community forward.

Saludos del presidente de SIGraDi

Marcelo Bernal, presidente
Sociedade Iberoamericana de Gráfica Digital, SIGraDi

Este Livro de Atas reúne o conjunto de trabalhos apresentados no XXVI Congresso da Sociedade Ibero-Americana de Gráfica Digital, SIGraDi, organizado pela Universidade Peruana de Ciências Aplicadas, UPC, Lima, Peru.

A chamada deste ano para "Apropriações Críticas" questiona a tensão entre as agendas de pesquisa regional e global. Como cultivamos nossa identidade e originalidade enquanto somos influenciados pelas tendências globais de pesquisa? Ou como influenciamos essas tendências a partir de nossas experiências regionais? Essa questão de mão dupla é particularmente importante considerando os idiomas e a distribuição territorial de nossa comunidade internacional. Enquanto conectamos ativamente novos pesquisadores, educadores, profissionais e instituições dentro dos limites de nosso território, cada vez mais visamos membros de todo o mundo que a cada ano escolhem o SIGraDi para compartilhar seu trabalho. Nosso desafio não é apenas a integração ibero-americana, mas tornar-se uma plataforma de debate global.

Esta publicação é possível graças à generosa contribuição de nossos membros através de diferentes comitês e funções, a começar pela nossa comunidade global, que, mais uma vez, optou por submeter seus trabalhos originais ao SIGraDi.

O Comitê Organizador Local, além de liderar a organização geral do comgresso mais importante do SIGraDi, o congresso internacional, organizou dois eventos paralelos: "Homo Faber", exposição dos Fab Labs latino-americanos, e as oficinas dos dois primeiros dias do O congresso.

O Comitê Científico, que inclui cento e quarenta e sete membros de vinte e cinco países diferentes, revisou e validou a qualidade dos esforços de pesquisa aqui apresentados por meio de um rigoroso processo de revisão por pares duplo-cego.

O Comitê Executivo Internacional durante o último ano se concentrou na atualização de procedimentos e plataformas internas, desenvolvendo o novo manual da sede para orientar novas instituições no processo de organização do congresso anual, convidando novos membros para o comitê científico, trabalhando na indexação de nossos anais e editar duas revistas, International Journal of Architectural Computing (IJAC) e Gestão &

Tecnologia de Projetos (GTP) que publicam anualmente versões estendidas de obras selecionadas de membros do SIGraDi.

Finalmente, um agradecimento especial aos líderes dos doze workshops da Grécia, Brasil, Japão, Estados Unidos, Reino Unido, Chile, Peru, Argentina, México e Irã, que generosamente compartilham seus conhecimentos e experiências para levar nossa comunidade adiante.

Saludos del presidente de SIGraDi

Marcelo Bernal, presidente
Sociedad Iberoamericana de Gráfica Digital (SIGraDi)

Este libro de actas reúne el cuerpo de trabajo presentado en el XXVI Congreso de la SIGraDi, organizado por la UPC, Lima, Perú.

Este año la convocatoria de "Apropiaciones críticas" cuestiona la tensión entre las agendas de investigación regional y global. ¿Cómo cultivamos nuestra identidad y originalidad mientras nos vemos influenciados por las tendencias de investigación globales? ¿O cómo influenciamos esas tendencias desde nuestras experiencias regionales? Esta pregunta bidireccional es particularmente importante considerando los idiomas y la distribución territorial de nuestra comunidad internacional. Mientras conectamos activamente a nuevos investigadores, educadores, profesionales e instituciones dentro de los límites de nuestro territorio, atacamos cada vez más a miembros de todo el mundo que cada año eligen SIGraDi para compartir su trabajo. Nuestro desafío no es solo la integración iberoamericana, sino convertirnos en una plataforma de debate global.

Esta publicación es posible gracias a la generosa contribución de nuestros miembros a través de diferentes comités y roles, comenzando por nuestra comunidad global, quienes, un año más, optaron por enviar su trabajo original a SIGraDi.

El Comité Organizador Local, además de liderar la organización general del evento más importante de SIGraDi, el congreso internacional, organizó dos eventos paralelos: "Homo Faber", una exposición de los Fab Labs latinoamericanos, y los talleres de los dos primeros días del congreso.

El Comité Científico, que incluye 147 miembros de 25 países diferentes, revisó y validó la calidad de los esfuerzos de investigación presentados aquí a través de un riguroso doble proceso ciego de revisión de pares.

El Comité Ejecutivo Internacional durante el último año se ha enfocado en actualizar los procedimientos y plataformas internas, desarrollar el nuevo manual de sede para guiar nuevas instituciones en el proceso de organización del congreso anual, invitar a nuevos miembros al comité científico, trabajar en la indexación de nuestras actas y editar dos revistas, International Journal of Architectural Computing (IJAC) y Gestão & Tecnologia de Projetos (GTP), que publican versiones extendidas de trabajos selectos de los miembros de SIGraDi cada año.

Finalmente, un agradecimiento especial a los líderes de los 12 talleres de Grecia, Brasil, Japón, Estados Unidos, Reino Unido, Chile, Perú, Argentina, México e Irán, quienes generosamente comparten su conocimiento y experiencia para hacer avanzar a nuestra comunidad.

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SIGraDi 2022: Critical Appropriations Conference is hosted by UPC (Lima, Peru) School of Architecture and supported by the SIGraDi Executive International Committee (CEI) and the SIGraDi Advisory Committee (CA).

A Conferência SIGraDi 2022 é organizada pela Faculdade de Arquitetura da UPC (Lima, Peru) e apoiada pelo Comitê Executivo Internacional da SIGraDi (CEI) e pelo Comitê Consultivo da SIGraDi (CA).

La Conferencia SIGraDi 2022 es organizada por la Facultad de Arquitectura de la UPC (Lima, Perú), y cuenta con el respaldo del Comité Ejecutivo Internacional SIGraDi (CEI) y el Comité Asesor SIGraDi (CA).

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Keynotes Presentations
Palestras Principais
Presentaciones principales

Touching Metaverse: How Fabrication Bridges the Virtual and the Real
Alcanzando el metaverso: cómo la fabricación une lo virtual y lo real
Philip F. Yuan, China

Aprender haciendo
Learning by Doing
Felipe Ferrer, Perú

Architecture and Artificial Intelligence – Rise of a Paradigm
Arquitectura e inteligencia artificial – El surgimiento de un paradigma
Matias del Campo & Sandra Manninger, United States

A Carrier Bag of Tools for Computational Feminism
Un maletín de herramientas para el feminismo computacional
Shelby Elizabeth Doyle, United States

Other Computations
Otras computaciones
Daniel Cardoso Llach, United States

Fabricación regenerativa | Más allá de la 4.ª Revolución Industrial
Regenerative Manufacturing | Beyond the 4th Industrial Revolution
Benito Juárez, Perú

Keynote Presentation

Touching Metaverse
How Fabrication Bridges the Virtual and the Real

Alcanzando el metaverso
Cómo la fabricación une lo virtual y lo real

Philip F. Yuan
Tongji University, China

Abstract. We live in the era when the subject-object relationship of architectural design needs to be re-pondered and reassembled, the era we usually call posthumanism. Facing global warming, geopolitical upheaval and the pandemic, while confronting the challenge of the mutual development of architecture and society, we need to redefine and rethink the relationship between globalization and locality to reflect the contradictions and the opportunities brought by the current trend of human-machine collaboration and Object-Oriented Ontology. We, as architects, need to take a serious look at the parallel development of virtual and real worlds, and phygital futures presents the challenge of an architectural ontological approach to thinking and design tools. The talk will explore this issue through my research and practice.

Speaker biography

Philip F. Yuan is a professor at the College of Architecture and Urban Planning (CAUP) at Tongji University, Thomas Jefferson professor at University of Virginia (UVA, 2019), the visiting professor at Massachusetts Institute of Technology (MIT, 2019) and Royal Melbourne Institute of Technology (RMIT, 2021). He is also the co-founder of DigitalFUTURES and Editor in Chief of Architectural Intelligence journal, the founder of Archi-Union Architects and Fab-Union Technology, council member of UIA Professional Practice Commission (PPC). Yuan is a pioneer in architectural intelligence and robotic fabrication, making achievements in both academic research and architectural practice. He emphasizes the integration of technological innovation and architectural culture, building environment and ethics, constantly seeking human-machine collaboration in the era of post-humanism.

Keynote Presentation

Learning by doing

Aprender haciendo

Felipe Ferrer
PUCP, Perú

Resumen. Desde nuestro taller y durante varios ciclos, capturamos de diversos lugares del Perú su cultura local y energía, y aprendimos de sus métodos constructivos. Experimentamos con tecnologías digitales y, a través de procesos empíricos, tratamos de amalgamar lo local con lo global. Creemos que el cruce entre tecnologías —*hi tech*— y —*low tech*— es la clave para entender el potencial de donde estamos trabajando. En la ciudad de Lima, uno puede encontrar ciertas paradojas socioeconómicas y políticas con mecanismos muy sofisticados y, a la vez, primitivos. Nos interesa usar tecnologías globales de punta, pero trabajamos con las técnicas locales de construcción y procesos artesanales. Apuntamos a responder de una manera muy local a problemas globales. Investigamos la intersección entre la arquitectura y lo artesanal, lo digital y lo físico, y el proceso de fabricación y su construcción. Aprender cómo hacer, cómo construir es entender los materiales y cómo transformarlos, comprender cómo se vinculan los diferentes elementos entre sí; es explorar sistemas constructivos y ver cómo operan a diferentes escalas; es afrontar cómo hacer realidad lo que diseñamos.

Speaker biography

Felipe Ferrer Cárdenas (Lima, 1978). He is a registered architect and founder of V.Oid. He is a professor at the PUCP where he has taught courses on Digital Fabrication, Final Degree Projects, and Experimental Workshop V on experimental design. He has a master's degree in Advanced Architectural Design from Columbia University where he was also a professor of the advanced design master's degree (2005-2006). He worked with Diller Scofidio + Renfro (2005-2010). In Italy they awarded him the Gold A' Award and he was nominated for the Mies Crown Hall Americas Prize Award in Chicago with the AGP eGlass Factory project in Lima. Felipe was selected as Curator for the Peruvian Pavilion at the Venice Biennale 2020-21 where he resignifies bars in public spaces to turn them into artifacts to interact with.

Keynote Presentation

Architecture and Artificial Intelligence
Rise of a Paradigm

Arquitectura e inteligencia artificial
El surgimiento de un paradigma

Matías del Campo
University of Michigan, United States

Abstract. We are currently experiencing the emergence of a new design methodology based on the application of artificial intelligence. The rise of a new paradigm in architecture design. In this lecture, Dr. Matias del Campo and Dr. Sandra Manninger offer an insight into a wide spectrum of possible applications within this new design ecology. The lecture, based on the book “Neural Architecture”, approaches the problem from two specific directions: the theoretical underpinnings of design methods that are capable of interrogating the deep layers of the history of our discipline, and the implementation of AI as a practical tool. Painting a picture of an architecture design ecology that includes nonhuman players, estranged architectural objects, and a posthuman ethos regarding agency and authorship, the lecture provides an opportunity to interrogate an environment that is already a reality, surrounding us on a daily basis. How will the discipline adapt to this rapidly changing landscape? How can we, as architects, contribute to the ongoing dataset building and avoid the pitfalls of cultural and racial bias? Will it change the way we as architects work in the future? This and more will be discussed in the keynote lecture 'Architecture and Artificial Intelligence - Rise of a Paradigm'.

Speaker biography

Dr. Matias del Campo is a registered architect, designer, and educator. He is an Associate Professor at Taubman College of Architecture and Urban Planning, University of Michigan (UoM), director of the AR2IL – The Architecture and Artificial Intelligence Laboratory at UoM, and affiliate faculty member of Michigan Robotics and MIDAS the Michigan Institute of Data Science. Most recently he published the AD Machine Hallucinations – Architecture and Artificial Intelligence with Wiley, and his book Neural Architecture – Design and Artificial Intelligence with ORO editions.

Speaker biography

Dr. Sandra Manninger is an architect, researcher, and educator. Born and educated in Austria, she co-founded SPAN Architecture together with Matias del Campo in 2003. SPAN Architecture's research highlights how to go beyond beautiful data to discover something that could be defined voluptuous data. This coagulation of numbers, algorithms, procedures, and programs uses the forces of thriving nature and, passing through the calculation of multi-core processors, knits them with human desire. Her award-winning projects have been published and exhibited internationally, e.g., at La Biennale di Venezia 14/16/18/21, MAK, Autodesk Pier 1 and have been included in the permanent collections of the FRAC, Design Museum in Munich, or the Albertina in Vienna. Sandra Manninger has taught internationally at, e.g., the TU Vienna, University for Applied Arts, DIA Bauhaus in Dessau, UPenn, Tongji and Tsinghua Universities, at the University of Michigan, and the Royal Melbourne Institute of Architecture.

Keynote Presentation

A Carrier Bag of Tools for Computational Feminism

Un maletín de herramientas para el feminismo computacional

Shelby Elizabeth Doyle
Iowa State University, United States

Abstract. This lecture will share work from the first six years of the ISU Computation & Construction Lab (CCL). The CCL is a physical space that houses digital fabrication machines and robotics – as well as a home to pedagogical experiments, fabricated objects, and theoretical ambitions collected under the hypothesis that computation is informed by and productive of architectural cultures. Or said differently: the CCL is a 'carrier bag' to hold the tools for constructing a feminist future for technology (See Le Guin). The CCL gathers these strategies for architecture and computation under the term computational feminism, operating relentlessly upon the cultures of architecture and computation using disciplinary tools: writing, teaching, coding, drawing, making, and building. Projects from each of these categories will be presented as methods for reflecting on how architect and designer's make-with, attribute, and historicize computational knowledge and labor.

Speaker biography

Shelby Elizabeth Doyle, AIA is an Associate Professor of Architecture and Stan G. Thurston Professor of Design Build at the Iowa State University College of Design, co-founder of the ISU Computation & Construction Lab (CCL), and director of the ISU Architectural Robotics Lab (ARL). The central hypothesis of CCL and Doyle's work is that computation in architecture is a material, pedagogical, and social project; computation is both informed by and productive of architectural cultures. This hypothesis is explored, through the fabrication of built projects and materialized in computational practices. The CCL is invested in questioning the role of education and pedagogy in replicating existing technological inequities, and in pursuing the potential for technology in architecture as a space of and for gender equity. Doyle received a Fulbright Fellowship to Cambodia, a Master of Architecture from the Harvard Graduate School of Design, and a Bachelor of Science in architecture from the University of Virginia.

Keynote Presentation

Other Computations

Otras computaciones

Daniel Cardoso Llach
Carnegie Mellon University, United States

Abstract. A growing body of architectural and design scholarship seeks to understand, for example, computational design methods' manifold effects on the design professions, their historical origins, pedagogical implications, as well as their potentials for both creative design and managerial efficiency. However, the bulk of these efforts has focused on practices and institutions of the global North. As a result, our understanding of the role of digital technologies in architecture and design is framed by historical and theoretical armatures that closely reflect concerns, and interests, native to these locations —chiefly the United States, UK, and Europe— and thus carry with them assumptions that, when unchecked, can occlude important questions and domains of analysis. How might we articulate other accounts of digital design and construction that do not place regions outside of the global North on the receiving end of technology and innovation? How might we dismantle the conceptual past that condemns entire regions and peoples to perpetually catch up with a seemingly pre-determined future? This talk will explore these questions through a series of recent investigations in the field of "other computations.".

Speaker biography

Daniel Cardoso Llach is Associate Professor of Architecture at Carnegie Mellon University, where he chairs the Master of Science in Computational Design and co-directs CodeLab. He is the author of publications, exhibitions, and artifacts exploring the nexus of design and computation through sociotechnical and historical lenses, including the book Builders of the Vision: Software and the Imagination of Design, and the forthcoming Designing the Computational Image, Imagining Computational Design, with Theodora Vardouli. Cardoso Llach's work has been supported by the Graham Foundation for Advanced Studies in the Fine Arts, Canada's Social Science and Humanities Research Council, Google's Artists + Machine Intelligence program, among others. He is also a 2021-22 Pennsylvania Manufacturing Fellow and founding co-editor of the Design, Technology, and Society Routledge book series. Daniel holds a Ph.D. and a MS (with honors) from MIT, and a B. Arch. from Universidad de los Andes at his native Bogotá.

Keynote Presentation

Regenerative Manufacturing | Beyond the 4th Industrial Revolution

Fabricación regenerativa | Más allá de la 4.ª Revolución Industrial

Benito Juárez
Fab Lat, Perú

Abstract. Unlike the exponential increase in digital information, every year we lose globally the bio-information contained in the DNA of the multiple species that become extinct due to human actions, specially by activities such as construction, agriculture, transport, and manufacturing, that directly affect the increase of global warming. The digital information vs. bio-information appear to travel on opposite growth curves. The loss of biodiversity in our planet is the consequence of a predatory economic model, which extracts raw materials and gives back contamination. How to strengthen the development of a regenerative and collaborative economy, based on the co-creation of value from bio-information, which stimulates and encourages the increase of local and global biodiversity? Regenerative Manufacturing | Beyond the 4th Industrial Revolution is a space to reflect on the opportunities offered by bio and digital technologies to develop a new generation of design and manufacturing models that increase the biodiversity of the planet.

Speaker biography

Benito Juarez is pioneer in digital manufacturing technologies in Peru and Latin America. Co-founder of the Latin American Fab Labs Network. Creator of the Floating Fab Amazon project, selected by the United Nations for the global launch of the 17 SDG (NYC, 2015) as “the World’s most disruptive project on Sustainable Manufacturing and Climate Change” (Summit Solutions, UN 2015). Creator of the SimbioCreación methodology, which promotes the culture of Exponential Collaborative Creativity. Co-founder of NUTRIGENE (Singularity University 2016), a company dedicated to eradicating malnutrition in the world through a nutrient printer. Director of Supernodo Latinoamérica (Fab Lat) from where he works for technological democratization through the creation of inclusive projects and avant-garde products based on digital fabrication, revaluing the riches in biodiversity and multiculturalism of Latin America.

Workshops Presentation
Apresentação dos Workshops
Presentación de talleres

The workshops will take place on November 7th and 8th. SIGraDi 2022 workshops will occur online via Blackboard Collaborate or similar video conferencing platform. The workshops at SIGraDi are an opportunity for students, teachers, and professionals from Latin America to explore the possibilities of digital technologies as allies of the design process, sharing their experience with their peers from different parts of the planet. As in every year, we are sure that it will be an enriching and knowledge space that promotes appropriations.

Os workshops acontecerão nos dias 7 e 8 de novembro. Os workshops do SIGraDi 2022 ocorrerão on-line via Blackboard Collaborate ou plataforma de videoconferência similar. Os workshops da SIGraDi são uma oportunidade para estudantes, professores e profissionais da América Latina explorarem as possibilidades das tecnologias digitais como aliadas do processo de projeto, compartilhando sua experiência com seus pares de diferentes partes do planeta. Como em todos os anos, temos a certeza que será um espaço enriquecedor e de conhecimento que promove apropriações.

Los talleres se llevarán a cabo los días 7 y 8 de noviembre. Los talleres de SIGraDi 2022 se realizarán en línea a través de Blackboard Collaborate o una plataforma de videoconferencia similar. Los talleres de SIGraDi son una oportunidad para que estudiantes, docentes y profesionales de América Latina exploren las posibilidades de las tecnologías digitales como aliadas del proceso de diseño, compartiendo su experiencia con sus pares de diferentes partes del planeta. Como cada año, estamos seguros de que será un espacio enriquecedor y de conocimiento que promueva apropiaciones.

Workshops Presentation*

WS1.
Biomimetic Design and prototyping: A digital toolkit for designers
Alexandros Efstathiadis & Ioanna Symeonidou
University of Thessaly, Greece

WS2.
Torres paramétricas a tectônica da concepção algorítmica à fabricação digital
Ana Carolina Santos Vicente & Wallace Dornelas
Universidade Federal de Viçosa, Brazil

WS4.
Optimizing into the Probable Future. Predictive Models of Sustainable Building Performance
Marcelo Bernal, & Victor Okhoya
Perkins&Will Design Process Lab, United States
Tyrone Marshall & Cheney Chen
Perkins&Will Energy Lab, United States
Mohamed Imam
Perkins&Will Vancouver, Canada

W5.
AR + Design: Augmented Reality Immersive Design Method
Yang Song
University of Liverpool, United Kingdom

W6.
Get Your Ph.D. Done
Paula Gómez Z.
Georgia Tech Research Institute, Atlanta, United States

* For reasons beyond our reach, the instructors of Workshops W3 and W8 had to cancel their calls at SIGraDI 2022.

W7.
Architectural Intelligence: Multimodal ML applications in Design
George Guida & Indrajeet Halder
Harvard University, Graduate School of Design, Cambridge, United States

W9.
Diseño 3D a partir de modelos basados en inteligencia artificial
Michael Hurtado
UPC, Perú

W10.
Diseño de exoesqueletos en productos
Patricio Rabus
Universidad de Buenos Aires, Buenos Aires, Argentina

W11.
Ibrida: Metodologías de dibujo desde la fabricación digital e inteligencia artificial aplicada al bocetaje para la producción de arte contemporáneo
Fernanda Olivares & Eduardo Ramírez
Ciudad de México, México

W12.
ML Plugin: Develop a Machine Learning plugin for Grasshopper
Mohammad Pourfooladi
Art University of Isfahan, Iran

Workshop Presentation W1

Biomimetic Design and Prototyping: A digital toolkit for designers

Workshop in English

Alexandros Efstathiadis & Ioanna Symeonidou
University of Thessaly, Greece

Biomimicry is the interdisciplinary science that studies nature's models and draws inspiration from them to solve contemporary design challenges. However, processing, evaluating, and imitating biological systems can be a daunting task for designers and architects. For this reason, specialized methodological tools have been developed to assist the biomimetic design process and bridge the existing knowledge gap. Furthermore, advancements in parametric, generative CAD software enable the extraction and emulation of complex biological structures. Algorithmic design allows for the generation of unlimited design permutations through a series of interactive parameters that can be altered by the user on-demand and in real-time, according to design requirements. Intricate biomimetic structures surpass the technical capabilities of traditional fabrication technologies. However, progress in additive manufacturing (AM) technologies like fused filament fabrication (FFF), enables the production of complex topologies. In nature, the information that guides the building process is stored in the DNA of organisms. Similarly, the data that dictates the 3D printing of a model is stored in the form of a G-code created by specialized slicing software. Biomimetic design combined with 3D printing is driving a paradigm shift in sustainable design. The workshop will provide an analytical strategy that will enable designers to extract, emulate and prototype biomimetic structures. Initially, the concept of biomimicry will be introduced. A variety of biological structures will also be presented along with specific biomimetic tools and databases. Afterwards, a series of algorithmic and parametric modeling tools and plug-ins will be explored in Rhinoceros 3D and Grasshopper 3D. In the end, the models will be transferred to the slicing program Cura where the.G-code for the AM process will be generated. The intricacies of 3D printing complex biomimetic geometries will be analyzed.

Keywords. Design, Nature and Ecosystems, Bio-Inspired Design, 3D printing

Topics. Day 1. Introduction to biomimicry; Presentation of biological structures, biomimicry tools and databases; Exploration of modeling tools in Grasshopper; Participant work in groups. Day 2. Introduction to 3D printing; 3D printing and biomimicry; Participant work in groups; Feedback and guidance; Final presentations

Workshop Presentation W2

Torres paramétricas a tectônica da concepção algorítmica à fabricação digital

Workshop em Português

Ana Carolina Santos Vicente & Wallace Dornelas
Universidade Federal de Viçosa, Brazil

Esse Workshop pretende aplicar os entendimentos acerca da tectônica digital, assim como a manipulação de seus elementos fundantes, desde a fase de concepção paramétrica, através do Grasshopper, até a de fabricação digital. Para isso, inicialmente será dada uma introdução teórica à tectônica digital, com foco nos principais autores que trataram do tema, e dos seus elementos (Estrutura, Manipulação, Material, Construção e Interação), propostos por estudos recentes. Em seguida, a fim de possibilitar o desenvolvimento de torres paramétricas, será ministrado um tutorial utilizando Rhinoceros + Grasshopper (e o plug-in Lunchbox), cujo foco será explorar componentes como a estrutura, pavimentos, envoltória, manipulação formal e materialidade das torres, considerando os fundamentos da tectônica e as possibilidades de fabricação digital (impressão 3D ou corte à laser). Para isso. Espera-se que os participantes possam compreender como considerar os elementos da tectônica nos processos de projeto computacionais, aliando de maneira declarada as dimensões funcionais e artísticas da arquitetura.

Keywords. Manufacturing and Industry 4.0, Digital Fabrication, Digital Tectonics, Computational Design Processes.

Topics. Day 1. Introdução teórica ao tema da tectônica digital. Tutorial Rhino + Grasshopper (torre paramétrica). Apresentação e início da atividade (divisão em grupos e desenvolvimento das torres). Day 2. Continuação do desenvolvimento das torres (acompanhado pelos ministrantes). Preparação dos arquivos para fabricação (orientado pelos ministrantes). Apresentação e discussão dos resultados

Workshop Presentation W4

Optimizing into the Probable Future. Predictive Models of Sustainable Building Performance

Workshop in English

Marcelo Bernal, & Victor Okhoya
Perkins&Will Design Process Lab, United States
Tyrone Marshall & Cheney Chen
Perkins&Will Energy Lab, United States
Mohamed Imam
Perkins&Will Vancouver, Canada

We aim to lead a hands-on discussion that asks how we might consider and anticipate the impact of climate change on buildings and the environment to speculate, imagine, and innovate new models of design intervention that can modulate better performance outcomes in an uncertain future. Although parametric analysis is an emergent data-driven approach to building performance analysis, few practitioners understand effective methods of evaluating parametric analysis data. Furthermore, even fewer understand predictive models and how to estimate uncertainties. In these two days' workshops, the participants will learn how to simulate performance models based on weather files that represent different scenarios for climate changes (current, 2050, and 2080) and then generate design alternatives, analyze the performance of large design spaces, sample large design spaces, interpolate simulated data using machine learning predictive methods, visualize data for qualitative data exploration, and perform sensitivity analysis for quantitative assessment and estimation of the contribution of individual parameters in the overall performance.

Keywords. Climate Change; Design Space; Machine Learning; Data Visualization; Sensitivity Analysis.

Topics. Day 1. Climate Model Scenarios; Generative Design; Parametric Analysis: Data Visualization. Day 2. Sampling the Design Space; Sensitivity Analysis; Predictions-based Machine Learning; Decision Making.

Workshop Presentation W5

AR + Design: Augmented Reality Immersive Design Method

Workshop in English

Yang Song
University of Liverpool, United Kingdom

W5 aims to introduce the knowledge of exploring immersive parametric design through the Augmented Reality (AR) environment. As the quintessential 3D-4D design field, architectural design has been limited throughout its history by 2D or cumbersome 3D representation. Even though computer-aided architectural design and modelling software is widely used to produce digital 3D models, the conventional screen-based visualization methods for design and analysis are restrictive to how well the user understands the space on a computer screen, as the design is done outside the building site, hence there might be disparities between the design and final. This limitation may be eliminated by AR technology, which has become readily available, together with tools facilitating the easy creation of 3D-4D models as holograms onsite. Furthermore, with its interactive input features, AR can increase the potential for interaction between humans and data. As we immerse ourselves into rapidly developing AR, this technology can also radically change how one interacts with and experience the built environment, enhancing or altering or adding a new layer of information to the surrounding environment. This workshop explores how AR technology can change the ways of architectural design. Ideas like immersive design, as well as real-time modification experience and interaction with the built environment and the metaverse, will therefore actuate as the central core for the research streams.

Keywords. Interactions and Collaborations, Mixed Realities (AR), Immersive Design.

Topics. Day 1. AR introduction; Basic AR interactive functions for design inputs; Design algorithm development. Day 2. AR immersive design workflow demonstration; Structural stability simulation; Participant design algorithm development and final outcome.

Workshop Presentation W6

Get Your Ph. D. Done!

Workshop in English

Paula Gómez Z.
Georgia Tech Research Institute, Atlanta, United States

Finish your Ph.D. in a defined period of time. This is a participatory, non-specific topic workshop. It will cover techniques to get your Ph.D. done by understanding the drivers of your progress. It requires active participation, teamwork and sharing your academic experiences with the instructors and other participants. The outcomes are two. First, a deep understanding of a set of techniques to be able to finish the dissertation, and second, an implementation plan for the milestones: Qualifying paper and exam, topic proposal, dissertation writing, Ph.D. defence, and graduation!

Keywords. Lifelong Learning, Ph.D., Education, Decision Making.

Topics. Day 1. Why haven’t you finished? Time management, Decide in advance. Day 2. Owning (your topic), Writing (your dissertation), Becoming (a Ph.D.).

Workshop Presentation W7

Architectural Intelligence: Multimodal ML applications in Design

Workshop in English

George Guida & Indrajeet Halder
Harvard University, Graduate School of Design, Cambridge, United States

We have now reached a historical moment of convergence between text and image processing, bringing forward new multimodal creative processes. Dalle2, StableDiffusion, and Midjourney are challenging current cultural practices of architectural production where a single text input can generate thousands of novel images. This workshop will reposition the role of language and semantics within architecture and introduce students to the opportunities of text-image models and 3D form generation for early design stages. Generated through a combination of the latest machine learning (ML) models, students will be taught how to generate images from text inputs and use these to inform a computational process of 2D to 3D reconstructions. The parameters behind each model and semantics specificity of each text input establish a new creative exchange between human and machine, where human agency finds new meanings. Following an introduction to ML applications architectural design, students will develop three sequential exercises related to 1) envelope making; 2) plan making; 3) a quasi-architectural or metaverse proposals to challenge the first two assignments. The course thus engages ways to reposition language within the design process through new methods and design metrics and considered these practices as challenging current cultural practices of architectural production.

Keywords. Programming Cultures, Machine Learning, Generative Design, Neural Networks, Metaverse

Topics. Day 1. Students will develop three sequential exercises related to 1) envelope making; 2) plan making; 3) a quasi-architectural or metaverse proposals to challenge the first two assignments. Day 2. The third step focuses on creating constructible and discretized forms that hybridize the 2D image outputs. The two primary workflows that we shall delve into are a NURBs based creation of forms in Rhino and several Grasshopper plugins (Monolith, Pufferfish, MeshEdit, Human, Python etc) and vozelized space-based methods using Houdini.

Workshop Presentation W9

Diseño 3D a partir de modelos basados en inteligencia artificial

Workshop en español

Michael Hurtado
UPC, Perú

Since the appearance of image generation models, there has been a growing interest in their use in areas such as art, design, and architecture. More recent are the text-to-image generation models that have shown the importance of choosing the right terms in the prompt to produce an image, this is known as prompt engineering. In this workshop, two 3D computational design methods will be presented, based on the use of image generation using AI. The first is based on the GAN generation model, specifically we will use the StyleGAN algorithm, which allows us to train the network from images chosen in a database, and the second method is based on the use of modifiers from a model. text-to-image generation model known as diffusion model, for this work we will use Stable Diffusion. Finally, through the Grasshopper plugin we will convert the resulting 2D image into a 3D model that can be used within the architectural computational design process.

Keywords. Manufacturing and Industry 4.0, Artificial Intelligence, 3d models, AI design.

Topics. Day 1. Artificial Intelligence fundamentals, diffusion models of text-to-image generation and GAN models, Grasshopper and how to convert a 2D image to 3D.

Workshop Presentation W10

Diseño de exoesqueletos en productos

Workshop en español

Patricio Rabus
Universidad de Buenos Aires, Buenos Aires, Argentina

Gracias a las posibilidades que ofrecen los actuales métodos de fabricación digital en simbiosis con los *softwares* 3D generativos, la estética resultante se convierte en un conductor en el diseño que llevó a la aplicación de las técnicas de diseño arquitectónico a escala de productos. El modelado 3D y las técnicas de impresión 3D han cuestionado las prácticas de diseño y fabricación, las cuales han liberado a los diseñadores de la estética anterior, y, sobre todo, han permitido recrear, visualizar y producir estructuras sustraídas de la naturaleza ya no como un recurso estético, sino funcional. Cuando una trama 2D, en una superficie, se utiliza como eje para una forma tubular se obtiene una estructura espacial. Si el punto de partida es una trama de crecimiento orgánico, el resultado será extremadamente poderoso en términos estructurales. El exoesqueleto es la forma en que está compuesto el hueso humano y animal. No se refiere tanto a una trama específica, sino a un tratamiento o forma de concreción. Se pueden obtener exoesqueletos de múltiples maneras: desde trama triangular a geometrías Voronoi, desde bordes de volúmenes poliédricos a dibujo de segmentos manualmente.

Keywords. Manufacturing and industry 4.0, digital fabrication, generative design, design, nature and ecosystems, bio-inspired design.

Topics. Day 1. Generative design, digital fabrication, bio-inspired design. Day 2. Generative design, digital fabrication, bio-inspired design.

Workshop Presentation W11

Ibrida: metodologías de dibujo desde la fabricación digital e inteligencia artificial aplicada al bocetaje para la producción de arte contemporáneo

Workshop en español

Fernanda Olivares & Eduardo Ramírez
Ciudad de México, México

Este taller está dirigido a artistas contemporáneos, *makers*, diseñadores y a la comunidad creativa para experimentar la traducción de métodos de dibujo a las herramientas de fabricación digital como escaneo e impresión 3D, modelos anatómicos e inteligencia artificial. Ibrida tiene como objetivo construir puentes hacia la hibridación de lo análogo y lo digital. Mediante el rescate de principios de dibujo anatómico y nuevas posibilidades de producción artística desde un enfoque multidisciplinario, el participante enriquecerá diversas exploraciones y alcances para crear un proyecto phygital a través de herramientas tecnológicas.

Keywords. Digital craft, life long learning and digital education, phygital artificial intelligence.

Topics. Day 1. Digital Anatomy, AI and phygitality, traditional drawing methods translated to the digital, AI and new image conceptions, figure model and pose with 3D scan, contemporary art, and hybridization.

Workshop Presentation W12

ML Plugin: Develop a Machine Learning plugin for Grasshopper

Workshop in English

Mohammad Pourfooladi
Art University of Isfahan, Iran

In 1950, Alan Turing asked, “Does a machine think?” A simple question that was the beginning of research on machine learning. Today, “Artificial Intelligence” (AI) is used in most fields of everyday life and learning it can greatly help in the development of new technologies. “Machine Learning” (ML) is one of the parts of artificial intelligence that must be learned to work in this field. The learning process in machine learning begins with data as input until the machine uses them to find the patterns in that data set and make better decisions based on the discovery of their patterns and the insights gained. Machine learning and how to use it for scientific research can be a powerful tool for architects. This workshop aims to provide a basic learning platform for entering the field of machine learning and how to write code for architecture, as well as building the tools desired by the architect for research and design with the help of artificial intelligence tools. In this workshop, students learn how to use the machine learning libraries in the Rhino software to create a plugin that is customized according to their needs.

Keywords. Programming Cultures, Generative Design, Machine Learning, Artificial Intelligence, Develop a Digital Tool.

Topics. Day 1. Basics of programming with C#, Basics of machine learning, Examples of using ML for architectural goals, Generative design using ML, Design evaluation with ML. Day 2. How to develop a plugin, Using ML Libraries, Building the customized plugin.

PhD Workshop
Workshop para doutorandos
Taller para doctorandos

PhD Workshop Committee

Frederico Braida (Chair)
Universidade Federal de Juiz de Fora, Brazil
Fernando Lima
Belmont University, United States
Maria Elena Tosello
Universidad Nacional del Litoral, Argentina
Paula Gómez
Georgia Tech Research Institute, United States
Rodrigo Martín-Iglesias
Universidad de Buenos Aires, Argentina
Silvia Patricia Hernández
Universidad Nacional de Córdoba, Argentina

The SIGraDi PhD Workshop is a unique opportunity for PhD students to present and discuss their research proposals in the CAAD field and related topics. The workshop aims to promote interaction between doctoral students and more experienced researchers and collaboration between doctoral students working on similar topics. Student enrolments at any stage of the work are welcome. The workshop will take place on November 7th and 8th from 9am to 11:30am (GMT -3:00). It is planned to discuss up to 10 proposals. In the case that more than 10 proposals are approved in the review process, the ones that represent the diversity of topics in the area will be selected for presentation. The remaining candidates are welcome to attend the workshop as listeners. The Committee will select the best presentation, whose author will receive a certificate and a SIGraDi Conference attendee registration (or reimbursement), which includes one year's membership of the society. In addition, the best presentations could be selected for the Global PhD Workshop.

Exhibition
Exposição
Exhibición

Homo Faber 3.0
Appropriation of Digital Fabrication from Latin America
Apropriação da Fabricação Digital pela América Latina
Apropiación de la fabricación digital desde Latinoamérica

Curators

Pablo C. Herrera
UPC, Perú
Rodrigo Scheeren
Universidade Federal da Bahia, Brazil
David Moreno Sperling
Universidade de São Paulo, Brazil

Homo Faber 3.0: Appropriation of Digital Fabrication from Latin America is inspired by local challenges, vulnerable communities, and semi-peripheral geographies, from the creative strategies that drive pioneers, developers, and end-users in our region with digital fabrication, as an ally of their processes of design, in any of its forms. For this version, the following categories are promoted: Artistic/Hacking; Bottom up / Community / Craft; Construction Components; Low-High Technologies; Robotic Strategies; Pedagogical Elements and Mobile Fab Labs. Homo Faber 3.0 explores the domestication, interpretation, and application of digital fabrication in the region, which stimulates the logic of technological appropriation of Homo Faber, beyond simple curiosity, automation, and personalization, to distance itself from the modest technological manipulation of Homo Fabricatus. Appropriation as a critical practice makes visible processes that create the foundations of a digital culture that establishes local agendas for other geographies, implementing technical solutions in synergy with situated ecosystems. This invitation to Homo Faber 3.0 hopes to reveal inspirations and synthesize thoughts from making objects, spaces, and environments.

Exhibition

Homo Faber 3.0. Categories and Laboratories
Homo Faber 3.0. Categorias e Laboratórios
Homo Faber 3.0. Categorías y laboratorios

Low-High Technologies

Superlimão, *São Paulo, Brazil*
Dum Dum LAB, *Valparaíso, Chile*
RILAB | UNL, *Santa Fé, Argentina*
Taller 1:1 | PUCP, *Lima, Perú*
FabLab U. de Chile, *Santiago, Chile*
LEFAD | PUC Minas, *Belo Horizonte, Brazil*
DATLab, UNaM, *Misiones, Argentina*
Laboratorio Bio, *Medellín, Colombia*
UNICAP ICAM-TECH, *Recife, Brazil*
MicroUtopias Lab, *Medellín, Colombia*

Pedagogical elements

IEH | UBA, *Buenos Aires, Argentina*
FabLab Belas Artes, *São Paulo, Brazil*
LAMO | UFRJ, *Rio de Janeiro, Brazil*
Fab Lab Tech Mx, *México DF, México*
Robot_Lab, *Bogotá, Colombia*

Artistic/Hacking

Morfolab | UPB, *Medellín, Colombia*
1maginari0 | UFMG, *Belo Horizonte, Brazil*
Estudio Trujillo-Pisanty, *México DF, México*
Vestibles, *Santiago, Chile*
Plasma | UNICAMP, *Campinas, Brazil*
WE-Labs, *Lima, Perú*

Mobile Fab Labs

FabLab Unal, *Medellín, Colombia*
FabLab Austral, *Puerto Williams, Chile*

Tracks
Sessões
Sesiones temáticas

Programming Cultures
Agent-Based Systems
Data Analytics
Generative Design
Machine Learning
Parametric Analysis
Predictive Modeling
Shape Grammars

Interactions and Collaborations
User Experience
Mixed Realities
Virtual Reality
Codesign
BIM adoption
Interdisciplinary Design

Special Topics
Digital Heritage
Inclusive Design
Media Art
COVID-19

Manufacturing and Industry 4.0
Robotics
Digital Fabrication
Internet of Things
Blockchain
Decision Making

Life Long Learning and Digital Education
Hybrid Education
Online Learning

Design, Nature, and Ecosystems
Smart Cities and Environments
Sustainable Design
Building Performance
Bio-Inspired Design
Living Things

Other Computations
Digital Craft