Autodesk AI

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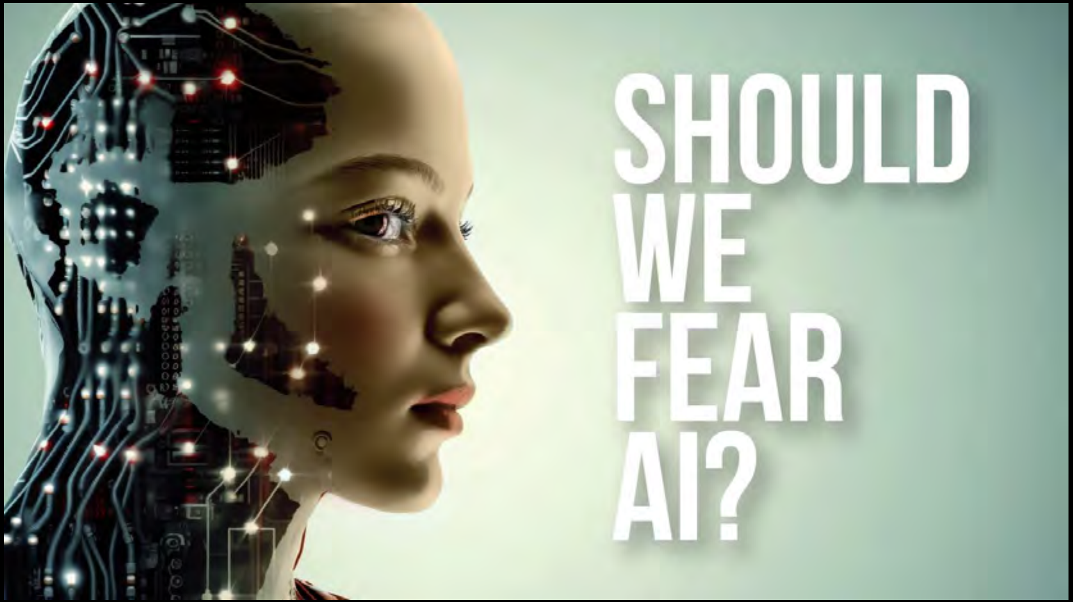
Artificial intelligence (n):

The theory and
development
of computer systems able
to perform tasks that
normally require human
intelligence and, in some
cases, will surpass it.

Yes, AI is having a moment



The Fear of Artificial Intelligence: Is It Justified?

Alongside its remarkable advancements, a palpable fear of AI has also emerged. This apprehension, stems from concerns about job displacement, existential risks, ethics, and the unintended consequences of humankind's insatiable desire to keep pushing for more..

THE SHIFT

A Coming-Out Party for Generative A.I., Silicon Valley's New Craze

A celebration for Stability AI, the start-up behind the ... tor, represents the

RUMMAN CHOWDHURY IDEAS APR 6, 2023 9:00 AM

AI Desperately Needs Global Oversight

As ChatGPT and its ilk continue to spread, countries need an independent board to hold AI companies accountable and limit harms.

Leaders | Technology and society

How to worry wisely about artificial intelligence

Rapid progress in AI is arousing fear as well as excitement. How worried should you be?

TECH | KEYWORDS: CHRISTOPHER MIMS

Can You Tell Whether This Headline Was Written by a Robot?

Not this time, but AI is churning out articles, illustrations, fake produc... reviews and even videos

By Christopher Mims Follow

Nov. 12, 2022 12:00 am ET

Share Resize 81 Listen (2 min)

MAGAZINE · EDITOR'S DESK

ChatGPT shows that the A.I. revolution has arrived. We're not ready

BY ALYSON SHONTELL

January 25, 2023 at 3:00 AM PST

IAN C. BATES—THE NEW YORK TIMES/REDUX

Generative Design Takes on the Golden Gate

Gen AI: Accuracy and precision

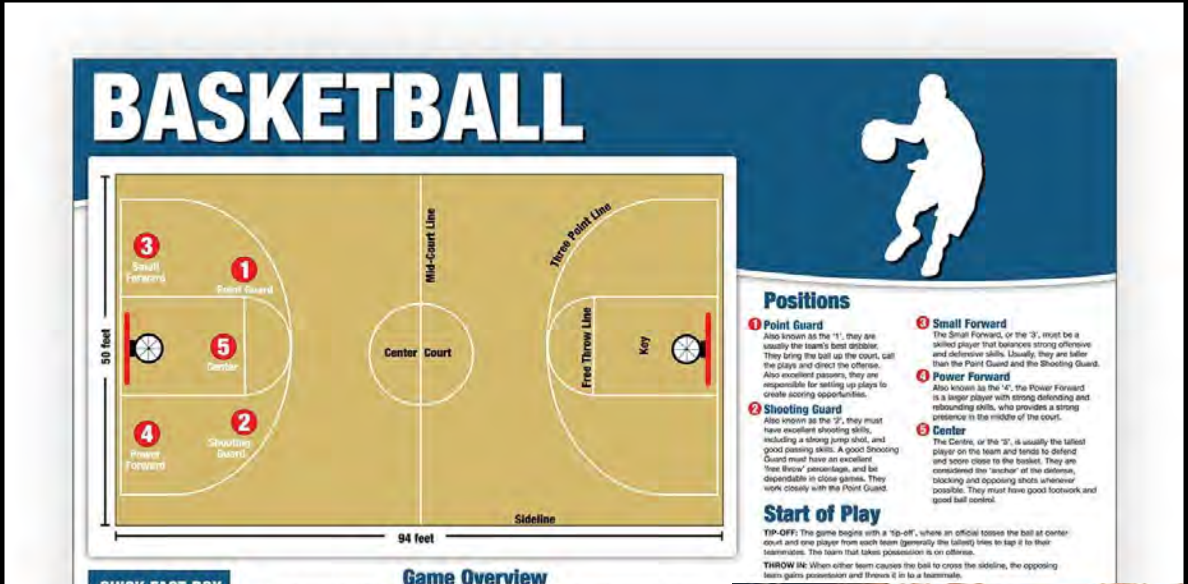
Inaccuracy

Question:
Who is taller, Yao Ming or Shaquille O’Neal?

ChatGPT 3.5:
Shaquille O’Neal is taller than Yao Ming. Shaquille O’Neal is 7’1” (216cm) while Yao Ming is 7’6” (229cm).

Imprecision

Image courtesy of ICAbim



Artificial Intelligence: Using all points of views.

Basketball point of view: All five players, coaches, Ref, and fans.

A history of research and publication

GENERATIVE DESIGN

First paper published in 2009

PHYSICS-BASED GENERATIVE DESIGN

RAMTIN ATTAR, ROBERT AISH, JOS STAM,
DUNCAN BRINSMEAD, ALEX TESSIER,
MICHAEL GLUECK, AZAM KHAN
Autodesk Research, Canada

ABSTRACT: We present a physics-based generative design approach to interactive form-finding. While form as a product of dynamic simulation has been explored previously, individual projects have been developed as singleton solutions. By identifying categories of computational characteristics, we present a novel unified model that generalizes existing simulations through a constraint-based approach. The potential of interactive form finding simulation is explored through exemplary studies: a conceptual approach to a fixed form that acts as a visualization of interacting forces, and a constraint-based model of the fabrication logic for a panelization system are examined. Implications of constraint-based simulation on future directions are discussed.

KEYWORDS: Form finding, dynamic simulation, physics-based design, panelization

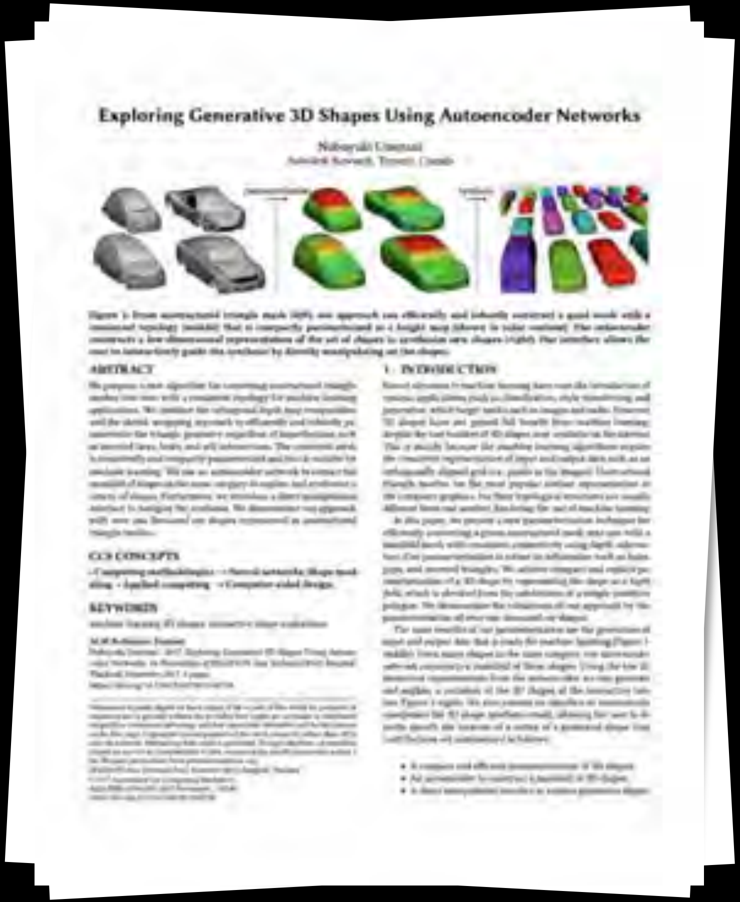
RÉSUMÉ : *Dans cet article on présente une approche générative basée sur la physique pour la conception des formes d'une manière interactive. Cette approche a été explorée précédemment mais seulement pour résoudre des problèmes isolés. En identifiant les catégories de caractéristiques numériques, nous proposons un nouveau modèle unifié qui généralise les simulations courantes par une méthode à base de contraintes. Nous explorons la puissance de la conception interactive des formes par deux études concrètes : une approche conceptuelle qui visualise les forces interagissant sur une forme fixe, et une méthode à base de contraintes pour la construction logique d'un système de panneaux. Nous examinons les implications de la simulation à base de contraintes et les directions futures de recherche.*

MOTS-CLÉS : *Forme recherchée, simulation dynamique, conception basée sur la physique, assemblage de panneaux*

T. Tidafi and T. Dorta (eds)
Joining Languages, Cultures and Visions: CAADFutures 2009

GENERATIVE AI

First paper published in 2017



50+

AI Research Papers

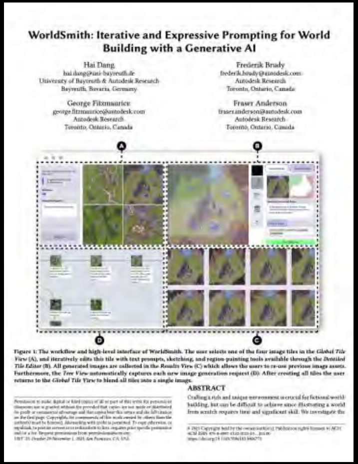
World’s leading publisher for
AI research for 3D geometry and design

Exploring Generative 3D Shapes Using Autoencoder Networks

Neural Implicit Style-net: synthesizing shapes in a preferred style exploiting self supervision

Marco Fumero
Hooman Shayani
Aditya Sanghi
Emanuele Rodolà

CAPRI-Net: Learning Compact CAD Shapes with Adaptive Primitive Assembly



WorldSmith: Iterative and Expressive Prompting for World Building with a Generative AI

Hai Dang
Frederik Brudy
George Fitzmaurice
Fraser Anderson

AI Across Autodesk AEC

Autodesk Design Solutions

- Generative Design
- Automated Analysis
- Design Tool Assistance

Autodesk Construction Solutions

- Assistive Workflows
- Predictive Insights
- Intelligent Search

Autodesk Research

- AI & Machine Learning
- Robotics
- Optimization
- Simulation
- Human and Computer Interaction
- Fundamental Mathematics & Geometry

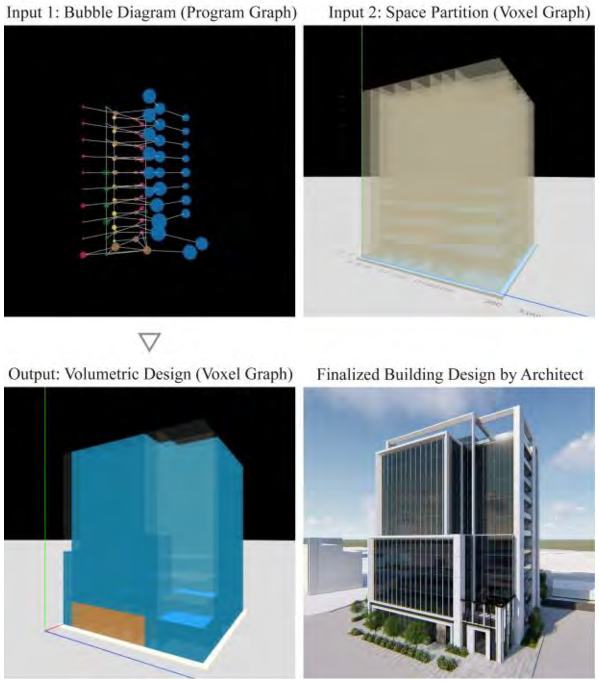
Autodesk approach

Autodesk AI mission

As the trusted technology partner for design and make worldwide, Autodesk has ***a mandate to harness the power of AI*** on behalf of our customers, and ***a duty to do so responsibly.***

Autodesk approach

- Suitable workflows
- Align with customer needs
- Combine Generative AI



Benefits the Three A's

- **Augmentation** : Enhancing exploration and experimentation
- **Automation** : reducing tedious tasks for more creativity
- **Analysis** : Immediate insights, earlier

AI & Data Ethics

Example Capabilities

Forma Rapid Analysis

Rapid Analysis Suite

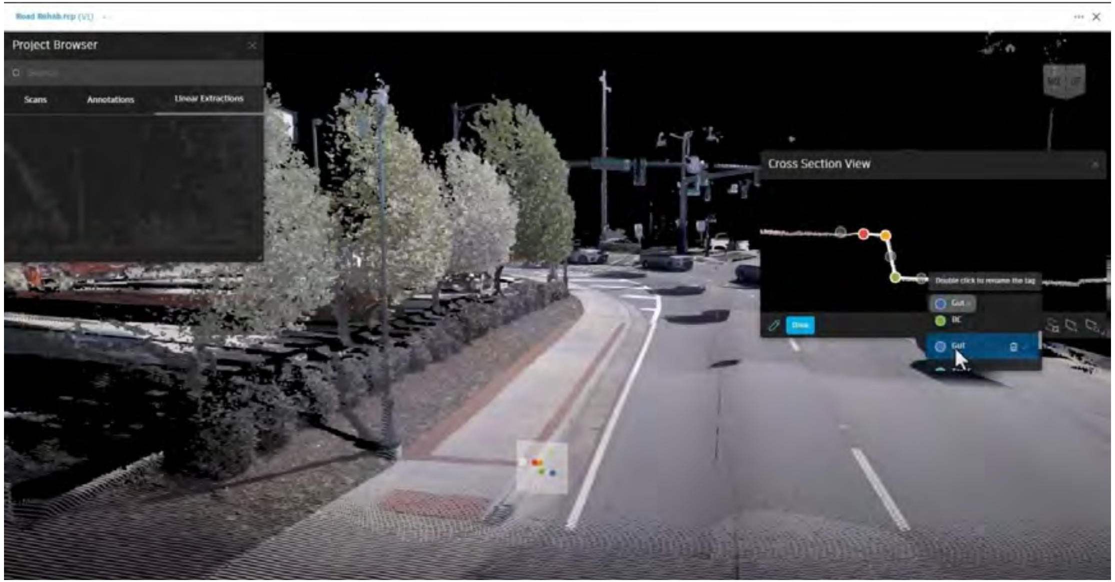
microclimate | solar | sun | daylight | wind | views | noise | energy

Machine learning based rapid analysis for wind, microclimate, noise, and operational energy.

Approach Machine Learning – Surrogate Models

Why it matters? Allows customers to analyze a design's performance without having to stop the design process to run a simulation. If thousands of options are generated, each can be analyzed quickly.

Recap Scan-to-Design

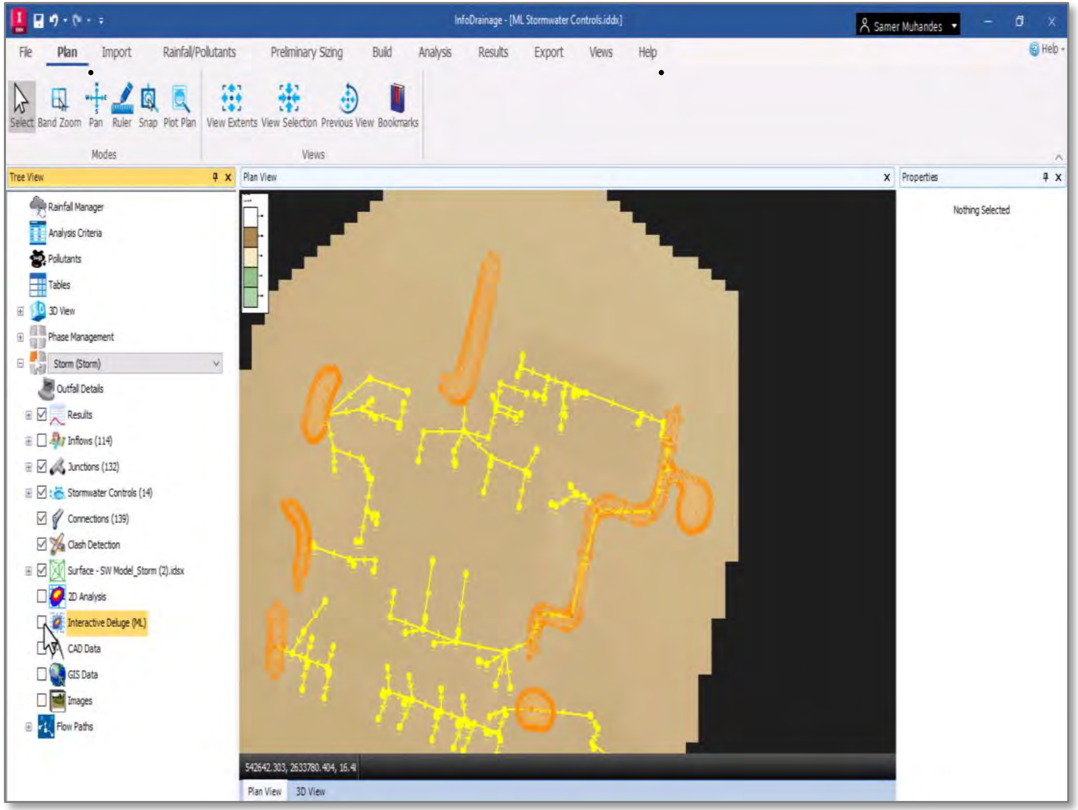


Quickly and easily extract features like curbs from point clouds that are uploaded to ACC in the online viewer reducing manual work

Approach Heuristics and ML (Neural Networks)

Why it matters? Customers have often used third party tools to do feature extraction in point clouds. Point clouds are large and difficult to work with in a desktop environment. These capabilities allow customers to work with point clouds and create design content in our platform quickly.

InfoDrainage: Deluge Modeling



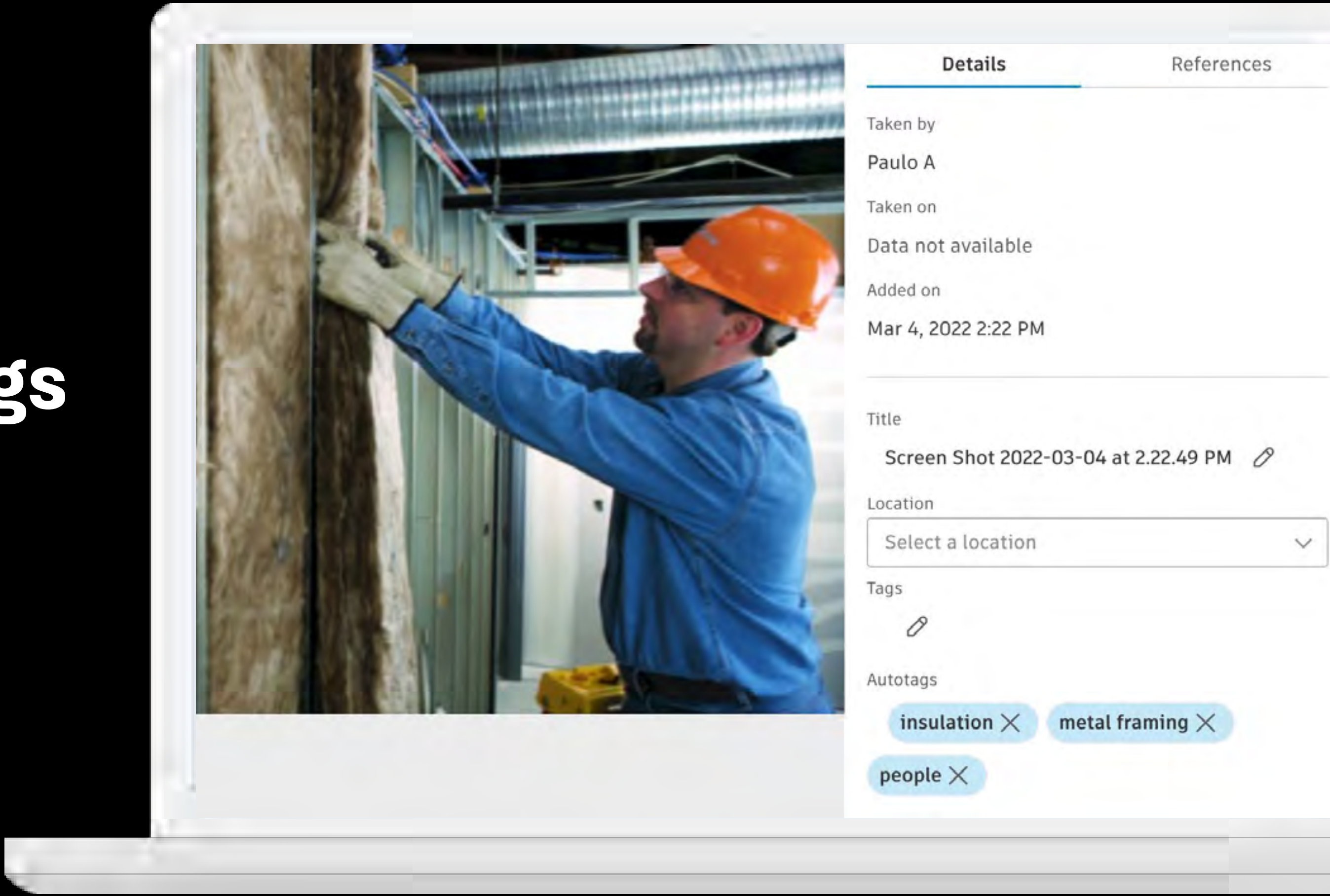
Rapidly generate deluge flood maps to inform storage, infrastructure, buildings, and evacuation routes without needing to run lengthy simulations.

Approach Machine Learning – Surrogate Models

Why it matters? Allows customers to understand flood implications quickly without lengthy simulations. Interactive flood maps are coming in FY25.

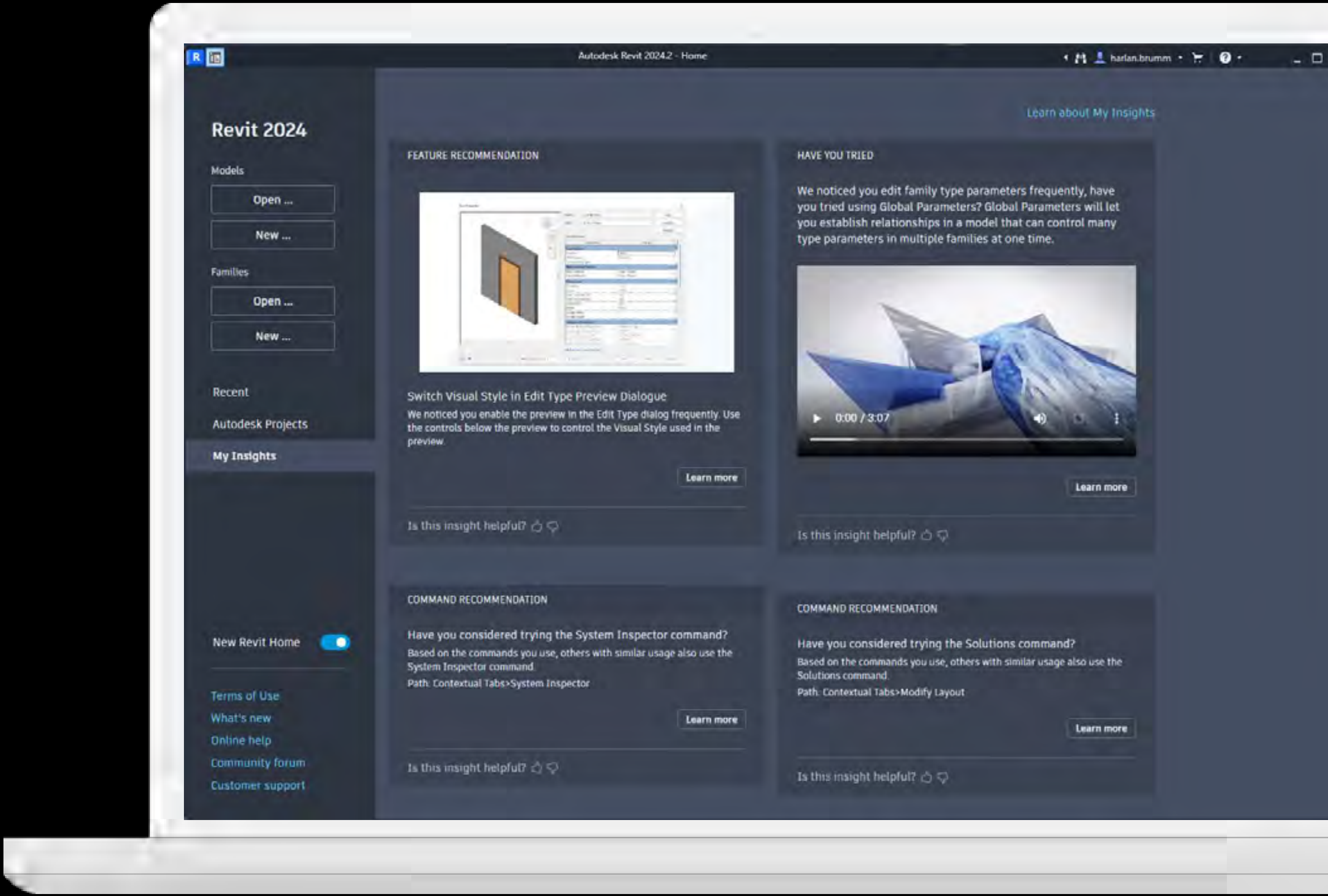
Photo Autotags

Autodesk Build



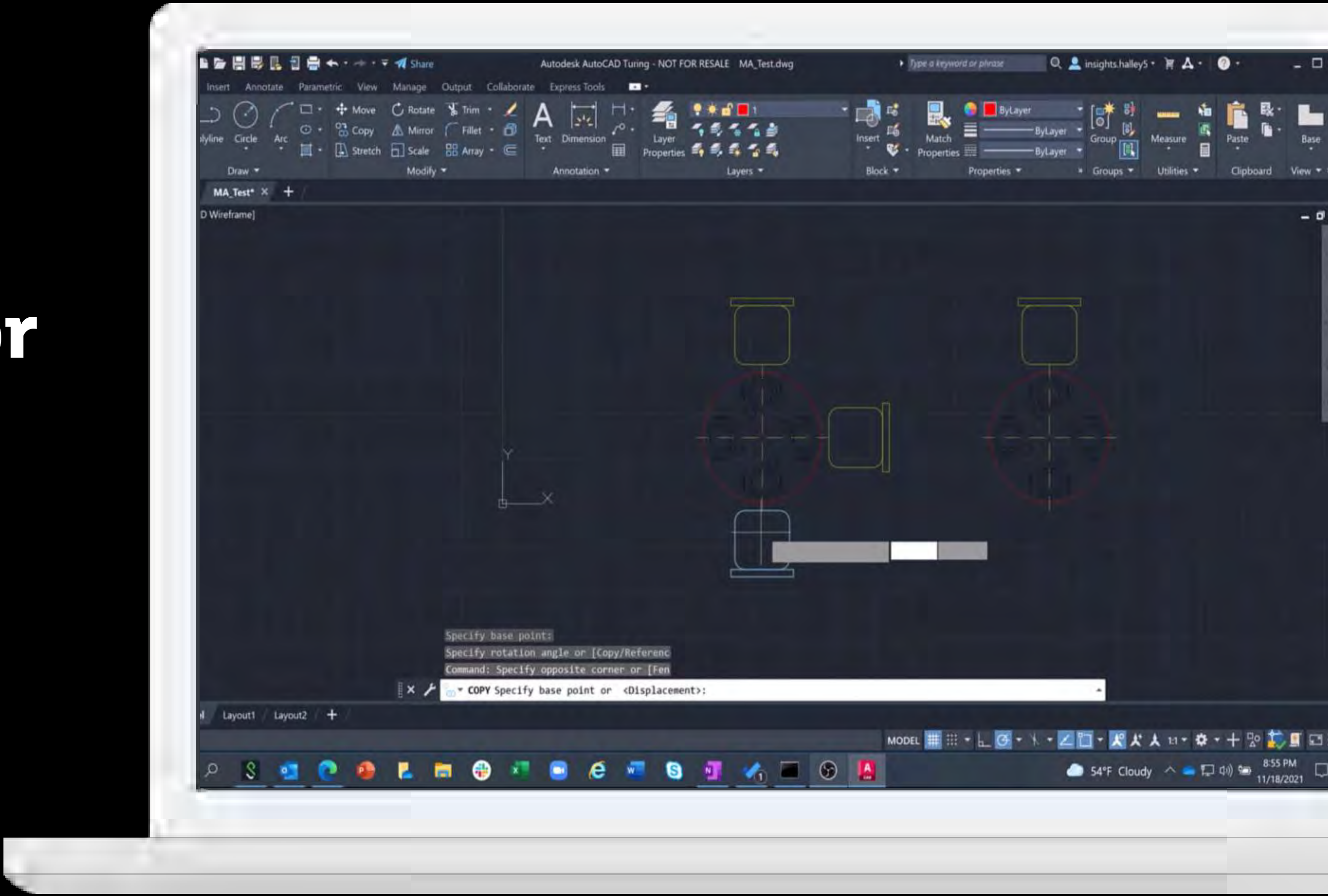
My Insights Dashboard

AutoCAD and Revit



Macro Advisor

AutoCAD



Dynamo Node Autocomplete

Customers are provided predictions on what node to place next to help them quickly and easily complete their script.

Approach Machine Learning – Neural Networks

Why it matters? Compared to traditional methods of search and place, this allows customers to build graphs 4x or more faster.

Autodesk AI in AEC

Forma Quick geometric design explorations

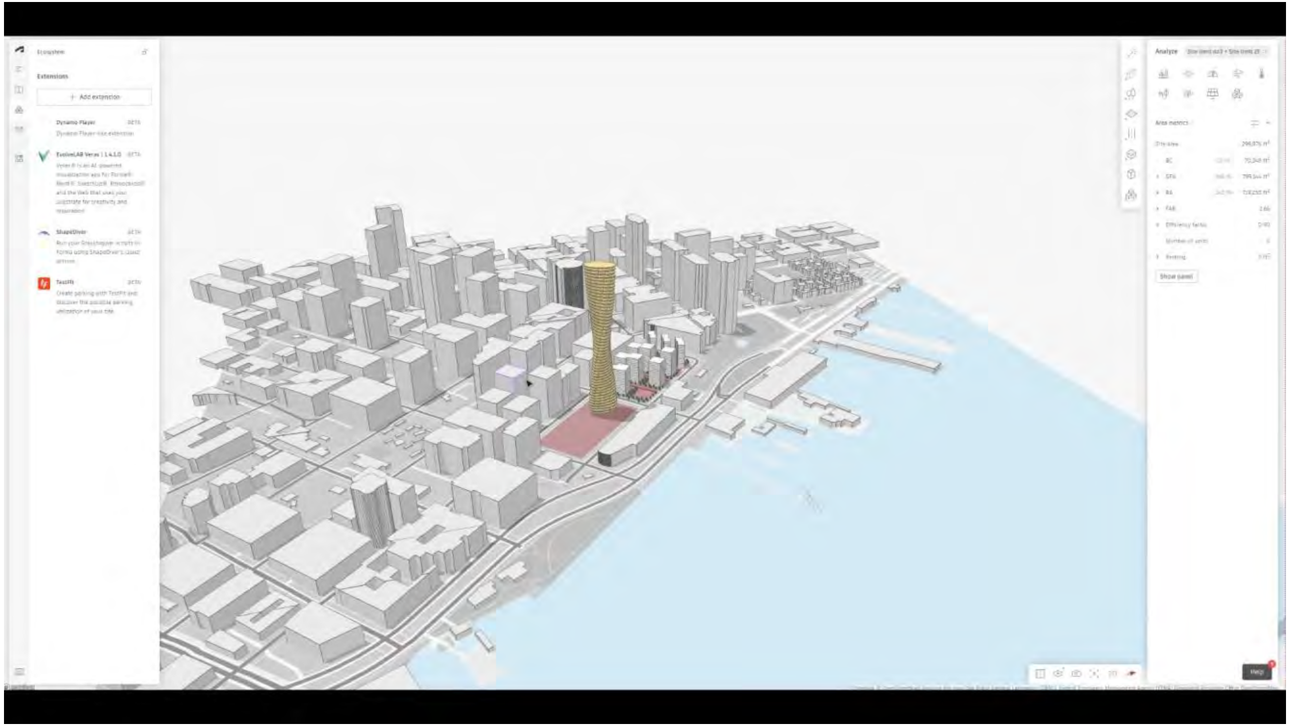
Third party integration (Testfit)

Customers can leverage interactive procedural modeling tools for site layouts, parametrize building features, plant vegetation, and more

Approach Generative Design

Why it matters? Provides more interactive, in-canvas generative design capabilities. Additionally, Forma Generator APIs allow third parties to easily build generative logic. There will be examples from TestFit and ShapeDiver.

Forma and Revit Quick visual design exploration



Third-party integration (Veras)

Customers can leverage the power of natural language prompts and LLMs to create visual rendering options for their site studies.

Approach Generative AI

Why it matters?
Leverages third party generative models to help customers visualize their designs using their own words.

Autodesk AI for Construction: FUTURE

Data is the backbone, but intelligence is the fuel for Transformation

The Benefits of Autodesk AI for Construction

Radical Efficiency Gains

Early Prevention of Construction Risk

Improve Everyday Decision Making

Why Autodesk AI

Construction Specific

AI model built specifically for construction by learning from your project data to provide the most accurate insights

Strong AEC Foundation

Combining the technology of LLM’s with our decades of global AEC industry experience to deliver more focused AI

Contextualized Assistance

AI-generated assistance in the context of construction workflows while maintaining full review and control

Privacy & Security

Trust us to bring AI solutions to market in a responsible manner that meets our pillars of transparency, caring, reliability, and capability

Visit our Trust Center

Autodesk AI:

- Autodesk AI technology enables capabilities in Autodesk's Design and Make Platform and other Autodesk products, with more coming every day.

Thank you.

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AUTODESK AI