

## REVIT+DYNAMO

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**Abstract:** The article discusses the possibilities of AutoDesk Revit in conceptual modeling and visual programming (Revit + Dynamo) in improving the efficiency of design and construction work in modern architecture, the creation of complex buildings and structures in the design process, as well as this software approach, designers and engineers. It was highlighted that the targeted area is very suitable for tours and that Dynamo has managed to become an additional utility in many applications and the possibilities of Dynamo.

**Keywords:** Concealer, model, 3ds Max, BIM , Auto Desk, visual, Revit, design, Dynamo, software.

**Introduction:** What is Dynamo? Dynamo is a software tool that works with Revit. Dynamo expands Revit by providing the Revit API (programming interface) in a more convenient way. Instead of entering code, you create programs by managing graphic elements called "nodes" in Dynamo. This software approach, like designers and engineers. Very suitable for oriented tours.

With the advent of Dynamo, BIM came in as an additional utility for the AutoDesk Revit program, which was adapted for data modeling. After this incident, Dynamo became an additional utility in many programs. Among other things, the designers have developed a platform that allows them to solve many problems and create their own tools by studying and applying these programs. Working with Dynamo may involve using an application that is connected to other Autodesk programs, or has been added to a wide range of users and participants involved in the software process.

**Dynamo** software is software that can be used as a plugin for software or other applications such as Revit or Maya that run in a virtual environment. It is described as follows:

Software that is accessible to both programmers and non-programmers. It allows users to visually create behavioral scenarios, define logic and scenarios using different text-based programming languages.

Once we have installed the program, Dynamo allows us to work within a programming process that combines elements to determine the sequence and relationships of the actions that make up the algorithms. We can use our algorithms for a wide range of applications - from data transfer to geometry production - in real time and without problems<sup>1</sup>.

Dynamo is a software tool for designers that allows you to create tools to use any Autodesk product that has an external library or software interface. With Dynamo Studio, we can develop applications in the style of the Sandbox app, but it continues to evolve as a Dynamo ecosystem<sup>2</sup>.

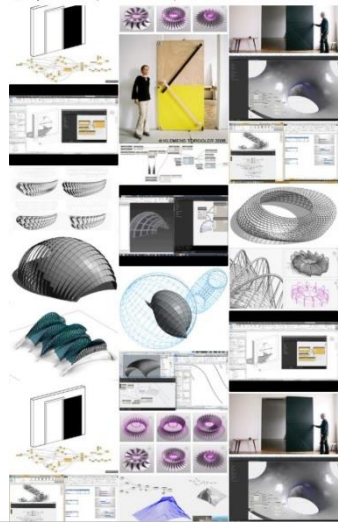
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<sup>1</sup> Yerjanovich, Y. B., & Mamadiyoroglu, A. A. (2021). Principles of Using Ornamental Plants in the Interior. *EUROPEAN JOURNAL OF INNOVATION IN NONFORMAL EDUCATION*, 1(2), 79-81

<sup>2</sup> Alisherbek, N. (2021). Development of Urban Development in the Territory of Uzbekistan. *CENTRAL ASIAN JOURNAL OF THEORETICAL & APPLIED SCIENCES*, 2(10), 24-26

Dynamo is an integral part of a variety of fun applications, and the project is programmed to be used in the development of custom software tools for workflows.

Dynamo Visualization is a software platform, a flexible and extended design tool. Whether it works as a standalone program or in addition to other design programs, we can use it to develop many creative workflows. Below we illustrate its capabilities.



Forms created in connection with Dynamo and Revit

### Dynamo for Revit

While Dynamo is a flexible environment designed to transition to a wide range of applications, it is actually designed to use Revit. The visual application creates robust options for the Building Information Model (BIM). Dynamo offers a variety of sites specifically designed for Revit, as well as third-party libraries by the advanced AEC team. This section is about the basics of using Dynamo in Revit.

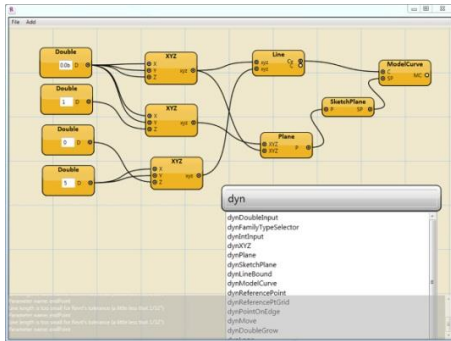
The Dynamo graphical algorithm editor for Revit extends the algorithmic data model using data environment and logic. Revit's flexibility with a reliable database opens up new prospects for BIM<sup>3</sup>.

This section describes Dynamo workflows for BIM. The sections are mostly exercise-based, as going directly to the project is the best way to get acquainted with the graphical editor of algorithms for BIM.

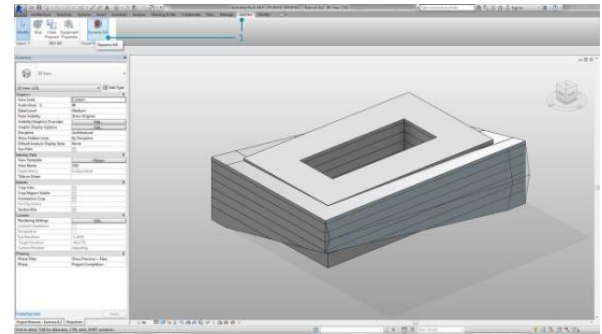
Dynamo was originally designed to regulate AEC workflows in Revit. When Revit creates a reliable database for each project, it can be difficult for the average user to get that information out of the interface. Revit includes a comprehensive API (Application Program Interface) that allows third-party developers to create their own tools. Developers have been using this API for years, but text scripts are not available for everyone. Dynamo Revit seeks to democratize data through a graphical algorithm editor.

<sup>3</sup> Yerjanovich, Y. B., & Mamadiyoroglu, A. A. (2021). ABOUT THE URBAN PLANNING PRACTICE OF THE URDA FORTRESS OF ANCIENT JIZZAK. *International Journal of Discoveries and Innovations in Applied Sciences*, 1(5), 148-151.

Using Dynamo primary nodes in conjunction with custom Revit nodes can significantly expand parametric workflows to provide user-generated worker, documentation, analysis, and generation. With Dynamo, boring workflows can be automated, and design work can evolve.

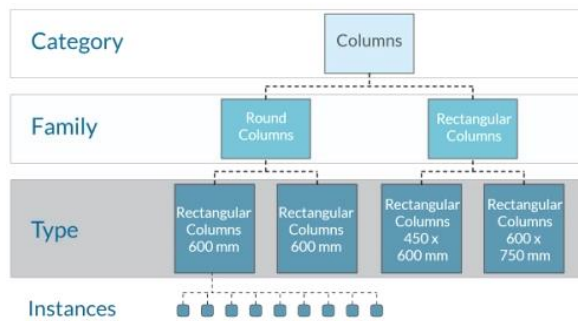


Execution of algorithms when working with Dynamo Revit



Form taken using Dynamo

Revit is a data-rich environment. This gives us ample opportunities. We can dynamically associate Revit elements with Dynamo Geometry when performing a Revit database query and parametric operations. To properly select Revit elements, it is important to fully understand the hierarchy of Revit elements.



Database

Dynamo is a powerful feature, you can change the parameters at the parametric level. For example, a generative algorithm or simulation results can be used to control a number of parameters of elements. Thus, the same family examples may have special features in your Revit project<sup>4</sup>.

### Dynamo Dictionaries.

Dynamo 2.0 provides the concept of distinguishing lexical data type from list data type. This change can lead to significant changes in how you create data in your workflow and how you work. Prior to version 2.0, dictionaries and lists were combined as data types. In short, the lists were actually dictionaries with keys. A dictionary is a type of data that consists of key-value pairs, each key in each set being unique. There are no orders in the dictionary, and you can basically "search for things" using a key instead of an index value like the one in the list. In Dynamo 2.0, switches can only be strings.

<sup>4</sup> Inomovich, A. N. (2021). CHARACTERISTICS OF HISTORICAL SAMARKAND CITY CENTERS. *International Journal of Discoveries and Innovations in Applied Sciences*, 1(5), 155-158

## What is a list?

A list is a type of data that consists of a set of ordered values. Dynamo uses lists as index values. Python is a widely used programming language, and its popularity depends largely on the syntax method. It is easier to read and easier to learn than many other languages. Python supports modules and packages and can be deployed to existing applications. The examples in this section offer basic access to Python. The Startup page at Python.org is a good resource for learning how to get started with Python<sup>5</sup>.

## Instructions for using Dynamo.

Why use a dynamo?

“Well,” what do you think? Dynamo seems to be a very good software tool based on the above ideas and it will be useful to use it. But what can it do for us? ”What are the advantages of the program? Here are five ways you can use Dynamo in your daily work life<sup>6</sup>.

1. Automation of repetitive tasks.

In Revit, a lot of our work is done in the same style or over and over again. Of course, the software makes it easier to perform specific tasks. If it is necessary to perform this task 10, 20, 100 times, it requires repeating the same command as many times. Creating an account is a great example. Creating a single new sheet is not very difficult. All you need to do is press the mouse buttons a few times and enter the text. But in most cases you need to create 50 or 100 new leaves. This is a boring situation<sup>7</sup>.

Fortunately, Dynamo makes things easier. You can create separate sheets from the views of the model directly from the work you are designing. Or create them from an Excel file. Your work, which takes hours, is completed in a matter of seconds<sup>8</sup>.

There are hundreds of tasks that can be automated with Dynamo. On the plus side, if you need to complete any task more than five times a day, and that task lasts more than a minute, it’s ready to be automated using Dynamo. Below are some of the apps offered:

- Rename the sequence of pages.
- Enter a group of families
- Make changes to multiple sheets
- Change the text box

There is no end to this list. On the plus side, once you’ve created these Dynamo devices, you will be able to use them directly in Revit using Dynamo Player (Revit 2017 and later). . You don't even have to open Dynamo to automate these tasks<sup>9</sup>.

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<sup>5</sup>Холиков, С. Р. (2021). Историческое развитие архитектурного комплекса Хазрати Имам (ХАСТИМОМ). *INTERNATIONAL JOURNAL OF DISCOURSE ON INNOVATION, INTEGRATION AND EDUCATION*, 2(1), 104-107.

<sup>6</sup>Ravshanovich, X. S. (2021). Types of domes of architectural monuments of Uzbekistan. *International Journal of Culture and Modernity*, 1, 5-8.

<sup>7</sup>Холиков, С. Р. (2021). Марказий Осиё архитектура ёдгорликлари гумбазларининг турлари. *INTERNATIONAL JOURNAL OF DISCOURSE ON INNOVATION, INTEGRATION AND EDUCATION*, 2(2), 40-43.

<sup>8</sup>Qudratovich, B. B. (2021). Personnel Issues in the Application of Nanotechnology in Construction and Architecture. *International Journal of Discoveries and Innovations in Applied Sciences*, 1(5), 248-250.

<sup>9</sup>Жонузаков, А. Э., & Холиков, С. Р. (2020). Архитектурный комплекс Хазрати Имам (Хастимом)-пример сохранения и использования культурного наследия в Узбекистане. *Academy*, (11 (62)).

## 2. Access to building information.

In general, BIM and Revit are databases. However, obtaining this information is not very easy. Of course, you can create graphics in Revit. You can even export these graphs to Excel. But sometimes you have to combine different categories of data, or you have to calculate exact values. Although Revit has been successful in improving these capabilities, it is still unable to perform many data-related tasks<sup>10</sup>.

However, Dynamo makes the process much easier. For example, with Dynamo, you can create a two-way relationship with your Revit model and Excel. You can first modify the data in Excel by creating a Dynamo chart to export some data to Excel<sup>11</sup>.

## 3. Explore several design options.

Dynamo is not only a task automation, but also a powerful design tool for exporting and importing data. With Dynamo, designers can turn the design developments they produce into a real process, as clearly defined. However, using Dynamo as a design tool is not limited to transforming buildings or complex geometries. It makes sense to automate the process of working with boring objects so that you can work with other elements of the building without working with repetitive parts of the building and spend time developing all parts of your project to make it more interesting<sup>12</sup>.

## 4. Performance test.

Do you know how the design you create works in real life? Dynamo helps to model the performance of buildings at all stages of the design process. Want to know how much light you can expect on a sunny cloudy day in March? You can create a tool to measure this<sup>13</sup>.

While simulation data cannot replace real data, it does allow the evaluation of projects based on objective criteria. Determining which classification works best will help you find the best solution. Computational design tools such as Dynamo allow this decision to be made not only after construction but also during the design process<sup>14</sup>.

Finally, Dynamo requires a systematic approach to your work. You have to think logically every step. Many architects rely on intuition in solving creative problems. Such thinking does not always correspond to the left brain, the computational process. But what happens when this intuition can be coded? You can review each step and understand what makes it work. Plus, you can reuse this design logic and improve over time.

## REFERENCES

1. Yerjanovich, Y. B., & Mamadiyoroglu, A. A. (2021). ABOUT THE URBAN PLANNING PRACTICE OF THE URDA FORTRESS OF ANCIENT JIZZAK. *International Journal of Discoveries and Innovations in Applied Sciences*, 1(5), 148-151.

<sup>10</sup> Dilshoda, S. About Modern Graphic Reconstruction Wall Painting Of The Throne-Room Of Afrasiab.

<sup>11</sup> Esirgapovich, J. A. (2021). CITY PARKS AND SOME ISSUES OF LANDSCAPE AND ENVIRONMENTAL ASPECT. *International Journal of Discoveries and Innovations in Applied Sciences*, 1(5), 145-147.

<sup>12</sup> Ravshanovich, X. S. (2021). Types of domes of architectural monuments of Uzbekistan. *International Journal of Culture and Modernity*, 1, 5-8.

<sup>13</sup> Ravshanovich, K. S., Xurramovich, K. A., & Inomovich, A. N. (2021). THE PROBLEM OF PROTECTION AND USE OF ARCHITECTURAL RESERVES OF HISTORICAL CITIES OF UZBEKISTAN. *International Journal of Discoveries and Innovations in Applied Sciences*, 1(5), 152-154.

<sup>14</sup> Xurramovich, K. A. (2021). The problem of protection and use of architectural reserves of historical cities of Uzbekistan. *ACADEMICIA: An International Multidisciplinary Research Journal*, 11(4), 1220-1223.

2. Yerjanovich, Y. B., & Mamadiyoroglu, A. A. (2021). Principles of Using Ornamental Plants in the Interior. *EUROPEAN JOURNAL OF INNOVATION IN NONFORMAL EDUCATION*, 1(2), 79-81.
3. Inomovich, A. N. (2021). CHARACTERISTICS OF HISTORICAL SAMARKAND CITY CENTERS. *International Journal of Discoveries and Innovations in Applied Sciences*, 1(5), 155-158.
4. Alisherbek, N. (2021). Development of Urban Development in the Territory of Uzbekistan. *CENTRAL ASIAN JOURNAL OF THEORETICAL & APPLIED SCIENCES*, 2(10), 24-26
5. Холиқов, С. Р. (2021). Марказий Осиё архитектура ёдгорликлари гумбазларининг турлари. *INTERNATIONAL JOURNAL OF DISCOURSE ON INNOVATION, INTEGRATION AND EDUCATION*, 2(2), 40-43.
6. Ravshanovich, X. S. (2021). Types of domes of architectural monuments of Uzbekistan. *International Journal of Culture and Modernity*, 1, 5-8.
7. Холиқов, С. Р. (2021). Историческое развитие архитектурного комплекса Хазрати Имам (ХАСТИМОМ). *INTERNATIONAL JOURNAL OF DISCOURSE ON INNOVATION, INTEGRATION AND EDUCATION*, 2(1), 104-107.
8. Ravshanovich, X. S. (2021). Types of domes of architectural monuments of Uzbekistan. *International Journal of Culture and Modernity*, 1, 5-8.
9. Ravshanovich, K. S., Xurramovich, K. A., & Inomovich, A. N. (2021). THE PROBLEM OF PROTECTION AND USE OF ARCHITECTURAL RESERVES OF HISTORICAL CITIES OF UZBEKISTAN. *International Journal of Discoveries and Innovations in Applied Sciences*, 1(5), 152-154.
10. Esirgapovich, J. A. (2021). CITY PARKS AND SOME ISSUES OF LANDSCAPE AND ENVIRONMENTAL ASPECT. *International Journal of Discoveries and Innovations in Applied Sciences*, 1(5), 145-147.
11. Жонузаков, А. Э., & Холиков, С. Р. (2020). Архитектурный комплекс Хазрати Имам (Хастимом)-пример сохранения и использования культурного наследия в Узбекистане. *Academy*, (11 (62)).
12. Xurramovich, K. A. (2021). The problem of protection and use of architectural reserves of historical cities of Uzbekistan. *ACADEMICIA: An International Multidisciplinary Research Journal*, 11(4), 1220-1223.
13. Dilshoda, S. About Modern Graphic Reconstruction Wall Painting Of The Throne-Room Of Afrasiab.
14. Qudratovich, B. B. (2021). Personnel Issues in the Application of Nanotechnology in Construction and Architecture. *International Journal of Discoveries and Innovations in Applied Sciences*, 1(5), 248-250.
15. What is Dinamo? Aproplan BLOG. AQSH. 2018
16. Revit dasturida konseptual modellash. Aleksey Merkulov. Piter. 2018
17. BIM nima? Ikramov Sh. R. Arxitektura muhitlari dizayning dolzarb muammolari va istiqbollari. Respublika ilmiy-texnik anjumanlar to'plami. TAQI. 2019y.

18. Autodesk® Revit2017. Технические рекомендации по высокопроизводительной работе с моделью.
19. Основы BIM: введение в информационное моделирование здания. Талапов В.В. - М.: ДМК Пресс. 2011. - 392 с.: ил.
20. Mastering Autodesk®Revit® Architecture 2016.James Vandezande, Eddy Krygiel.Copyright © 2015 by John Wiley & Sons, Inc., Indianapolis, Indiana