

# VirMuF Manual

V 0.5



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## Overview

The Virtual Museum Framework (VirMuf) project is a set of tools designed to work under the Unity game engine to help the cultural heritage community create virtual museums in a fast and easy way. With cultural heritage digitization technologies becoming more robust and affordable, many museums worldwide are actively digitizing their collections. VirMuF is aimed towards how these digitized collections can be presented in an easy, meaningful and useful way for both professional and casual users. VirMuF makes it easy to create entire virtual museums with so many useful tools without having to do any programming. VirMuf is open-source, and hence, users with programming knowledge can further extend it so as to fit their requirements.

## How it Works

VirMuf usage requires a minimal familiarity with the Unity editor environment. This includes how to import 3D models, create simple scenes, manipulate objects and adjust lighting. VirMuf is imported in the Unity project as an all-in-one package that contains code, shaders, materials and some 2D/3D assets.

Once the VirMuf package has been imported, the user should start designing the virtual museum scene. This includes importing the 3D models for the virtual museum architecture and the various artifacts that are going to be placed inside. The main script, “Artifact”, should be added to all the artifact 3D models, along with some simple data entry. The user can now run the project to walk around the virtual museum and click on the 3D artifact models to interact with them through a special menu. The Museum is now ready and the user can simply package the project to get the final application.

## Installation

- 1) Import VirMuF tools package
  - a. From Assets->Import Package->Custom Package->Virmuf.unitypackage
- 2) Create folders
  - a. Assets/Models
  - b. Assets/Resources/Sprites
- 3) Import sample environment 3D model (Optional, you can use your own 3D environment models and assets instead)
  - a. Inside Assets/Models folder right click->import new Asset-> environment.fbx
- 4) Import Artifact models
  - a. Inside Assets/Models folder right click->Import new Asset -> model.fbx
  - b. Select imported model and in Import Settings -> Model set Normals to Calculate instead of Import if we don't provide normal map and then Apply

- c. Repeat previous step till all artifacts are imported
- 5) Create new scene
- 6) Delete default camera (Main Camera)
- 7) Create new Layer named “Artifact”
- 8) Add environment as game object to the scene by drag and drop from Assets/Models to the scene
- 9) Select all children of the environment GameObject and add box collider component to them (don’t add collider to the main environment game object only the children)
- 10) Add FPSController from Assets/Standard Assets/Characters/FirstPersonCharacter/Prefabs to the scene by drag and drop
- 11) Position FPSController inside the desired starting position in the environment game object
- 12) Add “UI Menus” from Assets/Prefabs to the scene by drag and drop
- 13) Add the Artifact model from Assets/Models to the scene by drag and drop
- 14) Adjust the artifact game object to the desired location
- 15) Add Artifact Script to the artifact game object
  - a. If the model has children then we should add colliders to the children like we did with the environment instead on the main model
- 16) Fill all the artifact info
  - a. Note that images of the artifact needs to be added to Resources/Sprites folder and “File name” should be the name of the image or the path with image inside Resources/Sprites
  - b. Images import settings edit Texture type to be Sprite (2D and UI) instead of Default
- 17) Press the “play” button on top of the main viewport to test your scene.
- 18) When satisfied with your museum go to File menu and select package project.

## Usage

### Navigation

VirMuf uses a slightly modified version of the first person character controller that comes packaged with Unity standard packages. Simple use keyboard arrows to walk in the main four directions (Forward/Backward/Right/Left). Mouse movements will change the view direction. To interact with an artifact, point the cursor on top of it and left click. A small menu with “Inspect” and “Cancel” options. Click “Inspect” to start inspecting the object with a whole set of tools.



Fig. 1: VirMuF Navigation and object interaction

## Inspection

Once an artifact is under inspection, it's displayed as a main focus in an isolated scene where the rest of museum objects are hidden. In this isolated inspection scene movements are handled differently. Here, User moves camera around the object in order to get the best view and focus on the important parts. The main controls here are as following:

**rotate camera around object:** Left mouse click and drag

**Zoom in/out:** mouse scroll wheel

**Pan Camera:** Middle mouse click and drag

For the object under inspection, a set of tools (modules) can be used. These modules can be activated from the menu to the right by clicking the corresponding button. Multiple modules can be used simultaneously.

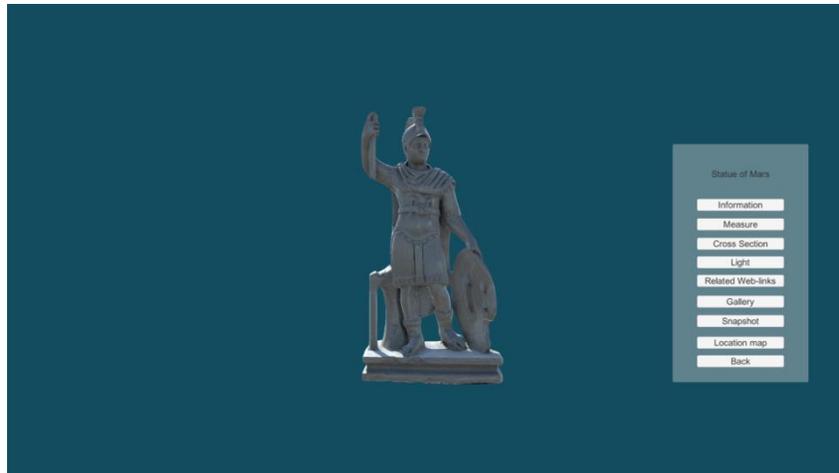


Fig. 2: Artifact inspection modules

## Information

This tool displays a window where basic information about the artifact is displayed. This info is entered in the Unity editor once the 'Artifact' script is applied to the 3D model. Future versions will support integration with existing databases.

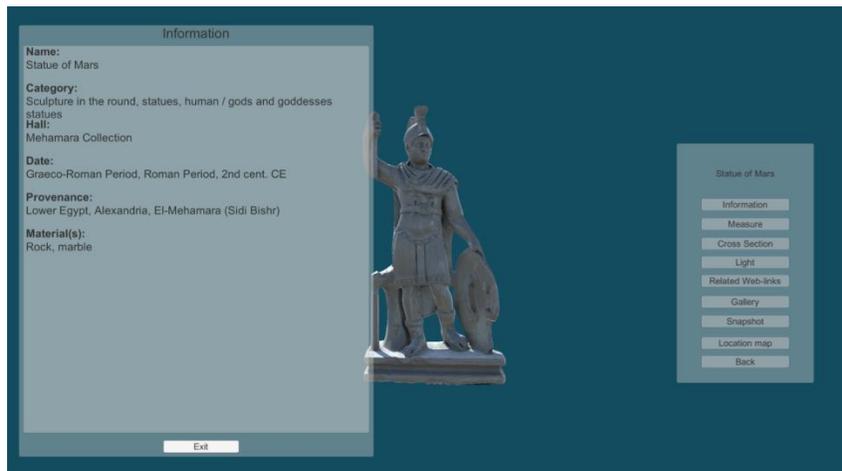


Fig. 3: information Module

## Measure

The "Measure" module allows user to make measurements on the artifact. By clicking anywhere on the artifact a new 3D point is added at the click position. The user can add any number of the 3D points and the tool will display the length between each two consecutive points as well as the overall length of all segments. The module provides the following options:

**Measurement Unit:** user can use meters, centimeters, millimeters, inches or feet

**Show Segment lengths:** Toggles the display of each line segment length in the viewport. If user is only concerned with the overall length, this option can be left unchecked.

**Show Bounding Box:** Toggles the display of a 3D bounding box that highlights the boundaries of the model in 3D space.

**Show Dimensions:** Toggles the display of overall width, length and height in the viewport.

**Total Length:** The total length of all segments

**Font Options:** Options for the font used for line segments displayed in the viewport. This includes font size, font color and the line segments thickness.

**Undo Last:** Removes the last point added. As a result, the last line segment added will be removed as well.

**Reset:** Removes all 3D points and line segments. Total length will be reset to zero.

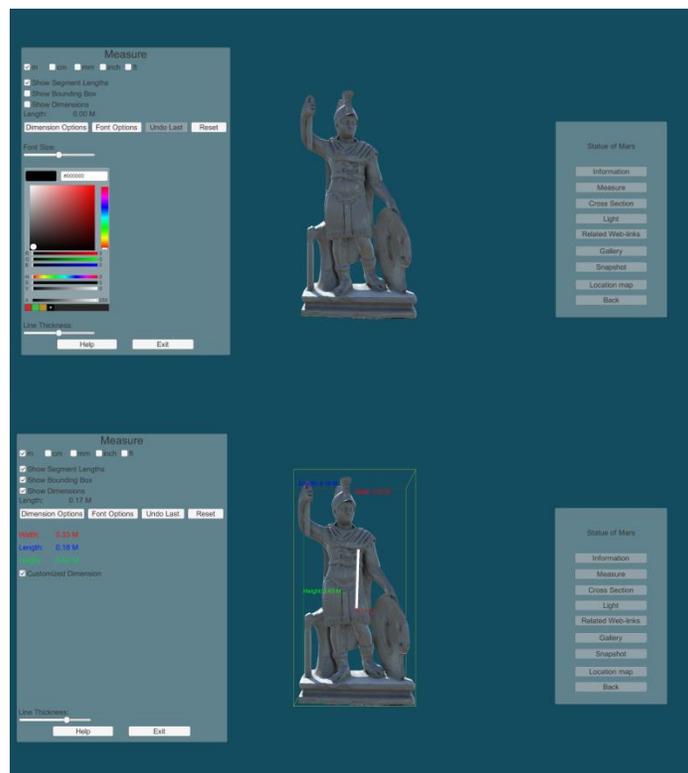


Fig. 4: Measurement Module

## Cross Section

This tool allows user to take cross sections through the artifact in any direction. The cross section can be taken in any of the three main directions (X,Y,Z) in both positive and negative directions. There is also the ability to use an arbitrary cross section plane in both directions.

There are the following options:

**Cross Section Axis:** User can make cross sections in X, Y or Z directions. In Case of free axis, user can set Pitch and Yaw for the arbitrary cross section plane.

**Offset:** This value sets how deep the cross section plane will be located within the artifact boundaries.

**Flip Direction:** Take the cross section in the negative direction of the selected axis



Fig. 5: Cross section Module

## Light

Light Module allows user to use a virtual torchlight. The light source has so many parameters that can be adjusted to help reveal the fine surface details. Light module has the following options:

**Right mouse Click and drag:** Rotate torchlight / light direction

**Light On:** Toggle light on/off. Light status remains the same even after the module has been closed

**Light Type:** User select between “Directional Light” and “Spot Light”. Directional light simulates parallel sun light rays and its intensity remains the same throughout all artifact parts. The only adjustable attribute of directional light is intensity. “Spotlight”, on the other hand, simulates an artificial light source that is emitted from a point and spread in cone shape. Light gets weaker at areas further away from emission source point. Light intensity, cone angle and effective light range are adjustable.

**Lock light’s direction to your position:** This option locks the light position to viewer camera position. It also locks the light direction so it always points towards the direction the camera is looking at.

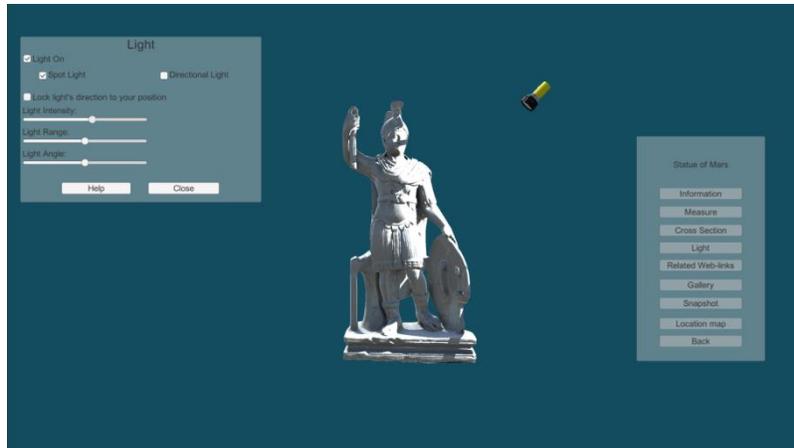


Fig. 6: Light Module

## Related Web Links

In case there is further online information resources related to this artifact, weblinks can be added to each artifact. Clicking on URL button will open the webpage in user's default browser (outside the virtual museum application).



Fig. 7: Web links Module

## Gallery

Through the unity editor data entry, each artifact can have a gallery of multiple images. When the "Gallery" module is activated, a window of all gallery images thumbnail is opened. When the user clicks on any thumbnail, it's opened in a separate window in full size. Future versions will also support video galleries as well.

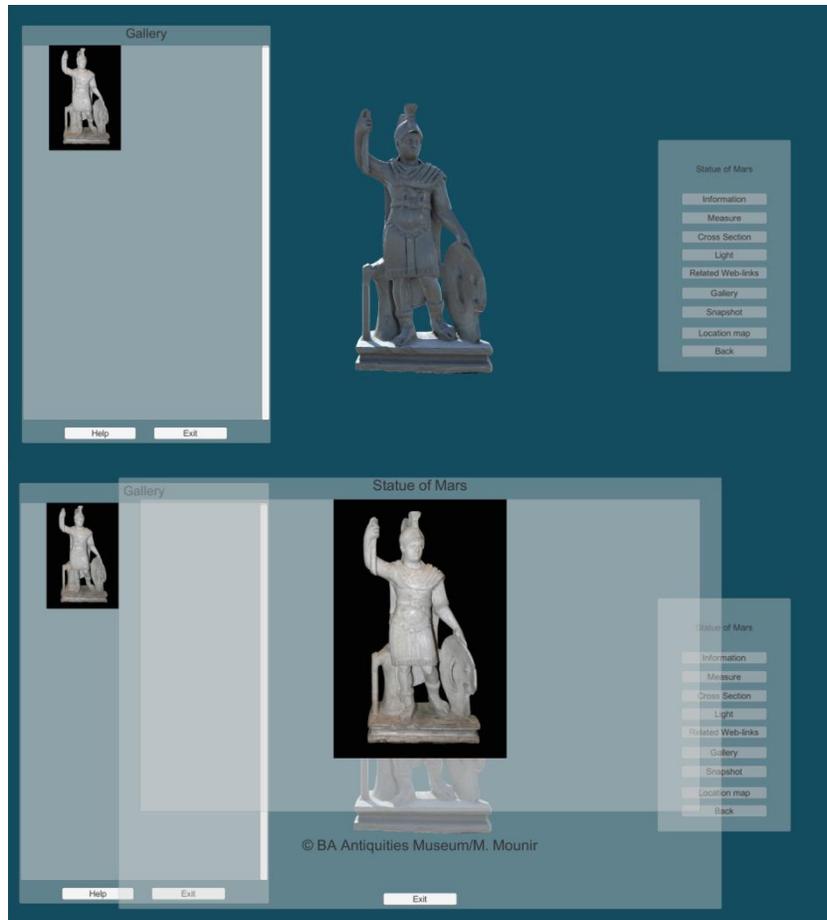


Fig. 8: Gallery Module

## Location Map

Through Uniy editor data-entry, each artifact has longitude and latitude fields that specify where the artifact was discovered. When virtual museum visitor activates the “Map Location” module, google map location of the discovery site. The module offers the following controls:

**Map Mode:** User can select from common google maps display modes which include Road map, Satellite, Terrain and Hybrid.

**Move Controls:** The four arrows moves the map in the 4 main directions, North, South, East and West.

**Zoom Controls:** The “+” and “-“ buttons are used to zoom in / zoom out respectively.

**Reset:** Returns map center point to discovery location.

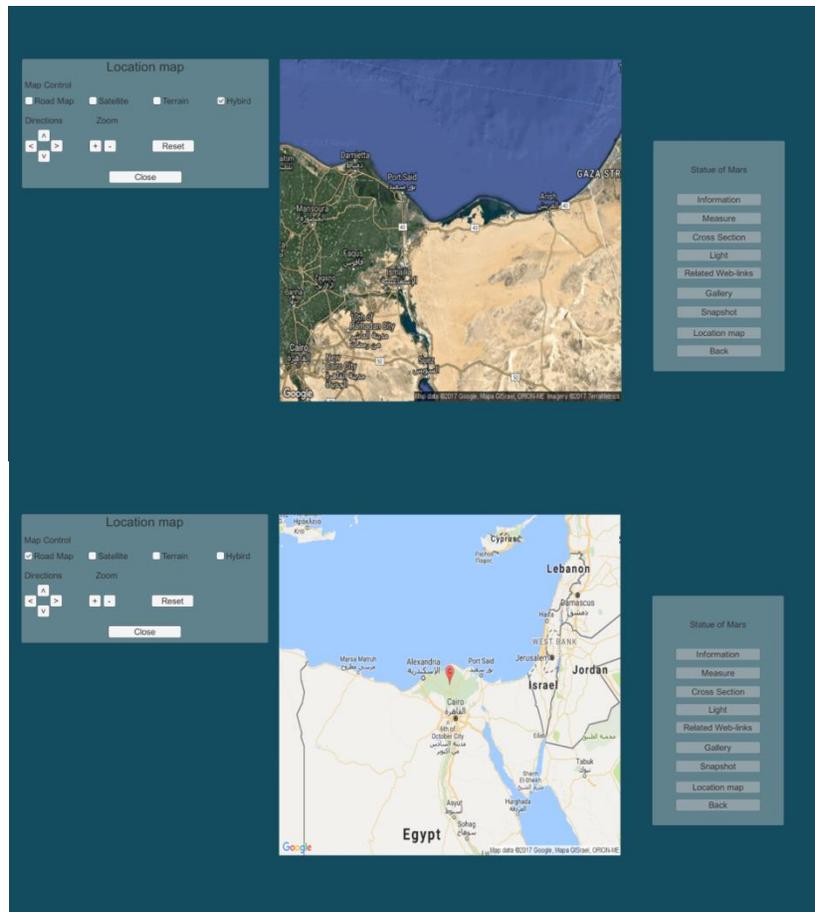


Fig. 9: Map Module

## Snapshot

Clicking this button saves a snapshot of the current view on the local hard drive.