

SYSTEM AND METHOD FOR VIRTUAL INTERACTIONS WITH HISTORICAL CONSTRUCTIONS AND/OR THEIR RELATED INFORMATION

5 FIELD OF INVENTION

The invention relates to the virtual education of historical constructions. More particularly, the invention relates to a system and method to provide virtual interactions with historical constructions and/or their related information, especially in the context
10 of the Islamic Civilization.

BACKGROUND OF THE INVENTION

In the current era, online databases have become conventional means for students and
15 researchers to obtain information for their research and education, especially in the fields of architecture, history, geography, sciences, or the like. Open-source projects such as Wikipedia remain a publically accessible database in which the users may contribute various facts or summaries so that readers, being students and researchers, using the platform may be informed when searching for information online. However,
20 the dynamic nature of such an online database may be prone to online vandalism or poor citation of the source material. They may also suffer from authorship bias.

Historical architecture refers to a cross-disciplinary field that involves the education, research, restoration and preservation of historical buildings that may have significant
25 historical or cultural importance to society, community, or civilization. Being a cross-disciplinary field, the learning process of historical architecture may be disrupted should it be implemented as a conventional online database. Moreover, for cross-disciplinary fields such as historical architecture, it is imperative that a student or researcher may find more value directly accessing source material as a reference. Not
30 only that, there may be a need to introduce an improvement in the experience of

accessing these source materials. In particular, in the context of the Islamic Civilization, the historical architecture of the Islamic Civilization may provide epistemological levels of discussion on its influence, or impact on modern society. As such, it is of significant importance that students and researchers are provided with improved educational means on the historical architecture of the Islamic Civilization.

Virtual reality refers to a simulated experience that immerses a user within an artificially generated, or virtual, environment. Unlike traditional human-computer interaction, virtual reality immerses the user inside an experience. Instead of viewing a screen or display, users are immersed within this virtual environment and can interact with it. For a user to be immersed in such an environment, they would use standard virtual reality systems to generate images, sounds and other sensations that simulate a user's physical presence in the virtual environment. Within the virtual environment, the user can look around the artificial world, move around in it, and interact with virtual features or models. The standard virtual reality systems that create these simulated effects may include virtual reality headsets consisting of a head-mounted display with a display in front of the user's eyes, or be specially designed rooms with multiple large screens.

Particularly, it is deduced that the implementation of a virtual reality system for the field of historical architecture may significantly improve the experience of accessing source material related to historical architecture. Moreover, a virtual reality system may also provide a more flexible means for the representation of information, in which it provides generation models of historical buildings within the virtual environment, especially their architectural principles. The virtual reality system may also allow the user to view models of historical buildings at different time periods or dynasties. More importantly, the virtual reality system may allow for virtual reconstructions of historical buildings that have been damaged or demolished in the modern day. The virtual reality system may also render the source materials in a virtually interactive form. With this, it provides shall direct access to the source material as well as an immersive experience

for the field of historical architecture preferably in the context of the Islamic Civilization.

There are a few disclosed technologies over the prior art that may relate to a system and method to provide virtual interactions with historical constructions and their related information. Among them CN111798714A, which discloses a historical building virtual reality teaching system. It comprises a server-side, a student-side and a teacher-side. The server-side comprises a virtual reality simulation unit and a human-machine interaction unit. The virtual reality simulation unit carries out the virtual renders that include assembling or disassembling a historical building through images and computer graphs. An assembled building and a separated unit of the assembled building are correspondingly marked with related information. The human-machine interaction unit comprises a control module for assembling or disassembling the building. This historical building virtual reality teaching system is touted to improve upon traditional teaching methods.

Another disclosed technology is CN112288884A, which discloses a method for realizing regional historical relics in virtual reality. It is characterized by being comprised of the steps of establishing video and audio data, building a model, applying the interactive design onto the model, post-processing the model, storing the model, and setting a user interface.

However, the disclosed technologies of CN111798714A and CN112288884A may not be comprehensive enough to provide an immersive experience for the field of historical architecture, especially in the context of the Islamic Civilization. Accordingly, it would be desirable to have a system and method to provide virtual interactions with historical constructions and/or their related information.

SUMMARY OF INVENTION

The main objective of the invention is to provide a system and method to provide virtual interactions with historical constructions and/or their related information, especially in the context of the Islamic Civilization. To achieve this objective, the invention provides a server that interfaces with a virtual immersion device worn by a user. The user interacts with the virtual environment for the generation of historical constructions and/or their related information therein.

As a result of this invention, the user may visualize the culture and heritage of historical constructions, especially in the context of the Islamic Civilization, in a virtual environment. They may be able to proceed with the preparation of an accurate representation of the architectural qualities of the historical constructions. They may also be able to be made aware of the relations that existed between the historical construction, its social function, and the society that used to live in that time period.

As a result of this invention as well, the user is provided with a platform that allows them to visualize historical constructions into their objective and subjective contexts, which shall empower the user to link history with everyday life at that time. As such, it makes it possible for the user to have an enhanced experience and understanding.

As a result of this invention as well, the user is also presented with virtual renders of preferably historically consistent reconstructions of historical constructions to allow for a better understanding of the historical architectural structures that existed in diverse locations, as well as being immersed within virtual environments that simulates specific ambiances, atmospheres, dramatic elements, or the likes.

As a result of this invention as well, the user will be informed of the untold story of Islam's cultural and intellectual history together with its shared characteristics especially in architecture and art. This is because the invention collects and shares

information and events in a global dimension while representing the scientific, humanistic and artistic culture in a digital manner. The invention also overcomes the segregated divisions between one or more civilizations by integrating them into a single easily accessible entity. This shall allow users to effectively integrate research questions
5 and heritage objectives to create more inclusive, sustainable and meaningful methods of preserving and reflecting on the past.

As a result of this invention as well, users can interactively experience, select cultural objects and observe their digital representations in a virtual environment in a semi-
10 tangible manner. Users may also become active participants rather than as a passive audience while learning the virtual interactions with historical constructions and their related information.

As a result of this invention as well, a tool for preserving the memory of history has
15 been created. Users may visualize missing and demolished parts of the historical constructions. This is because historical constructions are often susceptible to defects such as transformations due to time, anthropogenic factors or damages. In particular, in the context of Islamic cultural heritage, defects in historical constructions include de-historicalization, demolition due to war, deterioration due to inadequate
20 development control, and religious or political conflict.

As a result of this invention as well, the desire for heritage preservation among a populace may be increased. Applications of the invention may include the education sector by teaching students the historical contractions in virtual reality. Applications of
25 the invention may also include the tourism sector as a tourist may experience cultural tourism by immersing themselves in a virtual environment to interact with the historical contractions.

The invention intends to provide a system that provides virtual interactions of historical

constructions and/or their related information, comprising at least one data storage device for storing digital assets that are historical constructions and/or their related information, at least one server, having one or more processors, and at least implemented with a database management module for providing inter-relations to the
 5 assets stored in the data storage device, and a virtual immersion device to be worn by a user, running a client-side application software that makes requests to the server, and generates a virtual environment for the user to be artificially immersed therein. The user is virtually provided with interactive models in the virtual environment for them to select a desired historical construction and/or related information to be generated in the
 10 virtual environment.

Preferably, the assets stored in the data storage device includes primary assets, comprising one or more building assets, used for generating a virtual historical construction in the virtual environment, one or more building component assets, used
 15 for generating a virtual render of an architectural component of the virtual historical construction in the virtual environment, one or more building element assets, used for generating a virtual render of an architectural element of the virtual architectural component in the virtual environment, or a combination thereof.

20 Preferably, the building element assets are further divided into sub-classes that include arch assets, moulding assets, or a combination thereof.

Preferably, the assets stored in the data storage device further includes secondary assets, comprising one or more geohistorical assets, used for tagging time period data and
 25 location data, one or more artefact assets, used for generating virtual render of artefacts in the virtual environment, one or more sociocultural-context assets, for providing a sociocultural context, or a combination thereof.

Preferably, the assets stored in the data storage device further includes tertiary assets,

which further includes informative assets and characteristic assets.

Preferably, the tertiary assets that are informative assets include one or more layouts
plans of historical constructions and/or their related information, one or more elevation
5 plans of historical constructions and/or their related information, one or more cross-
section plans of historical constructions and/or their related information, one or more
isometric plans of historical constructions and/or their related information, one or more
text records of historical constructions and/or their related information, one or more
archived photos of historical constructions and/or their related information, one or more
10 invention information of historical constructions and/or their related information, one
or more scholar information of historical constructions and/or their related information,
or a combination thereof.

Preferably, the tertiary assets that are characteristic assets include one or more
15 environmental assets for rendering environments of the historical constructions and/or
their related information, one or more formal and spatial quality attribute assets that
indicate proportions of the historical constructions, one or more ideological
relationships assets of the historical constructions and/or their related information, one
or more technical attribute assets of the historical constructions and/or their related
20 information, one or more physical attribute assets of the historical constructions and/or
their related information, or a combination thereof.

Preferably, the interactive models include a primary interactive model that has one or
more surfaces, which include a first surface that allows selection of the geohistorical
25 assets by the user, by category, a second surface that allows selection of the building
assets by the user, by category, a third surface that allows selection of the building
component assets by the user, by category, a fourth surface that allows selection of the
building element assets by the user, by category, a fifth surface that allows selection of
the artefacts assets by the user, by category, a sixth surface that allows selection of the

social-cultural context assets by the user, by category, or a combination thereof.

Preferably, the interactive model includes a secondary interactive model that complements the primary interactive model by displaying the historical constructions
 5 and/or their related information, and also provides further selections to the user thereon.

Preferably, the database management module of the server provides inter-relations to the assets stored in the data storage device, these inter-relations being represented as tables with a one-to-one inter-relation, a many-to-one inter-relation, or a many-to-many
 10 relation, the tables include at least one table with inter-relational permutations between the primary assets, the secondary assets, or the tertiary assets, or at least one table with inter-relational permutations of the primary assets, the secondary assets, the tertiary assets themselves.

15 Preferably, the server further hosts a website through the use of a web application module to allow contributors to upload, modify and manage the assets of the data storage device, the web application module having one or more software modules that include an access sub-module, for assigning access levels to contributors accessing the website, a text input sub-module, for contributors to input text-based information
 20 related to the primary assets, the secondary assets, the tertiary assets, or a combination thereof, an asset upload sub-module, for providing an interface for contributors to upload assets related to the primary assets, the secondary assets or the tertiary assets, a hierarchy setting sub-module, for allowing the contributors to assign a class, a category, a hierarchy, a relationship, or a combination thereof to an uploaded asset, a search sub-
 25 module, for providing an interface for contributors to search for assets stored within the data storage device through the website, and a filter sub-module, for allowing contributors to filter a search result through the website.

Preferably, the server further comprises an application protocol interface module for

managing requests received from the virtual immersion device, which are selections made by the user through the interactive models, and delivering assets from the data storage device to be rendered in the virtual environment.

- 5 Preferably, the server further comprises a request interpreter module for interpreting requests received from the virtual immersion device, the request interpreter module comprising a retrieval request sub-module, for generating an interpreted request that directs the database management module on which asset or their metadata is to be retrieved from the data storage device as selected by the user through the interactive
10 models, an association request sub-module, for generating an interpreted request that directs the database management module on which metadata of an asset is to be retrieved from the data storage device that is related to an asset that was selected by the user through the secondary interactive model, a comparison request sub-module, for generating an interpreted request that directs the database management module to
15 retrieve metadata pertaining to similarities and differences between assets that were selected by the user through the secondary interactive model, or a combination thereof.

- Preferably, the server further comprises a transfer module for facilitating the receipt of assets uploaded by the contributors into the server, and for facilitating the transfer of
20 assets to the virtual immersion device after the server receives a request therefrom.

Preferably, the data storage device further stores contributor data related to the contributors.

- 25 The invention further intends to provide a method that provides virtual interactions of historical constructions and/or their related information, comprising the steps of storing assets that are historical constructions and/or their related information in at least one data storage unit, managing the assets by assigning inter-relations to the assets by at least one server, and requesting the assets by a user artificially immersed in a virtual

environment, the virtual environment generated through a client-side application software that makes requests to the server and runs on a virtual immersion device that is worn by the user. The user is virtually provided with interactive models in the virtual environment for them to select a desired historical construction and/or related
5 information to be generated in the virtual environment.

Preferably, the method further comprises a step for generating the assets or their metadata in the virtual environment to be viewed by the user, this step further comprising the steps of selecting, by the user, the desired historical constructions and/or
10 their related information through the interactive models, sending, by the virtual immersion device, a request for the assets or their metadata as selected by the user, to the server, parsing, by the server, the request from the virtual immersion device to retrieve the assets or their metadata as selected by the user, and delivering, by the server, the assets or their metadata to the virtual immersion device for the assets to be generated
15 and displayed in the virtual environment or through the interactive models.

Preferably, the method further comprises a step for generating a comparison between assets selected in the virtual environment through the secondary interactive model, this step further comprising the steps of selecting, by the user, one or more assets or their
20 metadata through the interactive models, sending, by the virtual immersion device, a request for a comparison between the assets as selected by the user through the interactive models, to the server, parsing, by the server, the request from the virtual immersion device to retrieve metadata pertaining to similarities and differences between the assets that were selected by the user through the interactive models, and
25 delivering, by the server, the metadata to the virtual immersion device for it to be rendered as a comparison result on the interactive models.

Preferably, the method further comprises a step for generating an association between assets selected in the virtual environment through the secondary interactive model and

further assets stored in the data storage device, this step further comprising the steps of selecting, by the user, at least one assets or their metadata through the interactive models, sending, by the virtual immersion device, a request for further assets that are associated with the assets or their metadata selected by the user through the interactive
5 models, to the server, parsing, by the server, the request from the virtual immersion device to retrieve metadata of the further assets stored in the data storage device that are associated with the assets or their metadata selected by the user through the interactive models, and delivering, by the server, the metadata to the virtual immersion device for it to be rendered as an association result on the interactive models.

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Preferably, the method further comprising a step for allowing contributors to upload, modify and manage the assets in the data storage device through a website, the step further comprising the steps of uploading, by the contributor, one or more assets into the data storage device through the website as an uploaded asset, inputting, by the
15 contributor, one or more text-based information related to the uploaded asset; and assigning, by the contributor, the inter-relations between the uploaded asset with existing assets in the data storage device.

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One skilled in the art will readily appreciate that the invention is well adapted to carry out the objects and obtain the ends and advantages mentioned, as well as those inherent therein. The embodiments described herein are not intended as limitations on the scope of the invention.

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BRIEF DESCRIPTION OF THE DRAWINGS

To facilitate an understanding of the invention, there is illustrated in the accompanying drawings the preferred embodiments from an inspection of which when considered in
5 connection with the following description, the invention, its construction and operation and many of its advantages would be readily understood and appreciated.

- 10 **FIG. 1** is a diagram illustrating the system of the present invention in its preferred embodiment.
- FIG. 2** is a block diagram illustrating the hardware components and software components of the server in the preferred embodiment.
- 15 **FIG. 3** is a block diagram illustrating the inter-relation between the assets stored in the database of the server in terms of their classes, hierarchies, and relationships.
- FIG. 4** is a block diagram illustrating the hardware components and software components of the virtual immersion device in the preferred
20 embodiment.
- FIG. 5a** is a diagram illustrating a view of an interface on a first surface of the primary interactive model.
- 25 **FIG. 5b** is a diagram illustrating a view of an interface on a second surface of the primary interactive model.
- FIG. 5c** is a diagram illustrating a view of an interface on a third surface of the
30 primary interactive model.

- FIG. 5d** is a diagram illustrating a view of an interface on a fourth surface of the primary interactive model.
- 5 **FIG. 5d(i)** is a diagram illustrating a view of a first sub-interface on the fourth surface of the primary interactive model.
- FIG. 5d(ii)** is a diagram illustrating a view of a second sub-interface on the fourth surface of the primary interactive model.
- 10 **FIG. 5e** is a diagram illustrating a view of an interface on a fifth surface of the primary interactive model.
- FIG. 5f** is a diagram illustrating a view of an interface on a sixth surface of the primary interactive model.
- 15 **FIG. 6** is a diagram illustrating a detailed view of the secondary interactive model within the virtual environment.
- FIG. 7a** is a diagram illustrating a first view of the user interface of the website that allows a contributor to contribute assets to the server.
- 20 **FIG. 7b** is a diagram illustrating a second view of the user interface of the website that allows a contributor to navigate through assets into the server.
- 25 **FIG. 8a** is a flowchart describing a process flow for a user to view a list of one or more digital assets of the database within the virtual environment.
- FIG. 8b** is a flowchart describing a process flow for a user to view associative assets of one or more assets as search results in the virtual environment,

using an association function.

FIG. 8c is a flowchart describing a process flow for a user to view the similarities and differences between one or more assets as search results in the virtual environment, using a comparison function.

FIG. 8d is a flowchart describing a process flow for a user to render digital assets of the database within the virtual environment.

FIG. 9 is a flowchart describing a process flow for a contributor to upload a digital asset from their contributor-end device to be stored in the database of the server.

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DETAILED DESCRIPTION OF THE INVENTION

The present invention relates the provision of virtual interactions between (i) a user, and (ii) historical constructions and/or their related information. The invention may also
5 be presented in a number of different embodiments with common elements.

According to the concept of the present invention, it comprises a server interfaced with a virtual immersion device worn by a user. The user, being immersed in a virtual environment through the virtual immersion device, may make requests to the server for
10 retrieving historical constructions and/or their related information therefrom, which are in the form of digital assets. The virtual immersion device may then render these digital assets in the virtual environment.

From hereon, it will be understood that, although the terms first, second, primary,
15 secondary, etc. may be used herein to describe various elements, components, images, layers or sections, these elements, components, regions, layers or sections should not be limited by these terms. These terms are only used to distinguish one element, component, region, layer or section from another region, layer or section. Thus, a first or primary element, component, region, layer or section discussed below could be
20 termed a second or secondary element, component, region, layer or section without departing from the teachings of the present invention.

The invention will now be described in greater detail, by way of example, with reference to the drawings.

25 **FIG. 1** illustrates the system of the present invention in its preferred embodiment. As shown, there is at least one server **1** that is interfaced with a virtual immersion device **2** that is worn by a user **A**, and one or more contributor end-devices **3** operated by one or more contributors **B**. As the user **A** wears the virtual immersion device **2**, they are to be
30 immersed in a virtual environment **4** whereby they are provided with a primary

interactive model **41** and a secondary interactive model **42**. These interactive models **41, 42** are interaction intermediaries that enable the user **A** to interface with the server **1** so that historical constructions and/or their related information, which are in the form of digital data, are retrieved and rendered within the virtual environment **4**.

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It is noted that historical constructions and/or their related information may also be referred to as “digital assets” since they may be regarded as assets of the system of the present invention. However, from hereon, the word “digital assets” may also be colloquially referred to as “assets” for simplicity. It shall also be noted that an asset may

10 further include metadata therein, which contains data describing the said asset.

FIG. 1 further illustrates a first interaction between the server **1** and the virtual immersion device **2**, and a second interaction between the server **1** and the contributor-end device **3**. Preferably, both the first interaction and second interaction are semi-

15 isolated from each other.

Regarding the first interaction between the server **1** and the virtual immersion device **2**, the user **A**, using a virtual interaction device **23** of the virtual immersion device **2**, interacts with the interactive models **41, 42** in the virtual environment **4** to request the

20 historical constructions and/or their related information. This request is sent by the virtual immersion device **2** through a network connection channel and reaches the server **1**. The server **1** interprets this request, and thus retrieves the assets or its metadata corresponding to the requested historical constructions and/or their related information therefrom. The server **1** then sends it back to the virtual immersion device **2**. The virtual

25 immersion device **2** may then render these assets or its metadata within the virtual environment **4**, or more specifically, the secondary interactive model **42**, for them to be viewed or interacted by the user **A**.

Regarding the second interaction between the server **1** and the contributor-end device

3, the contributor **B**, using a web browser on the contributor-end device **3**, interacts with a web application or website **111a** hosted by the server **1** through a network connection channel, for uploading assets related to historical constructions and/or their related information into the server **1**. During this interaction as well, the contributor **B**, through
5 the web application **111a**, may also: (i) assign one or more inter-relations to the uploaded digital asset, which include classes, categories, hierarchies, or relationships, for them to be properly stored within the server **1**, (ii) modify the inter-relations of existing assets within the server **1**, or (iii) remove existing assets from the server **1**. Moreover, depending on the access level of the contributor **B**, they may also possess
10 administrative privileges to approve or restrict assets to be delivered to the virtual immersion device **2** through the first interaction.

FIG. 2 illustrates a block diagram representation of the server **1** of the present invention in its preferred embodiment, which illustrates its hardware components and software
15 components therewithin. As shown, the server **1** comprises at least one processor **11** running a server-side application software **11a** that has one or more software modules, and at least one data storage device **12**. The server **1** serves to facilitate the input and output of assets or their metadata to and fro the virtual immersion device **2** or the contributor end-devices **3**, while the data storage device **12** has a role as a database and
20 serves to store the said assets.

Regarding the processor **11** of the server **1**, it preferably performs the scheduling and the execution of software instructions of the software modules of the server-side application software **11a** running thereon, while being interfaced with the data storage
25 device **12** as well. Preferably, it may be, but shall not be limited to, a conventional processor, application-specific integrated circuit (ASIC), a field-programmable gate array (FPGA), a graphics processing unit (GPU), or a combination thereof.

Regarding the data storage device **12** of the server **1**, it has a role as a database of the
30 server **1**. As such, it preferably has non-volatile memory for it to store data therewithin.

Preferably, the data storage device **12** shall store: (i) assets related to historical constructions and/or their related information, and (ii) program files related to the server-side application software **11a**. Preferably as well, the data storage device **12** may be, but shall not be limited to, a hard-disk drive, a solid-state drive, a hybrid drive, or
 5 the likes. In an alternative embodiment, the data storage device **12** may be a, or part of a, cloud database platform, in which it is separated from the server **1**. In embodiments where there are one or more data storage devices **12**, they are preferably set up to implement a Random Array of Independent Disks (RAID) configuration. From hereon, the data storage device **12** may be referred to as database **12**.

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Regarding the server-side application software **11a**, it preferably has one or more software modules for it to at least manage the assets stored on the database **12** and facilitate the input and output of assets to and fro the virtual immersion device **2** or the contributor-end device **3**. These software modules include a web application module
 15 **111**, a database management module **112**, an application protocol interface module **113**, a request interpreter module **114**, and a transfer module **115**. While not shown, server-side application software **11a** may further include one or more ancillary software modules that support the operations of the server **1**.

20 The web application module **111** of the server-side application software **11a** preferably provides the website **111a** for a contributor **B** to interact therewith through their contributor-end device **3**. In particular, the rendering of the website **111a** may be done on the server-side through the web application module **111** running on the processor **10**. Alternatively, the rendering of the web application **111a** may be done on the client-side
 25 on the contributor-end device **3**. Here, the application software **11a** sends the web application module **111**, or portions thereof, to the contributor-end device **3** to be run thereon through its browser and/or operating system.

Moreover, the web application module **111** of the server-side application software **11a**

- further includes one or more sub-modules to facilitate the interaction between the contributor **B** and the website **111a** for the contributor **B** to upload, modify, or remove assets stored in or to be stored in the database **12** of the server **1**. In particular, these sub-modules may include an access sub-module **1111**, a text-input sub-module **1112**, an
- 5 asset upload sub-module **1113**, an assignment sub-module **1114**, a search sub-module **1115**, and a filter sub-module **1116**. While not shown, the web application module **111** may further include one or more ancillary software modules that support the user interface and operation of the website **111a**.
- 10 Regarding the access sub-module **1111** of the web application module **111**, it preferably provides or assigns one or more access levels to a contributor **B** so that integrity of the assets within, or uploaded to, the server **1** is maintained. For an access level to be assigned to a contributor **B**, the user interface of the website **111a** may request authentication credentials of the contributor **B**, which will then be verified by the access
- 15 sub-module **1111**. Should a contributor **B** opt to be a guest contributor, they may be assigned with a low access level. Contributors with low access levels may have restrictions in uploading, modifying, or removing assets stored in the database **12** of the server **1**. In contrast, contributors with high access levels may have administrative privileges with little to no restrictions in uploading, modifying, removing, or reviewing
- 20 the assets stored in the database **12** of the server **1**.

- Regarding the text input sub-module **1112** of the web application module **111**, it preferably displays one or more text fields on the user interface of the website **111a** to allow the contributor **B** to input one or more text information thereto. With this, the
- 25 contributor **B** is able to input or type in text information, which may be relevant to the historical constructions and/or their related information, into the website **111a**. These text information may be manuscripts of primary sources, written stories, encyclopaedia entries, journal paragraphs, mathematical formulae, measurements, or the like. Preferably, these text information are to be encoded into computer-readable characters,

as defined by the Unicode Standard or the likes, so that they may be stored as assets in the database **12** of the server **1**.

Regarding the asset upload sub-module **1113** of the web application module **111**, it preferably displays one or more upload fields on the user interface of the website **111a** to allow the contributor **B** to upload one or more data files or folders that may be relevant to the historical constructions and/or their related information into the website **111a** to be stored in the database **12** as assets. In particular, the data files or folders may include building information modelling (BIM) data, geographic information system (GIS) data, or the like. The formats of these files or folders may be in the form of OBJ geometry format (.obj), Filmbox format (.fbx), Portable Network Graphics format (.png), Joint Photographic Experts Group format (.jpg), Portable Document Format (.pdf), or any other file formats that pertain to (i) the materialization of a historical construction model in a virtual environment, or (ii) the related information of a historical construction.

Regarding the assignment sub-module **1114** of the web application module **111**, it preferably presents one or more selections in the form of drop-down lists or call-to-action buttons on the user interface of the website **111a**. The contributor **B** may select a combination of these selections so that an inter-relation, which may include a class, a category, a hierarchy, or a relationship of an asset may be assigned, or modified. This may be done onto a digital that is still in the process of being uploaded into the server **1**, or onto an existing digital asset within the server **1**. Preferably, a proper class, category, hierarchy, or relationship is assigned to the asset so that the database management module **112** of the server **1** understands the proper storage location of the asset within the database **12** of the server **1**.

Regarding the search sub-module **1115** of the web application module **111**, it preferably presents a text field together with a call-to-action button on the user interface of the

website **111a** that allows the contributor **B** to initiate a search. The contributor **B** may type query text into the said text field, and upon pressing said call-to-action button, the search sub-module **1115**, with the assistance of the database management module **112**, may then attempt to find assets within the database **12**, which may have text information

5 that matches the query text. The search sub-module **1115**, with the assistance of the database management module **112**, may then retrieve the matched assets within the database **12** and display their metadata on the website **111a** as search results.

Regarding the filter sub-module **1116** of the web application module **111**, it preferably

10 works in conjunction with the search sub-module **1115** to filter or sort the search results. The filter sub-module **1116** may present one or more selections in the form of a drop-down list or call-to-action buttons on the user interface of the website **111a** for the contributor to **B** filter or narrow down search results.

15 The database management module **112** of the server-side application software **11a** preferably facilitates the input and output of assets between: (i) the database **12** of the server **1**, and (ii) the virtual immersion device **2** or the contributor-end device **3**. Preferably, the database management module **112** is a software that implements a relational database management system (RMDBS), using known domain-specific

20 languages such as Structured Query Language (SQL), onto the assets stored in the database **12**. This allows these assets to be represented as one or more entries of one or more tables. These tables would have one or more primary keys and foreign keys which may be indicative of an inter-relation of an asset, which shall allow the entries of these tables to have interconnected inter-relations between each other such as: (i) a one-to-

25 one inter-relation, (ii) a one-to-many inter-relation, and (iii) a many-to-many inter-relation. These inter-relations may also be expressed as classes, categories, hierarchies, or relationships. Preferably as well, the database management module **112** is able to support one or more users **A** as well as one or more contributors **B** that may be using the system simultaneously.

- The application protocol interface module **113** of the server-side application software **11a** preferably serves as a point of communication for the server **1** that allows it to communicate with the virtual immersion device **2**. Preferably, it shall receive requests from the virtual immersion device **2**, and pass these requests to subsequent software
- 5 modules for this request to be interpreted. Preferably as well, it shall also send or deliver the assets or its metadata back to the virtual immersion device **2** when required. Preferably as well, the application protocol interface module **113** may be based on the RESTful design architecture, the GraphQL design architecture, or the likes.
- 10 The request interpreter module **114** of the server-side application software **11a** deciphers and interprets a request received from application protocol interface module **113**, this request further originating from the virtual immersion device **2**. In particular, it generates an interpreted request that shall be directed towards the database management module **112** so that the database management module **112** correctly
- 15 understands which asset or its metadata is to be retrieved from the database **12**.

Moreover, the request interpreter module **114** of the server-side application software **11a** further includes one or more sub-modules to facilitate the interpretation of the received request. In particular, these sub-modules may include a retrieval request sub-

20 module **114a**, an association request sub-module **114b**, and a comparison request sub-module **114c**. While not shown, the request interpreter module **114** may further include one or more ancillary software modules that support its operation.

Regarding the retrieval request sub-module **114a** of request interpreter module **114**, it

25 allows the request interpreter module **114** to understand a retrieval request that is requesting for the retrieval of assets or their metadata from the server **1**. Then, the request interpreter module **114** may form an interpreted request therefrom, which has information on which asset or metadata is to be retrieved from the database **12**.

Regarding association request sub-module **114b** of request interpreter module **114**, it allows the request interpreter module **114** to understand a request that is requesting for the association of assets from the server **1**. Then, request interpreter module **114** may form an interpreted request therefrom, which has information on one or more assets,
 5 stored within the database **12**, the assets themselves preferably have associative relationships with other assets.

Regarding comparison request sub-module **114c** of request interpreter module **114**, it allows the request interpreter module **114** to understand a request that is requesting for
 10 a comparison of assets from the server **1**. Then, request interpreter module **114** may form an interpreted request therefrom, which has information on one or more assets, stored within the database **12**, the assets preferably having similar or different inter-relations from each other.

15 The transfer module **115** of the server-side application software **11a** preferably initiates and facilitates the transfer of assets or their metadata from the database **12** to the virtual immersion device **2**, through the database management module **112** and the application protocol interface module **113**. Preferably, the transfer module **115** operates based on known file transfer protocol standards or secure file transfer protocol standards for the
 20 deliverance of the assets as well as their metadata to the virtual immersion device **2** as per the interpreted request. With this, a copy of the asset or its metadata may be downloaded by the virtual immersion device **2**. Not only that, a copy of an asset on the contributor-end device **3** may be uploaded to be stored in the database **12** of the server.

25 Regarding the database **12**, it preferably stores the one or more assets. These may be classified into primary assets **121**, secondary assets **122**, and tertiary assets **123**. Each of these may further be divided into one or more sub-class.

In particular, the primary assets **121** may comprise sub-classes such as building assets
 30 **1211**, building component assets **1212**, and building element assets **1213**. The building

element assets **1213** may be further divided into sub-classes such as arch assets **1213a** and moulding assets **1213b**.

In particular, the secondary assets **122** may comprise sub-classes such as geohistorical assets **1221**, artefact assets **1222**, and sociocultural-context assets **1223**.

In particular, the tertiary assets **123** may, or may not, be supplementary assets of the primary assets **121** or the secondary assets **122**. In particular as well, the tertiary assets **123** comprises sub-classes such as informative assets **1231** and characteristic assets **1232**. The informative assets **1231** may be further divided into sub-classes such as layout plans **1231a**, elevation plans **1231b**, cross-section plans **1231c**, isometric plans **1231d**, text records **1231e**, archived photos **1231f**, invention information **1231g** and scholar information **1231h**. The characteristic assets **1232** may be further divided into sub-classes such as environmental render data **1232a**, formal & spatial quality attribute data **1232b**, ideological relationships data **1232c**, technical attribute data **1232d**, physical attribute Render data **1232d**.

Finally, whilst not shown, the database **12** may further store program files related to the application software **11a**, as well as account information of the contributors **B**.

FIG. 3 illustrates an example block diagram representation of the relationships between the assets stored within the database **12**, as assigned by the database management module **112** based on the intended inter-relations of the assets, which include classes, hierarchies, or relationships

As shown in **FIG. 3**, within the Primary Assets **121**, there may be one or more Building Assets **1211**. Among the Building Assets **1211**, there may be a Building #1, which may be a specific building composed from GIS data or BIM data. As an example, Building #1 may be Masjid al-Haram.

- The Building #1 may have a hierarchical parent-child relationship with one or more building component assets **1212**. The Building #1 is a parent to building component assets **1212** such as Building Component #1 and Building Component #2. In other words, Building Component #1 and Building Component #2 are children of Building
- 5 #1. Building Component #1 and Building Component #2 may refer to different building components of Building #1. As an example, with Building #1 being Masjid al-Haram, Building Component #1 may be a Dome within Masjid al-Haram and Building Component #2 may be a Door within Masjid al-Haram.
- 10 The Building Component #1 and Building Component #2 may further have a hierarchical parent-child relationship with one or more building element assets **1213**. In particular, the Building Component #1 may be a parent to building element assets **1213** such as Building Element #1, Building Element #2, and Building Element #4, while the Building Component #2 may be a parent to building element assets **1213** such
- 15 as Building Element #2 and Building Element #3. In other words, Building Element #1, Building Element #2, and Building Element #4 are children of Building Component #1, while Building Element #2 and Building Element #3 are children of Building #1. As an example, with Building Component #1 being a Dome within Masjid al-Haram (Building #1), Building Element #1 may be a Murqarnas of this Dome, Building
- 20 Element #2 may be an Arch of this Dome, and Building Element #4 may be a Calligraphy of this Dome. As an example as well, with Building Component #2 being a Door within Masjid al-Haram (Building #1), Building Element #2 may be an Arch of this Door, and Building Element #3 may be another Arch of this Door.
- 25 Further shown in **FIG. 3** as well is that the hierarchical parent-child relationships between the building assets **1211**, the building component assets **1212**, and the building element assets **1213** may or may be shared between each other. For example, within the building element assets **1213**, Building Element #2, may be shared between the Building Component #1 and the Building Component #2, thereby implying that both

Building Component #1 and Building Component #2 have the same type of building element within them.

- As shown in **FIG. 3**, the secondary assets **122**, having geohistorical assets **1221**, the artefact assets **1222**, and the sociocultural-context assets **1223**, may be inter-related with the primary assets **121**. As an example, with Building #1 within the primary assets **121** being Masjid al-Haram, it may have: (i) a relationship with one or more corresponding geohistorical assets **1222** that asserts Masjid al-Haram's geographical location and its historical timeline by tagging time period data and location data thereto, (ii) a relationship with one or more artefact assets **1223** that asserts the artefacts within Masjid al-Haram, which may be its Furniture, Carpets, etc., and (iii) a relationship with one or more sociocultural-context assets **1223** that asserts Masjid al-Haram's influence on society and culture in the fields of, inter alia, Engineering, History, or the likes.
- Further shown in **FIG. 3**, within the secondary assets **122**, the geohistorical assets **1221**, the artefact assets **1222**, and the sociocultural-context assets **1223**, may further be inter-related with each other. As a first example, a geohistory may relate to one or more Artefacts or Sociocultural-contexts, i.e. a geohistory of the caliphs dynasty within the country of Saudi Arabia may have one or more artefacts or sociocultural-contexts corresponding to it. As a second example, an artefact may relate to one or more geohistories or sociocultural-contexts, i.e. an astrolabe artefact may have one or more geohistories or sociocultural-contexts corresponding to it. As a third example, a sociocultural-context may relate to one or more geohistories or artefacts, i.e. an astronomy sociocultural-context may have one or more geohistories or artefacts corresponding to it.

As shown in **FIG. 3**, the tertiary assets **122**, having informative assets **1231** and characteristic assets **1232**, may be inter-related with the primary assets **121** and the secondary assets **123**.

In no particular order, among the informative assets **1231**, the layout plans **1231a**, the elevation plans **1231b**, the cross-section plans **1231c**, the isometric plans **1231d**, the archived photos **1231f** may correspond to an asset of the primary assets **121**. In no particular order as well, among the characteristic assets **1232**, the environmental renders **1232a**, the formal and spatial quality attributes **1232b**, the ideological relationships **1232c**, the technical attributes **1232d**, and the physical attributes **1232e**, may correspond to an asset of the primary assets **121**.

In no particular order, among the informative assets **1231**, the text records **1231e**, the archived photos **1231f**, the invention information **1231g**, and the scholar information **1231h** may correspond to an asset of the secondary assets **122**. In no particular order as well, among the characteristic assets **1232**, the ideological relationships **1232c**, the technical attributes **1232d**, and the physical attribute **1232e**, may correspond to an asset of the secondary assets **122**.

For the relational database management system (RMDBS) of the database management module **112** to inter-relate the classes, categories, hierarchies and relationships, it shall represent these inter-relations as tables that at least includes at least one table with inter-relational permutations between the primary assets **121**, the secondary assets **122**, or the tertiary assets **123**, or at least one table with inter-relational permutations of the primary assets **121**, the secondary assets **122**, the tertiary assets **123** themselves.

For example, there may be a first table for providing an inter-relation between the geohistorical assets **1221** and the building assets **1211**, a second table for providing an inter-relation between the geohistorical assets **1221** and the building component **1212** assets, a third table for providing an inter-relation between the geohistorical assets **1221** and the building element assets **1213**, a fourth table for providing an inter-relation between the geohistorical assets **1221** or the building assets **1211** and the artefact assets **1222**, a fifth table for providing an inter-relation between the geohistorical assets **1221**,

the building assets **1211**, the building component assets **1212**, the building element assets **1213**, and the sociocultural-context assets **1223**.

FIG. 4 illustrates a block diagram representation of the virtual immersion device **2** of the present invention in its preferred embodiment, which illustrates its hardware components and software components therewithin. As shown, the virtual immersion device **2** comprises a processor **21** running a client-side application software **21a** that has one or more software modules, a database **22**, a virtual interaction device **23**, a display screen **24**, a speaker **25**, and a communications unit **26**. The virtual immersion device **20**, when worn by the user **A**, for them to be immersed in the virtual environment **4** to virtually interact with the historical artefacts and/or their related information.

Preferably, the virtual immersion device **2** itself in the form of a smart glasses or a virtual reality headset. In this exemplary embodiment, when the user **A** wears the smart glasses or virtual reality headset, the user is immersed in the virtual environment **4** through the lenses of the smart glasses or virtual reality headset. Alternatively, it may be a large display such as a powerwall or an immersive surrounding such as the Cave Automatic Virtual Environment (CAVE).

Regarding the processor **21** of the virtual immersion device **2**, it preferably performs the scheduling and the execution of software instructions of the software modules of the server-side application software **21a** running thereon, while being interfaced with the data storage device **22** as well. Preferably, it may be, but shall not be limited to, a conventional processor, holographic processing unit (HPU), application-specific integrated circuit (ASIC), a field-programmable gate array (FPGA), a graphic processing unit (GPU), or a combination thereof.

Regarding the data storage device **22** of the virtual immersion device **20**, it may preferably be a kind of non-volatile memory unit that stores program files **221** associated with client-side application software **21a**, such as primary interactive model

assets **221a**, and primary interactive model assets **221b**. The kind of non-volatile memory unit in which the data storage device **22** may be a hard-disk drive, a solid-state drive, a hybrid drive, or the like.

- 5 Regarding the virtual interaction device **23**, it preferably is a kind of device interfaced with the virtual immersion device **2**, through wired or wireless means, for facilitating the user **A** in interacting with the virtual environment **4**. The virtual interaction device **23** may be in the form of a handheld device such as a console controller or a remote controller, or the like. It may also be in the form of a wearable such as a haptic glove, a
 10 haptic suit, or the like. In particular, the virtual interaction device **23** should at least allow the user **A** to make gestures or movements that can be translated into the virtual environment **4**.

- Regarding the display screen **24** of the virtual immersion device **20**, it may be in the
 15 form of a pair of eyepieces or lenses that covers the field of view of the user **A**, and further provides a stereoscopic vision for the user **A** so that the user may be able to perceive depth and distance within the virtual environment **4**.

- The speaker **25** serves to enable audio to be played and listened to by the user **A** to
 20 enhance the immersion of the user **A** within the virtual environment **4** generated by the client-side application software **21a**.

- The communications unit **26** serves to provide the virtual immersion device **20** a network communication channel for it to connect to routers for accessing a local area
 25 network (LAN) or a wide area network (WAN), or a network of networks such as the internet. This network communication channel may be wireless or wired. Should the network communication channel be wireless, the communications unit **26** may implement known wireless communication protocols such as Bluetooth, ZigBee, Wireless Fidelity (Wi-Fi), or Z-wave. Preferably, Wi-Fi is used, which is based on any

of the implementations under the IEEE 802 standard, or any related network standards relating to Physical and Data-Link layers. This shall allow the virtual immersion device **2** to send or receive data across the network communication channel for: (i) sending a request to the server **1**, and (ii) downloading assets or their metadata from the server **1**.

5 Preferably as well, encrypted communication between the server **1** and the communications unit **26** may be done using known internet communication protocols such as TCP/IP through secure communication channels such as secure socket layer (SSL) or transport layer security (TLS).

10 Regarding the client-side application software **21a**, it may be an executable (.exe) file format or the likes that is loaded into the virtual immersion device **2**. It is preferably being set up to run when the virtual immersion device **2** is powered on. Furthermore, the client-side application software **21a** preferably has one or more software modules for the handling of content stored on the database **22**, as well as facilitating the input
15 and output of information to and fro with the sever **1**. These software modules include an asset rendering module **211**, an asset interaction module **212**, an asset simulation module **213**, and a software driver module **214**. While not shown, server-side application software **21a** may further include one or more ancillary software modules that support its operations.

20

Regarding the asset rendering module **211** of the client-side application software **21a**, it serves to render the virtual environment **4** that may be specific to the application software **21a**, interactive models **41**, **42**, and the assets and/or its metadata downloaded from the server **10**. In particular, the asset rendering module **211** shall read the file
25 format of these files and materialize them in the virtual environment, preferably with proper coordinates when required.

Regarding the asset interaction module **212** of the client-side application software **21a**, it serves to regulate the interaction between the virtual interaction device **23** and the

virtual environment **40** by interpreting the gestures or movements made by the virtual interaction device **23** and then translating them into interactions with the interactive models **41, 42**, in the virtual environment **4**.

- 5 Regarding the asset simulation module **213** of the client-side application software **21a**, it serves to read simulation files that may have come bundled together with the assets so that simulations may be processed by it. Examples of simulations may include light effects, particle effects, or object physics, within the virtual environment **4**.
- 10 Regarding the software driver module **214**, it preferably comprises a set of one or more software modules, which may include a display driver **214a**, a virtual interaction device driver **214b**, a speaker driver **214c**, and a communications unit driver **214d**. These software drivers serve as a software interface between the hardware peripherals being the virtual interaction device **23**, the virtual interaction device **24**, the speaker **25**, and
15 the communications unit **26**.

- Finally, regarding the contributor-end device **3**, while its block diagram representation is not illustrated in any of the figures, it is preferably a conventional consumer-level computing device with hardware components and software components that allows the
- 20 contributor **B** to interact with the website **111a**. It may be a desktop, laptop, smartphone, personal digital assistant, or the like. Preferably as well, within the operating systems of the contributor-end device **3**, web browsers are installed therein for contributor **B** to interact with the website **111a** through the internet, or any form of network communication channel, upon keying in the web address of the website **111a** hosted by
25 server **1** into its web browser.

- Regarding the primary interactive model **41**, as shown in **FIG. 1**, it is a kind of cube-like virtual model with one or more faces, preferably six, thereon. Each face displays a class or subclass of assets, preferably from the primary assets **121** or secondary assets
- 30 **122**, divided into categories. These assets may be requested from the server **1** through

interacting with it. In particular, the first surface **411** displays geohistory assets **1221** sorted by category, the second surface **412** displays the building assets **1211** by building type category, the third surface **413** displays the building component assets **1212** sorted by category, the fourth surface **414** displays the building element assets **1213** sorted by category, the fifth surface **415** displays artefact assets **1222** sorted by category, and the sixth surface **416** displays sociocultural-context assets **1223** sorted by category.

The view of the first surface **411** of the primary interactive model **41** is shown in **FIG. 5a**. Preferably, it displays geohistory assets **1221** sorted as categorical selections pertaining to the Geohistory of Islamic civilization, which includes: (i) a list of countries in the form of call-to-action buttons, (ii) a list of cities in the form of a drop-down list, (iii) selections of periods or dynasties in the form of one or more call-to-action buttons, (iv) a globe indicating the country or cities that may have been selected, and (v) a map of a region indicating the country or cities using one or more pins.

Preferably, the list of countries displayed on the first surface **411** may include Spain, Morocco, Algeria, Tunisia, Egypt, Saudi Arabia, Yemen, Jordan, Palestine, Syria, Italy, Azerbaijan, Turkey, Greece, Bulgaria, Bosnia, Hungary, Iraq, Iran, Uzbekistan, Afghanistan, Pakistan, India, China, Malaysia, Indonesia, Brunei, or any other country with or had an Islamic civilization.

Preferably, the list of cities displayed on the first surface **411** may include Almeria, Alzaraa, Cordoba, Granada, Malaga, Seville, Toledo, Zaragoza, or any other city that preferably has a historical influence of Islam.

Preferably, the list of time periods or dynasties displayed on the first surface **411** is related to Islamic history, or based on the Islamic calendar. Preferably, it may include the dynasty of the Caliphs, the Umayyad dynasty, the Abbasid dynasty, the Idisid dynasty, the Aghilabid dynasty, the Tahirid dynasty, the Safavid dynasty, the Ghaznavid

- dynasty, the Seljuk dynasty, the Buwahid dynasty, the Mamluk dynasty, the Tulunid dynasty, the Fatimid dynasty, the Zirid dynasty, the Berber dynasty, the Ayyubid dynasty, the Almohada dynasty, the Ottoman dynasty, the dynasty of the Khans, the Timurid dynasty, the Illkshidid dynasty, the Almoravid dynasty, the Zengid dynasty, the
- 5 Mongolian dynasty, the Mughal dynasty, the Tugluk dynasty, the Kutaldin dynasty, the Ghorid dynasty, the Muderhar dynasty, the Nasrid dynasty, the Merinidis dynasty, the Saadian dynasty, the Alaouite dynasty, the Hafsid dynasty, and contemporary period dynasty.
- 10 The view of the second surface **412** of the primary interactive model **41** is shown in **FIG. 5b**. Preferably, it displays the building assets **1211** by building type categorical selections, the types being relevant to the architecture of the Islamic civilization, in the form of call-to-action buttons. They may include selections such as Aqueduct, Bazaar, Caravanserai, Citadel, Gate, Hammam, House, Khanqah, Madrasa, Maristan, Masjid,
- 15 Mausoleum, Palace, Qissariya, Rabaa, Ribat, Sabil, Sabil-kuttab, Tekiyyah, Tower, University, and Wikalah.

- The view of the third surface **413** of the primary interactive model **41** is shown in **FIG. 5c**. Preferably, it displays building component assets **1212** sorted as categorical
- 20 selections that may be of relevance to the Islamic civilization, in the form of call-to-action buttons. They may include selections such as Badjer, Comice, Dazrabzin, Dome, Door, Fountain, Galleries, Iwan, Kabuli, Kawsara, Lantern, Malqaf, Maqaad, Merlons, Mihrab, Minaret, Minbar, Musaqqaf, Niche, Rafrat, Salsabil, Shadharawn, Takhtabush, Vault, and Window.

25

The view of the fourth surface **414** of the primary interactive model **41** is shown in **FIG. 5d**. Preferably, it displays building element assets **1213** sorted as categorical selections that may be of relevance to the Islamic civilization, in the form of call-to-action buttons. They may include selections such as Arches, Calligraphy, Columns,

Mashrabiyya, Mouldings, Muqarnas.

In particular, when a user **A** selects Arches on the fourth surface **414**, the fourth surface **414** may change to a view that is similar to **FIG. 5d(i)**. Preferably, this view shall
 5 display arch assets **1213a** sorted as categorical selections, in the form of call-to-action buttons. They may include selections such as Complex, Pointed Horseshoe, Round Horseshoe, Lobed Cinquefoil, Lobed Sacracenic, Lobed Round Multifoil, Lobed Horseshoe Multifoil, Lobed Pointed Trefoil, Lobed Round Trefoil, Pointed Triangular, Lobed Pointed Multifoil, Lobed Pointed Cinquefoil, Ogee Bulbous, Multi-lobed,
 10 Pointed-two Centered, Moulded, Pointed kneel, Segmental, Radial, Linear interlaced, Round Interlaced, Pointed Interlaced, Muqarnas, Ornamental, and Semicircular.

In particular, when a user **A** selects Mouldings on the fourth surface **414**, the fourth surface **414** may change to a view that is similar to **FIG. 5d(ii)**. Preferably, this view
 15 shall display mounding assets **1213a** sorted as categorical selections, in the form of call-to-action buttons arranged within a tree diagram.

In the aforementioned tree diagram of **FIG. 5d(ii)**, there is a first main branch that includes Moulding Patterns, which leads to selections such as Geometric, Organic, and
 20 Geon-Org. In particular, the Geometric selection may further branch out into selections such as Triangle Shape, Square Shape, Pentagon shape, or combination thereof.

In the aforementioned tree diagram of **FIG. 5d(ii)**, there is a second main branch that includes Moulding Ornaments, which leads to selections such as Circle Shape,
 25 Hexagon Shape, Octagon Shape, Pentagon Shape, Rectangle Shape, and Square Shape. In particular, each of these selections may further branch out into selections such as Geometric, Organic, and Geon-Org.

In the aforementioned tree diagram of **FIG. 5d(ii)**, there is a third main branch that

includes Moulding Freize, which further leads to selections such as Geometric, Organic, and Geon-Org.

In the aforementioned tree diagram of **FIG. 5d(ii)**, there is a fourth main branch that
 5 includes Moulding Fillet, which further leads to selections such as Geometric, Organic, and Geon-Org.

The view of the fifth surface **415** of the primary interactive model **41** is shown in **FIG. 5e**. Preferably, it displays artefact assets **1222** sorted as categorical selections that may
 10 be of relevance to the Islamic civilization, in the form of call-to-action buttons. They may include selections such as Furniture, Pottery, Manuscript, Carpets, Accessories, Jewellery, Lighting Ornaments, Fashion, and Astrolabe.

The view of the sixth surface **416** of the primary interactive model **41** is shown in **FIG. 5f**. Preferably, it displays sociocultural-context assets **1223** sorted as categorical
 15 selections that may be of relevance to the Islamic civilization, in the form of call-to-action buttons. They may include Astronomy, Engineering, Geography, Geometry, History, Medicine, Music, Philosophy, and Science.

It is preferable that, within the virtual environment **4**, when the user **A** selects a geohistorical categorical selection on the first surface **411** of the primary interactive model **41** using the virtual interaction device **23**, a request is sent to the server **1**. The server **1** processes this request. Then, the server **1** preferably retrieves assets or asset
 20 asset metadata that is inter-related to the geohistorical categorical selection. The assets or asset metadata may then be sent back to the virtual immersion device **2** for it to be rendered within the virtual environment **4**, or more specifically, on the secondary interactive model **42** as a list of results.

It is preferable that, within the virtual environment **4**, when the user **A** selects a building
 30 type categorical selection on the second surface **412** of the primary interactive model

41 using the virtual interaction device **23**, a request is sent to the server **1**. The server **1** processes this request. Then, the server **1** preferably retrieves assets or asset metadata of the building assets **1221** that falls under the building type categorical selection. The assets or asset metadata may then be sent back to the virtual immersion device **2** for it
 5 to be rendered within the virtual environment **4**, or more specifically, on the secondary interactive model **42** as a list of results.

It is preferable that, within the virtual environment **4**, when the user **A** selects a categorical selection on the third surface **413** of the primary interactive model **41** using
 10 the virtual interaction device **23**, a request is sent to the server **1**. The server **1** processes this request. Then, the server **1** preferably retrieves assets or asset metadata of the building component assets **1222** that falls under the categorical selection. The assets or asset metadata may then be sent back to the virtual immersion device **2** for it to be rendered within the virtual environment **4**, or more specifically, on the secondary
 15 interactive model **42** as a list of results.

It is preferable that, within the virtual environment **4**, when the user **A** selects a categorical selection on the fourth surface **414** of the primary interactive model **41** using the virtual interaction device **23**, a request is sent to the server **1**. The server **1** processes
 20 this request. Then, the server **1** preferably retrieves assets or their metadata of the building element assets **1213** that falls under the categorical selection. The assets or asset metadata may then be sent back to the virtual immersion device **2** for it to be rendered within the virtual environment **4**, or more specifically, on the secondary interactive model **42** as a list of results.

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In particular, should the user **A** have navigated to the arch categorical selection as shown in **FIG. 5d(i)** and made a selection therefrom, the server **1** would then retrieve the assets or asset metadata of the arch assets **1223a** that falls under the categorical selection. In particular, should the user **A** have navigated to the mouldings categorical selection as

shown in **FIG. 5d(ii)** and made a section therefrom , the server **1** would then retrieve the assets or their metadata of the mouldings assets **1223a** that falls under the categorical selection. In both cases, the assets or their metadata is sent back to the virtual immersion device **2** for it to be rendered within the virtual environment **4**, or more specifically, on the secondary interactive model **42** as a list of results.

It is preferable that, within the virtual environment **4**, when the user **A** selects a categorical selection on the fifth surface **415** of the primary interactive model **41** using the virtual interaction device **23**, a request is sent to the server **1**. The server **1** processes this request. Then, the server **1** preferably retrieves assets or asset metadata of the artefact assets **1222** that falls under the categorical selection. The assets or asset metadata may then be sent back to the virtual immersion device **2** for it to be rendered within the virtual environment **4**, or more specifically, on the secondary interactive model **42** as a list of results.

It is preferable that, within the virtual environment **4**, when the user **A** selects a categorical selection on the sixth surface **416** of the primary interactive model **41** using the virtual interaction device **23**, a request is sent to the server **1**. The server **1** processes this request. Then, the server **1** preferably retrieves assets or asset metadata of the sociocultural-context assets **1223** that falls under the categorical selection. The assets or asset metadata may then be sent back to the virtual immersion device **2** for it to be rendered within the virtual environment **4**, or more specifically, on of the secondary interactive model **42** as a list of results.

Another view of the virtual environment **4** is as shown in **FIG. 6**, which prominently illustrates the secondary interactive model **42**. For completeness, the primary interactive model **41** is included as well. From hereon, the secondary interactive model **42** shall be described.

From **FIG. 6**, it is illustrated that the secondary interactive model **42** is preferably in

- the form of an interactive plane rendered within the virtual environment **4** having a virtual graphical user interface (GUI) with a view window. The display of view window may be changed by cycling through one or more tabs, and it may be “dragged out” from the secondary interactive model **42** into the virtual environment **4**. The secondary
- 5 interactive model **42** may render one or more text or images for the user **A** to view within the virtual environment **4**. In particular, it is noted that the secondary interactive model **42** primarily serves to complement the functionalities of the primary interactive model **41** by displaying results within its view window.
- 10 From **FIG. 6** as well, the secondary interactive model **42** has one or more selections, in the form drop-down lists, at its lower portions, which corresponds to the selections that may be made on the primary interactive model **41**. The user **A** may also opt to directly interact with the secondary interactive model **42** and select these selections instead of interacting with the primary interactive model **41**. Upon selecting any one of these
- 15 selection buttons using the virtual interaction device **23**, the view window may display a list of assets, preferably being of the primary assets **121** or secondary assets **122**, within the selected category, in a grid layout or a flexbox layout.

- In particular, these selectors include a country selector, a city selector, and a dynasty
- 20 selector, which corresponds to the selections on the first surface **411** of the primary interactive model **41**. These selectors further include a building type selector, which corresponds to the categorical selections on the second surface **412** of the primary interactive model **41**. These selectors further include a building component selector, which corresponds to the categorical selections on the third surface **413** of the primary
- 25 interactive model **41**. These selectors further include a building element selector, which corresponds to the categorical selections on the fourth surface **413** of the primary interactive model **41**. These selectors further include an artefact selector, which corresponds to the categorical selections on the fifth surface **415** of the primary interactive model **41**. These selectors further include sociocultural-context selectors,

which corresponds to the categorical selections on the sixth surface **416** of the primary interactive model **41**.

- From **FIG. 6** as well, the secondary interactive model **42** has one or more selections, in the form of call-to-action buttons, at its side portions, which corresponds to selection buttons requesting for tertiary assets **123** of the selected primary assets or secondary assets. Upon selection of an asset of the primary asset **121** or secondary asset **122** on the view window, the Information Box would show the informative assets **1231** that may pertain to it in which the user **A** may select therefrom, while the Characteristics Box would show the characteristics assets **1232** that may pertain to it in which a user may select therefrom. With this, a chosen informative assets **1231** or characteristics assets **1232** of the primary assets **121** or secondary assets **122** may show up in a current tab or another tab of the view window.
- From **FIG. 6** as well, the secondary interactive model **42** further includes one or more Boxes, in particular at its bottom-right portions, which allows comparisons or associations between one or more assets to be made. In particular, there is an Associate Box for an association function, which may list one or more assets therein selected from the view window, the assets being from the primary assets **121** or the secondary assets **122**. Preferably, it also has an association call-to-action button to send a request to the server **1** for associations of assets listed within the Associate Box to be done. In particular as well, there is a Compare Box for a comparison function, which may list one or more assets therein selected from the view window, the assets being from the primary assets **121** or the secondary assets **122**. Preferably as well, it also has a comparison call-to-action button to send a request to the server **1** for comparisons between assets listed within the Compare Box to be done.

From **FIG. 6** as well, at the further bottom-right portion of the secondary interactive model **42**, there are navigation buttons for the Associate Box and Compare Box, which

include an add button, a clear button, and a reset button. These buttons shall act upon the compare box and associate box when either one of them is highlighted by the user **A**. The add button may add an asset present in the view window to be listed in either one of the Boxes, the clear button may delete an asset listed in either one of the Boxes, and the reset button may reset either one of the Boxes to remove all listed assets. In particular, upon requesting a comparison or an association of the listed assets, the server **1** processes this request, and sends the results in the form of metadata back to the virtual immersion device **2** to be rendered and displayed in the view window.

- 10 **FIG. 7a** illustrates a view of the asset entry graphical user interface of the website **111a**, which is displayed to the contributor **B**. Preferably, this asset entry graphical user interface is an interface that allows the contributor **B** to upload, modify or remove assets of the server **1** from their contributor-end device **3**. It is noted that the asset entry graphical user interface substantially leverage the functionalities of the access sub-module **1111**, the text-input sub-module **1112**, the asset upload sub-module **1113** and
15 the assignment sub-module **1114** of the web application module **111**.

- Preferably as well, the asset entry graphical user interface, as seen in **FIG. 7a**, includes:
- 20 (i) a text field for entering the name of the asset, (ii) an upload field in the form of a drop zone for dragging and dropping a copy of files related to the asset from the contributor-end device **3** therein, (iii) an assignment menu for assigning inter-relations to the asset for it to be either one of a primary asset **121**, secondary asset **122**, a tertiary asset **123**, or sub-classes within them, (iv) a text field for inputting further essential information related to the asset, (v) a text field for inputting further additional
25 properties of the asset, (vi) a text field for keying-in review notes or feedback, (vii) a text field for keying-in characteristics of the digital asset, (viii) one or more call-to-action buttons for the contributor **B** to either save and upload the asset onto the server **1**, delete the asset from the server **1**, publish the digital asset to be accessible by the virtual immersion device **2**, or cancel the edits made on the asset entry graphical user
30 interface, and (ix) an indicator of historical revisions of the data entry. Whilst not shown

in **FIG. 7a**, there may be another assignment menu for assigning the asset relationships with other existing assets stored with the database **12** of the server **1**.

FIG. 7b illustrates a view of the asset exploration graphical user interface of the website **111a**, which is displayed to the contributor **B**. Preferably, this digital asset exploration user interface allows the contributor **B** to explore existing assets that are stored within the database **12** of the server **1** from their contributor-end device **3**. These assets may be displayed as filecards on the digital asset exploration user interface. It is noted that the asset exploration graphical user interface substantially leverages the functionalities of the search sub-module **1115** and the filter sub-module **1116** of the web application module **111**.

Preferably as well, the asset exploration graphical user interface, as seen in **FIG. 7b**, includes: (i) a side menu that lists the folder directories of the database **12**, (ii) a search bar to allow the contributor **B** to search for assets within the database **12**, (iii) a filtration setting for filtering the search results by data type, and (iv) a result window that displays the search results as filecards

Preferably, regarding the side menu of the asset exploration graphical user interface, there may be one or more categories, which include folders category, data hierarchy category and special category.

The folder category of the side menu may include categorical sub-selections such as icon sub-selections, layout plans sub-selections, master plans sub-selections, floor plans sub-selections, elevation plans sub-selections, archived photos sub-selections, and unknown sub-selections. Selections of any one of these sub-selections may narrow down the assets from the search results so that only assets which may be tagged with these sub-selections may remain.

The data hierarchy category may be used to navigate through or narrow down the search

results based on their hierarchy inter-relation.

The specials category may be used to navigate through or narrow down the assets of the search results based on their circumstances. The specials category may further
 5 include one or more sub-categories such as (i) a recently added sub-category, (ii) a recently changed sub-category, (iii) an unprocessable sub-category, and (iv) an orphaned sub-category. The recently added sub-category may narrow down the asset search results to only list assets that were recently added into the data storage device
 12. The recently changed sub-category may narrow down the asset search results to
 10 only list assets in the database **12** that were recently edited or modified. The unprocessable sub-category may narrow down the asset search results to only list assets that have errors that stem from corrupted data files, validation errors, or any form of unforeseen errors. The orphaned sub-category may narrow down the asset search results to only list assets that have no inter-relations with other assets within the database **12**.
 15 With the system of the present invention sufficiently elucidated, methods on how a user **A** interacts with the system of the present invention shall now be described.

FIG. 8a illustrates a flowchart that describes a process flow for a user **A** to view a list
 20 of one or more assets of the database **12** as search results within the virtual environment **4**.

First, in step **SA1**, the user **A** wears, or is currently wearing, the virtual immersion device **2** that runs, or is running, the client-side application software **21a** thereon.

25 Then, in step **SA2**, the client-side application software **21a** preferably materializes the virtual environment **4** in which the user **A** is immersed therein. Preferably as well, the virtual environment **4** would present the interactive models **41**, **42** to the user **A**.

30 Then, in step **SA3**, the user **A**, using the virtual interaction device **23**, interacts with the

interactive models **41, 42** within the virtual environment **4**, and selects at least one categorical selection therefrom. In particular, interactive selections made on the primary interactive model **41** which may be from any one of the first surface **411**, the second surface **412**, the third surface **413**, the fourth surface **414**, the fifth surface **415**, or sixth surface **416**. In particular, interactive selections made on the secondary interactive model **42** may be from any one of the country selector, the city selector, the dynasty selector, the building type selector, the building component selector, the building element selector, the artefact selector, or the sociocultural-context selector.

10 Then, in step **SA4**, the asset interaction module **212** of the client-side application software **21a** interprets the selection made on the interactive models **41, 42** and generates a request therefrom.

15 Then, in step **SA5**, this generated request is sent to the server **1** through a communication channel established by the communications unit **26** of the virtual immersion device **2**.

Then, in step **SA6**, the application protocol interface module **113** of the server **1** receives and accepts the request, and passes it to the request interpreter module **114**.

20

Then, in step **SA7**, the retrieval request sub-module **114a** of the asset interpreter module **114** interprets this request as a request for the retrieval of assets within the categorical selection as selected by the user **A**. This interpreted request is then passed to the database management module **112**.

25

Then, in step **SA8**, the database management module **112** parses the interpreted request and retrieves the resource directory of assets stored in the database **12** based on their class as specified by the interpreted request.

Then, in step **SA9**, the database management module **112** provides the metadata of the assets retrieved in the prior step **SA8** to the transfer module **115**.

Then, in step **SA10**, the transfer module **115** transfers the metadata of these assets,
 5 through the application protocol interface module **113** of the server **1**, for them to reach the communications unit **26** of the virtual immersion device **2**. Preferably, upon receipt, these metadata may be temporarily stored within the virtual immersion device **2**.

Finally, in step **SA11**, the asset rendering module **211** of the client-side application
 10 software **21a** renders the metadata as results displayed on a tab of the view window of the secondary interactive model **42**. More specifically, the results displayed is a list of assets within the server **1** that is of the categorical selection that was selected by the user **A** through the interactive models **41, 42**.

15 It is noted that the steps illustrated in **FIG. 8a** may be repeatable for filtering the list of assets displayed as results on the tab of the view window of the secondary interactive model **42**. For example, in a first iteration of **FIG. 8a**, the user **A** may select a categorical selection from the second surface of the interactive model **42**, which may be the Mausoleum categorical selection. This results in building assets **121** that are of
 20 the Mausoleum category to be displayed as a list on the view window of the secondary interactive model **42**. Then, in a second iteration of **FIG. 8a**, the user **A** may select a categorical selection from the first surface of the interactive model **42**, which may be the contemporary period dynasty categorical selection. With this, the list of building assets **121** that are of the Mausoleum category displayed on the view window of the
 25 secondary interactive model **42** may be filtered so that only building assets **121** that are of the Mausoleum category and of the contemporary period dynasty category is shown. The user **A** may perform this at any number of iterations through further interactions with any one of the interactive models **41, 42**.

30 Shown in **FIG. 8b** is a flowchart describing a process flow for a user **A** to view

associative assets of one or more assets as search results in the virtual environment **4**, using the association function. In particular, it should be noted that the flowchart of **FIG. 8b** may follow sequentially from the flowchart of **FIG. 8a**.

- 5 First, in step **SB1**, the user **A** wears, or is currently wearing, the virtual immersion device **2** that runs, or is running, the client-side application software **21a** thereon.

Then, in step **SB2**, the client-side application software **21a** preferably materializes the virtual environment **4** in which the user **A** is immersed therein. Preferably as well, the
10 virtual environment **4** would present the interactive models **41, 42** to the user **A**.

Then, in step **SB3**, the user **A**, using the virtual interaction device **23**, interacts with the interactive model **42** for highlighting its Associate Box.

- 15 Then, in step **SB4**, the user **A**, using the virtual interaction device **23**, interacts with the interactive model **42** for selecting one or more assets listed on its view window.

Then, in step **SB5**, the user **A**, using the virtual interaction device **23**, interacts with the interactive model **42** for adding the selected assets into the Associate Box and selects
20 the associate call-to-action button.

Then, in step **SB6**, the asset interaction module **212** of the client-side application software **21a** interprets the selection made on the secondary interactive model **42** and generates a request therefrom.

25

Then, in step **SB7**, this generated request is sent to the server **1** through a communication channel established by the communications unit **26** of the virtual immersion device **2**.

Then, in step **SB8**, the application protocol interface module **113** of the server **1** receives and accepts the request, and passes it to the request interpreter module **114**.

Then, in step **SB9**, the asset interpreter module **114** interprets this request as a request
5 to determine the association of the selected asset with other assets. This interpreted request is then passed to the database management module **112**.

Then, in step **SB10**, the database management module **112** parses the interpreted request and retrieves the resource directory of the asset stored in the database **12** as specified
10 by the interpreted request, parses its metadata to derive the metadata of other assets associated with it through its inter-relations with them.

Then, in step **SB11**, the database management module **112** provides the metadata of these other assets retrieved in the prior step **SB10** to the transfer module **115**.
15

Then, in step **SB12**, the transfer module **115** transfers the metadata of these assets, through the application protocol interface module **113** of the server **1**, for them to reach the communications unit **26** of the virtual immersion device **2**. Preferably, upon receipt, these metadata may be temporarily stored within the virtual immersion device **2**.
20

Finally, in step **SB13**, the asset rendering module **211** of the client-side application software **21a** renders the metadata as results displayed on a tab of the view window of the secondary interactive model **42**. More specifically, the results displayed is a list of other assets associated with the asset that was selected by the user **A** through the
25 interactive models **42** in the prior step **SB4**. Preferably, this list may further display these other assets sorted by their category, hierarchy, or relationship with the asset that was selected by the user **A**.

Shown in **FIG. 8c** is a flowchart describing a process flow for a user **A** to view the
30 similarities and differences between one or more assets as search results in the virtual

environment **4** using the comparison function. In particular, it should be noted that the flowchart of **FIG. 8c** may follow sequentially from the flowchart of **FIG. 8a**.

First, in step **SC1**, the user **A** wears, or is currently wearing, the virtual immersion
5 device **2** that runs, or is running, the client-side application software **21a** thereon.

Then, in step **SC2**, the client-side application software **21a** preferably materializes the virtual environment **4** in which the user **A** is immersed therein. Preferably as well, the virtual environment **4** would present the interactive model **42** to the user **A**.
10

Then, in step **SC3**, the user **A**, using the virtual interaction device **23**, interacts with the interactive model **42** for highlighting its Compare Box.

Then, in step **SC4**, the user **A**, using the virtual interaction device **23**, interacts with the
15 interactive model **42** for selecting one or more assets listed on its view window.

Then, in step **SC5**, the user **A**, using the virtual interaction device **23**, interacts with the interactive model **42** for adding the selected assets into the Compare Box and selects the comparison call-to-action button.
20

Then, in step **SC6**, the asset interaction module **212** of the client-side application software **21a** interprets the selection made on the secondary interactive model **42** and generates a request therefrom.

25 Then, in step **SC7**, this generated request is sent to the server **1** through a communication channel established by the communications unit **26** of the virtual immersion device **2**.

Then, in step **SC8**, the application protocol interface module **113** of the server **1** receives

and accepts the request, and passes it to the request interpreter module **114**.

Then, in step **SC9**, the asset interpreter module **114** interprets this request as a request to determine the comparison between the selected assets. This interpreted request is
 5 then passed to the database management module **112**.

Then, in step **SC10**, the database management module **112** parses the interpreted request and retrieves the resource directory of the asset stored in the database **12** as specified by the interpreted request, and sorts their metadata in terms of similarities and
 10 differences.

Then, in step **SC11**, the database management module **112** provides the metadata of the assets retrieved in the prior step **C10** to the transfer module **115**.

15 Then, in step **SC12**, the transfer module **115** transfers the metadata of these assets, through the application protocol interface module **113** of the server **1**, for them to reach the communications unit **26** of the virtual immersion device **2**. Preferably, upon receipt, these metadata may be temporarily stored within the virtual immersion device **2**.

20 Finally, in step **SC13**, the asset rendering module **211** of the client-side application software **21a** renders the metadata as results displayed on a tab of the view window of the secondary interactive model **42**. More specifically, the results displayed is a list of similarities and differences between the assets that were selected by the user **A** through the interactive model **42** in the prior step **SC4**.

25

FIG. 8d illustrates a flowchart that describes a process flow for a user **A** to view one or more assets of the database **12** rendered within the virtual environment **4**. In particular, it should be noted that the flowchart of **FIG. 8d** may follow sequentially from any one of the flowcharts of **FIG. 8a**, **FIG. 8b**, **FIG. 8c**, or a combination thereof.

First, in step **SD1**, the user **A** wears, or is currently wearing, the virtual immersion device **2** that runs, or is running, the client-side application software **21a** thereon.

- 5 Then, in step **SD2**, the client-side application software **21a** preferably materializes the virtual environment **4** in which the user **A** is immersed therein. Preferably as well, the virtual environment **4** would present the interactive model **42** to the user **A**.

- Then, in the step **SD3**, the user **A**, using the virtual interaction device **23**, interacts with
10 the interactive model **42** within the virtual environment **4** for selecting one or more assets listed on its View Window.

- Then, in step **SD4**, the asset interaction module **212** of the client-side application software **21a** interprets the selection made on the secondary interactive model **42** and
15 generates a request therefrom.

- Then, in step **SD5**, this generated request is sent to the server **1** through a communication channel established by the communications unit **26** of the virtual immersion device **2**.

20

- Then, in step **SD6**, the application protocol interface module **113** of the server **1** receives and accepts the request, and passes it to the request interpreter module **114**.

- Then, in step **SD7**, the asset interpreter module **114** interprets this request as a request
25 for the retrieval of an asset selected by the user **A**. This interpreted request is then passed to the database management module **112**.

- Then, in step **SD8**, the database management module **112** parses the interpreted request and retrieves the resource directory of the asset stored in the database **12** as specified

by the interpreted request.

Then, in step **SD9**, the database management module **112** provides the resource directory of the asset retrieved in the prior step **SD8** to the transfer module **115**.

5

Then, in step **SD10**, the data transfer module **115** facilitates the progressive transfer of a copy of the said asset, through the application protocol interface module **113** of the server **1**, for it to be received by the communications unit **26** of the virtual immersion device **2**. Preferably, upon receipt, this asset may be temporarily stored within the

10 virtual immersion device **2**.

Then, the following step, step **SD11**, may be a decision step. Here, it shall be determined by either one or both server **1** and virtual immersion device **2** whether or not the copy of said asset has been completely downloaded into the virtual immersion device **2**.

15 Should this not be the case, step **SD11** returns to **SD10**, in which the data transfer module **115** shall attempt to continue or restart the progressive transfer of the copy of said asset to the virtual immersion device **2**. Should this be the case, step **SD11** proceeds to step **SD12**.

20 Finally, in step **SD12**, the asset rendering module **211** of the client-side application software **21b** may render the asset in the virtual environment **4**, preferably at specific virtual coordinates, based on the information within its data files, or it may append the asset to the secondary interactive model **42**. Should the asset include one or more simulation files, the asset simulation module **213** may proceed to run and apply these

25 simulations after the asset is rendered in the virtual environment **4**.

Shown in **FIG. 9** is a flowchart describing a process flow for a contributor **B** to upload a digital asset from their contributor-end device **3** to be stored in the database **12** of the server **1**.

30

First, in step **SE1**, the contributor **B** connects to the website **111a** hosted by the server **1** through their contributor-end device **3** by keying in the web address of the website **111a** into a browser.

- 5 Then, in step **SE2**, the website **111a** may prompt the contributor **B** to be logged into the website **111a** by keying in their authentication credentials such as their username and password.

Then, in step **SE3**, the access sub-module **1111** may verify these authentication
10 credentials. Upon successful log-in, the contributor **B** may now be allowed to upload assets into the database **12** of the server **1**.

Alternatively, the contributor **B** may opt to be not logged into the website **111a** and proceed as a guest.

15

Then, in step **SE4**, the contributor **B** may navigate the website **111a** to reach the asset entry graphical user interface of **FIG. 7a**. This may be done by either searching for an asset that exists in the database **12** for editing through the asset exploration graphical user interface of **FIG. 7b**, or through prompting the website **111a** for an addition of a
20 new digital asset.

Then, in step **SE5**, at this digital asset entry user interface, the contributor **B** may then drag and drop, or attach, program files of an asset from their contributor-end device **3** into the upload field of the digital asset entry user interface.

25

Then, in step **SE6**, the contributor **B** may key in all relevant information of the asset into the text fields of the digital asset entry user interface.

Then, in step **SE7**, the contributor **B** may assign a class, category, relationship,

hierarchy, or a combination thereof, to the asset in the digital asset entry user interface.

Then, in step **SE8**, the contributor **B** may select the upload option on the digital asset entry user interface for uploading the asset onto the server **1**.

5

Then, in step **SE9**, the transfer module **115** facilitates this upload of a copy of this asset from the contributor-end device **3** into the server **1** through the website **111a**. Preferably, upon receipt, this asset may be temporarily stored within server **1**.

- 10 Then, in step **SE10**, the database management module **12** parses the class, category, relationship, hierarchy, or a combination thereof assigned by the contributor **B** onto the asset.

- 15 Finally, in step **SE11**, the database management module **112** allocates the digital asset into a proper location within the database **12**. While doing so, a resource locator may be generated, which points to the digital asset so that it may be retrieved when required.

With this, methods on how a user **A** or a contributor **B** interacts with the system has now been sufficiently elucidated.

20

- Moreover, an example of how a user **A** may interact with the system for overlaying a missing architecture onto a building asset as per **FIGS 8a to 8d** may be described. This shall allow the user **A** to visualize missing and demolished parts of the historical constructions due to time, anthropogenic factors or damages. In this example, the user
25 **A** uses the system for rendering a fountain of the Qalawun Complex that has been lost in the contemporary period.

- In the first step, within the virtual environment **4** the user **A** may interact with the interactive models **41**, **42** to request a list of building assets within the server **1** as per
30 the steps illustrated in **FIG 8a**. Preferably, the user **A** selects a building type categorical

selection on the primary interactive model **41**, and then on a first tab of the view window of the secondary interactive model **42**, a list of building assets pertaining to the categorical selection is displayed.

- 5 In the second step, the user **A** may further interact with the interactive models **41**, **42** to filter out the list of building assets displayed on the view window of the secondary interactive model **42**. Preferably, the user **A** selects a geohistory categorical selection on the primary interactive model **41**, and then on the first tab of the view window of the secondary interactive model **42**, a list of building assets is filtered so that only building
10 assets that are under the geohistory categorical selection remains.

- In the third step, the user **A** may further interact with the interactive model **42** to choose a building asset of the Qalawun Complex that is displayed on the first tab of the view window. For a building asset of the Qalawun Complex to at least be made available in
15 the view window in this third step, the user **A** had preferably chosen the Mausoleum category in the first step. Moreover, the user **A** had preferably chosen a period dynasty category that is at least succeeds the Mamluk period dynasty in the second step (since Qalawun Complex was constructed during that dynasty). However, for this example, it is most preferably that the user **A** had chosen the contemporary period dynasty category.
20

- In the fourth step, a model of the Qalawun Complex of the contemporary period is rendered in the virtual environment **4**, or more specifically in a second tab of the secondary interactive model **42**, based on the building asset of the Qalawun Complex received from the server **1**.
25

In the fifth step, the user **A** may perform the association function. The user **A** may cycle back to the first tab and highlight the Association Box. With this, the user **A** may add the Qalawun Complex listed in this first tab, into the Association Box, and subsequently, select the associate call-to-action button of the Association Box.

In the sixth step, the user **A** may then be presented with a list of assets that are associated with the Qalawun Complex in the secondary interactive model **42**. Here, the user may similarly filter out the list of assets similar to the second step. Preferably, the user **A** selects a fountain categorical selection from the third surface of the primary interactive model **41**.

In the seventh step, the user **A** may then be presented with a list of fountain assets that are associated with the Qalawun Complex on the first tab of the view window of the secondary interactive model **42**. Preferably, the user **A** shall choose the fountain that is currently missing from the Qalawun Complex of the contemporary period after referring to the rendered Qalawun Complex in the second tab.

Finally, in the eighth step, the user **A** may then view the fountain, which was missing in the Qalawun Complex of the contemporary period, in a third tab of the secondary interactive model **42**. With this, the user **A** is able to visualize missing and demolished parts of the historical constructions due to time, anthropogenic factors or damages using the system and method of the present invention.

Ultimately, the present invention has provided a system and method that provides virtual interactions with historical constructions and/or their related information, especially in the context of the Islamic Civilization.

The present disclosure includes as contained in the appended claims, as well as that of the foregoing description. Although this invention has been described in its preferred form with a degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangements of parts may be resorted to without departing from the scope of the invention.

CLAIMS

1. A system for providing virtual interactions of historical constructions and/or their related information, comprising
 - 5 at least one data storage device (12) for storing digital assets that are historical constructions and/or their related information;
at least one server (1), having one or more processors (11), and at least implemented with a database management module (112) for providing inter-relations to the assets stored in the data storage device (12); and
 - 10 a virtual immersion device (2) to be worn by a user, running a client-side application software (21a) that makes requests to the server (1), and generates a virtual environment (4) for the user to be artificially immersed therein;
wherein the user is virtually provided with interactive models (41, 42) in the virtual environment (4) for them to select a desired historical construction and/or related
15 information to be generated in the virtual environment (4).
2. The system according to claim 1, wherein the assets stored in the data storage device (12) includes primary assets (121), comprising
 - one or more building assets (1211), used for generating a virtual historical
20 construction in the virtual environment (4);
one or more building component assets (1212), used for generating a virtual render of an architectural component of the virtual historical construction in the virtual environment (4);
one or more building element assets (1213), used for generating a virtual render
25 of an architectural element of the virtual architectural component in the virtual environment (4);
or a combination thereof.
3. The system according to claim 2, wherein the building element assets (1213)
30 are further divided into sub-classes that include arch assets (1213a), moulding assets

(1213b), or a combination thereof.

4. The system according to any one of the preceding claims, wherein the assets stored in the data storage device (12) further includes secondary assets (122),
5 comprising
one or more geohistorical assets (1221), used for tagging time period data and location data;
one or more artefact assets (1222), used for generating virtual render of artefacts in the virtual environment (4);
10 one or more sociocultural-context assets (1223), for providing a sociocultural context;
or a combination thereof.
5. The system according to any one of the preceding claims, wherein the assets
15 stored in the data storage device (12) further includes tertiary assets (123), which further includes informative assets (1231) and characteristic assets (1232).
6. The system according to claim 5, wherein the tertiary assets (123) that are informative assets (1231) include
20 one or more layouts plans (1231a) of historical constructions and/or their related information;
one or more elevation plans (1231b) of historical constructions and/or their related information;
one or more cross-section plans (1231c) of historical constructions and/or their
25 related information;
one or more isometric plans (1231d) of historical constructions and/or their related information;
one or more text records (1231e) of historical constructions and/or their related information;

one or more archived photos (1232f) of historical constructions and/or their related information;

one or more invention information (1232g) of historical constructions and/or their related information;

5 one or more scholar information (1232h) of historical constructions and/or their related information;

or a combination thereof.

7. The system according to claim 5 or 6, wherein the tertiary assets (123) that are
10 characteristic assets (1232) include

one or more environmental assets (1232a) for rendering environments of the historical constructions and/or their related information;

one or more formal and spatial quality attribute assets (1232b) that indicates proportions of the historical constructions;

15 one or more ideological relationships assets (1232c) of the historical constructions and/or their related information;

one or more technical attribute assets (1232d) of the historical constructions and/or their related information;

20 one or more physical attribute assets (1232e) of the historical constructions and/or their related information;

or a combination thereof.

8. The system according to claim 5, wherein the interactive models (41, 42) includes a primary interactive model (41) that has one or more surfaces, which include

25 a first surface (411) that allows selection of the geohistorical assets (1221) by the user, by category;

a second surface (412) that allows selection of the building assets (1211) by the user, by category;

a third surface (413) that allows selection of the building component assets

(1212) by the user, by category;

a fourth surface (414) that allows selection of the building element assets (1213) by the user, by category;

a fifth surface (415) that allows selection of the artefacts assets (1222) by the user, by category;

a sixth surface (416) that allows selection of the social-cultural context assets (1223) by the user, by category;
or a combination thereof.

9. The system according to claim 8, wherein the interactive models (41, 42) includes a secondary interactive model (42) that complements the primary interactive model (41) by displaying the historical constructions and/or their related information, and also provides further selections to the user thereon.

10. The system according to claim 8 or claim 9, wherein the database management module (112) of the server (1) provides inter-relations to the assets stored in the data storage device (12), these inter-relations being represented as tables with a one-to-one inter-relation, a many-to-one inter-relation, or a many-to-many relation, the tables include

at least one table with inter-relational permutations between the primary assets (121), the secondary assets (122), or the tertiary assets (123); or

at least one table with inter-relational permutations of the primary assets (121), the secondary assets (122), the tertiary assets (123) themselves.

11. The system according to any one of claims 5 to 10, wherein the server (1) further hosts a website (111a) through the use of a web application module (111) to allow contributors to upload, modify and manage the assets of the data storage device (12), the web application module (111) having one or more software modules that include an access sub-module (1111), for assigning access levels to contributors

accessing the website (111a);

a text input sub-module (1112), for contributors to input text-based information related to the primary assets (121), the secondary assets (122), the tertiary assets (123), or a combination thereof;

5 an asset upload sub-module (1113), for providing an interface for contributors to upload assets related to the primary assets, the secondary assets or the tertiary assets;

a hierarchy setting sub-module (1114), for allowing the contributors to assign a class, a category, a hierarchy, a relationship, or a combination thereof to an uploaded asset;

10 a search sub-module (1115), for providing an interface for contributors to search for assets stored within the data storage device (12) through the website (111a); and

a filter sub-module (1115), for allowing contributors to filter a search result through the website (111a).

15 12. The system according to claim 11, wherein the server (1) further comprises an application protocol interface module (113) for managing requests received from the virtual immersion device (2), which are selections made by the user through the interactive models (41, 42), and delivering assets from the data storage device (12) to be rendered in the virtual environment (4).

20

13. The system according to claim 12, wherein the server (1) further comprises a request interpreter module (114) for interpreting requests received from the virtual immersion device (2), the request interpreter module (114) comprising

a retrieval request sub-module (114a), for generating an interpreted request that
25 directs the database management module (112) on which asset or their metadata is to be retrieved from the data storage device (12) as selected by the user through the interactive models (41, 42);

an association request sub-module (114b), for generating an interpreted request that directs the database management module (112) on which metadata of an asset is to

be retrieved from the data storage device (12) that is related to an asset that was selected by the user through the secondary interactive model (42);

a comparison request sub-module (114c), for generating an interpreted request that directs the database management module (112) to retrieve metadata pertaining to
 5 similarities and differences between assets that were selected by the user through the secondary interactive model (42);

or a combination thereof.

14. The system according to any one of claims 11 to 14, wherein the server (1)
 10 further comprises a transfer module (115) for facilitating the receipt of assets uploaded by the contributor into the server (1), and for facilitating the transfer of assets to the virtual immersion device (2) after the server (1) receives a request therefrom.

15. The system according to any one of the preceding claims, wherein the data
 15 storage device (12) further stores contributor data related to the contributors.

16. A method for providing virtual interactions of historical constructions and/or their related information according to any one of claims 1 to 15, comprising the steps of

20 storing assets that are historical constructions and/or their related information in at least one data storage unit (12);

managing the assets by assigning inter-relations to the assets by at least one server (1); and

requesting the assets by a user artificially immersed in a virtual environment (4),
 25 the virtual environment (4) generated through a client-side application software (21a) that makes requests to the server (1) and runs on a virtual immersion device (2) that is worn by the user;

wherein the user is virtually provided with interactive models (41, 42) in the virtual environment (4) for them to select a desired historical construction and/or related

information to be generated in the virtual environment (4).

17. The method according to claim 16, further comprising a step for generating the assets or their metadata in the virtual environment (4) to be viewed by the user, the step
5 further comprising the steps of
 selecting, by the user, the desired historical constructions and/or their related information through the interactive models (41, 42);
 sending, by the virtual immersion device (2), a request for the assets or their metadata as selected by the user, to the server (1);
10 parsing, by the server (1), the request from the virtual immersion device (2) to retrieve the assets or their metadata as selected by the user; and
 delivering, by the server (1), the assets or their metadata to the virtual immersion device (2) for the assets to be generated and displayed in the virtual environment or through the interactive models (41, 42).
15
18. The method according to claim 16, further comprising a step for generating an association between assets selected in the virtual environment (4) through the secondary interactive model (42) and further assets stored in the data storage device (12), the step further comprising the steps of
20 selecting, by the user, at least one assets or their metadata through the interactive models (41, 42);
 sending, by the virtual immersion device (2), a request for further assets that are associated with the assets or their metadata selected by the user through the interactive models (41, 42), to the server (1);
25 parsing, by the server (1), the request from the virtual immersion device (2) to retrieve metadata of the further assets stored in the data storage device (12) that are associated with the assets or their metadata selected by the user through the interactive models (41, 42); and
 delivering, by the server (1), the metadata to the virtual immersion device (2)

for it to be rendered as an association result on the interactive models (41, 42).

19. The method according to claim 16, further comprising a step for generating a comparison between assets selected in the virtual environment (4) through the
5 secondary interactive model (42), the step further comprising the steps of

selecting, by the user, one or more assets or their metadata through the interactive models (41, 42);

sending, by the virtual immersion device (2), a request for a comparison between the assets as selected by the user through the interactive models (41, 42), to
10 the server (1);

parsing, by the server (1), the request from the virtual immersion device (2) to retrieve metadata pertaining to similarities and differences between the assets that were selected by the user through the interactive models (41, 42); and

delivering, by the server (1), the metadata to the virtual immersion device (2)
15 for it to be rendered as a comparison result on the interactive models (41, 42).

20. The method according to any one of claims 16 to 19, further comprising a step for allowing contributors to upload, modify and manage the assets in the data storage device (12) through a website (111a), the step further comprising the steps of

20 uploading, by the contributor, one or more assets into the data storage device (12) through the website (111a) as an uploaded asset;

inputting, by the contributor, one or more text-based information related to the uploaded asset; and

assigning, by the contributor, the inter-relations between the uploaded asset with
25 existing assets in the data storage device (12).