

SYSTEM FOR MANIPULATING A VIRTUAL OBJECT
IN AN INTERACTIVE ENVIRONMENT

The present invention generally concerns a system for making a virtual object evolve in an interactive environment. The present invention also concerns a method enabling a virtual object to evolve in an interactive environment.

In the present description, "virtual object" means an object defined by a set of
5 parameters and data. In particular, "evolving virtual object" means a virtual object wherein at least a part of the parameters and/or data of the object can be modified or can evolve over time.

"Interactive environment" means an environment in which at least a part of the parameters and/or data of a virtual object can evolve over time or be modified by the
10 direct or indirect interaction of a user with said virtual object.

One already knows portable devices commonly called "virtual companions" or "artificial companions" whose "behaviour" or "evolution" can be affected by means of a user interface provided for example with push buttons or other similar control members.

15 In such portable devices, the virtual object is capable of evolving in a relatively limited interactive environment. One drawback of such "artificial companions" lies in the fact that the possibilities offered to the user for affecting the evolution of the virtual object are greatly limited by the user interface with which they are typically provided. Indeed, because of the necessarily small size of these portable devices, and thus the
20 generally low number of control members, the number of interactions between the user and the virtual object is greatly restricted. This drawback is all the greater since one typically wishes to produce devices having the smallest possible volume in order to avoid handicapping the user when carrying this device.

Another drawback of such portable devices or "artificial companions", also due
25 to the necessarily small size thereof, lies in the fact that they are typically provided with displays which only provide reduced and primitive visualisation of the virtual object and its environment. Portable devices of this type thus prove to be unattractive to the user.

One also knows computer programs which are capable of being executed on a
30 computer terminal, such as a personal computer or a play station for example, wherein the virtual object is staged and evolves in a more or less broad interactive environment.

One advantage of such computer programs with respect to the aforementioned portable devices lies in the fact that the computer terminal on which the computer
35 program is executed offers wide possibilities for interaction between the user and the

virtual object or its environment, and wide possibilities for visualizing and modeling the virtual object and its environment. Numerous possibilities for interaction with the virtual object and its environment are in particular possible, for example, via the keyboard of the computer terminal or via other interface means, such as a
5 microphone, a mouse or a joystick connected to the computer terminal.

However, one drawback of such computer programs lies in the fact that they typically require equipment which is large and less mobile, and cannot be executed completely in a portable object of small volume and low power. This thus results in low mobility, which also makes this type of solution unattractive to the user.

10 An additional drawback of the two aforementioned solutions also lies in the fact that they are typically limited to an interaction between a single user and a single virtual object.

Yet another drawback of the two aforementioned solutions lies in the fact that they are typically limited to the evolution of a single virtual object in a single interactive
15 environment.

One object of the present invention is thus to propose a system and a method for making a virtual object evolve in an interactive environment, which overcomes the aforementioned multiple drawbacks.

The present invention thus concerns a system for making a virtual object
20 evolve in an interactive environment whose features are listed in claim 1.

The present invention also concerns a method for making a virtual object evolve in an interactive environment whose features are listed in claim 10.

Advantageous embodiments of the present invention, described in the present description, form the subject of the dependent claims.

25 One advantage of the present invention lies in the fact that the user has available a wide range of possibilities for interacting with the virtual object. The user has, moreover, both the advantages, in terms of mobility, of portable devices known in the prior art, and the advantages, in terms of interactivity, of the computer programs known in the prior art. The user is thus in no way limited by the reduced capacity of
30 portable devices or the lack of mobility of computer programs.

According to a preferred embodiment of the invention, another advantage lies in the fact that different virtual objects each evolving in different environments can nonetheless remain in contact and affect each other's evolution.

35 These objects, features and advantages of the present invention, in addition to others, will appear more clearly upon reading the following detailed description, made with reference to the annexed drawings given by way of non-limiting example and in which:

- Figure 1 illustrates schematically the interactive system according to the present invention,

5 - Figure 2 shows an example embodiment of a system for making a virtual object evolve in accordance with the present invention and including a portable unit and a computer terminal,

 - Figure 3 shows a detailed block diagram of a portable unit of the system of Figure 2;

 - Figure 4 illustrates how a virtual object is capable of evolving in the interactive environment supported by the system according to the present invention,

10 - Figure 5 shows an embodiment of the invention wherein two portable units of the system interact with each other,

 - Figure 6 illustrates schematically the interaction of the two portable units of Figure 5; and

15 - Figure 7 shows another embodiment of the invention wherein several computer terminals are connected to each other via a computer network

Figure 1 shows schematically the subjacent principle of the present invention. According to the present invention, as is schematised in Figure 1, a system is proposed for making a virtual object evolve in an interactive environment including a first interactive environment 100, called the main interactive environment, and a
20 second interactive environment 200, called the secondary interactive environment, smaller than main interactive environment 100, the user having interface means and display means in each of interactive environments 100 and 200.

A virtual object, designated by the reference numeral 150, is schematised in Figure 1 in the form of a virtual animal, such as a dog. This virtual object 150 is
25 capable of evolving in either main interactive environment 100 or secondary interactive environment 200, in particular via the interaction of a user in the corresponding environment. In Figure 1, virtual object 150 has thus been schematised as evolving in main interactive environment 100.

According to the present invention, virtual object 150 is capable of evolving in
30 secondary interactive environment 200 by being transferred, totally or in part, from main interactive environment 100 to interactive environment 200. Preferably, as is shown schematically in Figure 1, only a part representative of virtual object 150, and in particular a part of the parameters and/or data of virtual object 150 which are capable of evolving, will be transmitted or exchanged between main and secondary interactive
35 environments 100 and 200. This representative part of virtual object 150, indicated by reference numeral 155 in Figure 1, will be called hereinafter in the present description,

an "evolving parameter". This evolving parameter 155 is for example a binary word including a plurality of bits each capable of being modified by an action by the user.

It will be understood that the fact of only transferring a representative part of virtual object 150 and in particular the "evolving" part of virtual object 150, such as a
5 binary word of several bits, has the advantage of requiring only a relatively short communication time and thus permits the use of transmitting and receiving means with a low transmission rate.

Preferably, main interactive environment 100 has means for extracting this representative part of virtual object 150, namely evolving parameter 155. These
10 extracting means are essentially data processing means enabling characteristic data of the virtual object to be selected or defined, and in particular, the characteristic data of the virtual object capable of evolving following, in particular, an action by the user.

As will be seen hereinafter, secondary interactive environment 200 is supported by a portable unit that the user can thus carry with him and, according to a
15 preferred embodiment, he can make it communicate with other similar portable units. According to the present invention, main interactive environment 100 is supported by a computer terminal preferably arranged to execute a computer program via which the user can interact with virtual object 150.

Figure 2 shows an example embodiment of a system enabling a virtual object
20 to evolve in an interactive environment in accordance with the present invention. This system includes at least a first portable unit indicated globally by the reference numeral 2 and at least a first computer terminal indicated globally by the reference numeral 1.

Portable unit 2 may be any type of autonomous portable device having its own
25 electric power source and at least one function enabling it to process and/or store data. Preferably, this portable unit 2 is a device capable of being worn on the user's wrist, such as a watch. It will be understood however that this portable unit may take other forms such as that of a cellular telephone or an electronic diary for example.

Figure 2 thus shows a portable unit 2 such as a wristwatch having in particular
30 display means 22 such as a liquid crystal display and interface means S1 to S5 that the user can activate as he wishes to select functions and modify information or data stored or processed in portable unit 2, and in particular to interact with the virtual object of the system. In particular, the interface means of the portable unit include, purely by way of illustration, a plurality of control members such as push buttons S1,
35 S2, S3, S4 and S5 arranged on the periphery of portable unit 2. It will be noted that other control members can be envisaged in order to allow the user to interact with the data processed or stored in portable unit 2. In particular, it will be noted that portable

unit 2 may also or alternatively be provided with acoustic means enabling for example a user to execute actions via speech. The notion of "interface means" thus includes any type of control means or members offering possibilities of interaction between a user and a portable unit 2.

5 Computer terminal 1 may be any type of computer device capable of executing computer programs, such as a personal computer, as is for example illustrated in Figure 2. It will be noted that "computer terminal" also means a computer device dedicated to executing specific computer programs, such as for example a play-station essentially dedicated to playing games.

10 In the example of Figure 2, computer terminal 1 is for example a multimedia personal computer provided with display means 12, such as a monitor, and interface means 14, 15 and 16 including in particular a keyboard 14, a peripheral control unit 15, such as a mouse, and a microphone 16.

 According to the present invention, portable unit 2 and computer terminal 1 of
15 the system are each fitted with data transmission and receiving means, not shown in Figure 2, in order to assure data transfer, and in particular transfer of evolving parameter 155, from computer terminal 1 to portable unit 2, as is schematised by arrow A in Figure 2, respectively from portable unit 2 to computer terminal 1, as is schematised by arrow B.

20 These transmitting and receiving means are thus preferably bi-directional communication means. In particular, these transmitting and receiving means are preferably wireless communication means, such as radio, inductive, optical, or acoustic communication means, allowing greater mobility and ease of use of the portable unit and the computer terminal. The present description will not enter into
25 details as to the particular embodiment of these transmitting and receiving means, those skilled in the art being perfectly able to choose the most suitable solution answering his criteria as to cost, performance and ease of manufacture.

 In the system according to the present invention, illustrated in Figure 2, the main interactive environment (100 in Figure 1) is thus supported by computer terminal
30 1, and secondary interactive environment (200 in Figure 1) is supported by portable unit 2.

 It will be noted that the user thus has broad interface means (keyboard 14, mouse 15, microphone 16, etc.) for interacting with virtual object 150 in the main interactive environment supported by computer terminal 1, and more limited interface
35 means (push buttons S1, S2, S3, S4, S5) for interacting with virtual object 150 in the secondary interactive environment supported by portable unit 2. The user also has broad display means (monitor 12) for displaying virtual object 150 in the main

interactive environment and reduced display means (display 22) for displaying at least a part of virtual object 150, namely evolving parameter 155, in the secondary interactive environment.

Figure 3 shows in more detail, in the form of a block diagram, an example embodiment of portable unit 2 of the system illustrated in Figure 2. This portable unit 2 includes in particular a central processing unit or microprocessor 20 controlling the functions of the portable unit, and an electric power source 21 connected in particular to microprocessor 20 as is illustrated in Figure 3. This power source 21 also powers other components of the portable unit.

Portable unit 2 further includes, connected to microprocessor 20, display means 22, such as a liquid crystal display, clock means 23, such as a quartz oscillator allowing a clock signal (CLK) to be supplied to microprocessor 20, interface means 24 responding to action on control members S1 to S5.

Connected to microprocessor 20, portable unit 2 also includes memory means 25 including in particular a RAM memory 251, a ROM memory 252, and a reprogrammable EEPROM memory 253. Reprogrammable EEPROM memory 253 is in particular intended for storing the evolving parameter (155 in Figure 1) from the virtual object transmitted, for example, by computer terminal 1.

Portable unit 2 further includes transmitting and receiving means 26 for transmitting and receiving data, in particular with computer terminal 1 of the system. With a view to transmitting data, these transmitting and receiving means typically modulate an electric control signal on the basis of data to be transmitted and convert this electric control signal into a transmission signal capable of being transmitted to the addressee. With a view to receiving data, these transmitting and receiving means 26 typically convert an incident transmission signal into a modulated electric signal and demodulate this electric signal into data capable of being processed by microprocessor 20 of portable unit 2. As was mentioned hereinbefore, various transmitting and receiving means fulfilling the aforementioned functions can be envisaged by those skilled in the art. In a non-limiting manner the Applicant was able to observe that a wireless link via acoustic waves easily allows communication to be achieved between portable unit 2 and computer terminal 1.

Figure 4 annexed hereto illustrates how a virtual object is capable of evolving in the interactive environment supported by the system according to the present invention, such as the system of Figure 2. Figure 4 shows main interactive environment 100 and secondary interactive environment 200 schematised by two assemblies. Arrows A and B in Figure 4 respectively show a transfer of evolving parameter 155 from main interactive environment 100 to secondary interactive

environment 200 and a transfer of evolving parameter 155 from secondary interactive environment 200 to main interactive environment 100.

A person using the system according to the present invention, thus generates, or "gives life", firstly, to a virtual object 150 in main interactive environment 100. This
5 virtual object 150 is for example created on the computer terminal supporting main interactive environment 100 by means of a computer programs. According to one embodiment of the present invention, which will be presented hereinafter with reference to Figure 7, the user also has the possibility of downloading a predetermined virtual object, which is for example accessible on a server connected to
10 the computer terminal via a computer network.

Rhombus-shaped unit 41, and all the other units of the same shape in Figure 4, symbolise an interaction of the user with the virtual object. More specifically, unit 41 symbolises an interaction of the user via the interface means, such as the keyboard, the mouse or the microphone (14, 15, 16 in Figure 2) of the computer terminal
15 supported main interactive environment 100.

As symbolised by arrow A, an evolving parameter 155 representative of virtual object 150 can be transferred into secondary interactive environment 200. In this secondary interactive environment 200, the user can thus interact with the virtual object, i.e. evolving parameter 155, via the interface means, such as the control
20 members (S1 to S5 in Figure 2) of the portable unit supporting secondary interactive environment 200, as is schematised by unit 42.

Evolving parameter 155 may be transferred again to main interactive environment 100 as is symbolised by arrow B.

In addition to the possibilities of interaction schematised by units 41 and 42,
25 the user also has, in each interactive environment 100 and 200, according to one embodiment of the invention, additional possibilities of interaction, schematised by units 41' and 42'. As will be seen subsequently with reference to Figures 5 and 6, unit 42' symbolises interaction of/with another portable unit of the system, unit 41' symbolises interaction of/with another computer terminal of the system as will be
30 illustrated subsequently with reference to Figure 7.

According to one embodiment of the present invention, schematised in Figure 5, a first 2.1 and another portable unit 2.1' of the system are capable of exchanging at least a part of their evolving parameter 155, respectively 155'. The transmitting and receiving means (26 in Figure 3) of each portable unit 2.1 and 2.1', in this embodiment
35 are thus adapted to transmit at least a part of evolving parameter 155, respectively 155', from first portable unit 2.1 to the other portable unit 2.1', respectively from the other portable unit 2.1' to first portable unit 2.1.

In the system illustrated in Figure 5, a virtual object evolving in the secondary interactive environment of a first portable unit, for example portable unit 2.1, is thus capable of affecting the evolution of a virtual object evolving in the secondary interactive environment of another portable unit, for example portable unit 2.1', and, conversely, a virtual object evolving in the second interactive environment of the other portable unit 2.1' is capable of affecting the evolution of a virtual object evolving in the secondary interactive environment of first portable unit 2.1.

Preferably, each portable unit is adapted to generate a new evolving parameter, which depends upon the preceding evolving parameter of this portable unit and the evolving parameter part of another unit. Figure 6 thus shows a diagram illustrating the generation of a new evolving parameter, indicated by the reference numeral 155*, from evolving parameters 155 and 155' of two similar portable units of the system.

Following an exchange between two similar portable units of the system of their respective evolving parameter, each portable unit thus has, stored in its memory means, its own evolving parameter 155 and the evolving parameter 155' transmitted by the other portable unit. These evolving parameters 155 and 155' are each schematised, in Figure 6, by a binary word of N bits.

The microprocessor (20 in Figure 3) of each portable unit is thus adapted to effect a mixing operation between at least parts of each evolving parameter 155 and 155' to generate at one of its outputs a new evolving parameter 155*, for example a new binary word of N bits.

Preferably, as is schematised in Figure 6, the mixing operation is effected also taking account of an additional variable or random parameter, designated 160. This additional parameter 160 can for example be provided via the clock means (23 in Figure 3) of each portable unit. In particular, this additional parameter 160 can for example be the time of a watch forming the portable unit.

Figure 7 shows another embodiment of a system according to the present invention constituting an evolution of the interactive system described hereinbefore.

Figure 7 shows a diagram of a system comprising several portable units, 2.1 to 2.3 and 2.1', and several computer terminals, 1.1 to 1.3. Each portable unit and each computer terminal is similar to the portable unit and computer terminal of Figure 2. It will be understood that there is a different user, not shown, for each portable unit.

The system according to Figure 7 has the peculiarity that the computer terminals 1.1 to 1.3 are connected or capable of being connected to each other on a computer network, schematised by the connecting lines designated 30. This computer network 30 is either a local area network (LAN), a wide area network (WAN), or a

combination of these two types of network. It will be noted that the connecting lines schematising computer network 30 cover both a network formed of physical lines as well as a wireless network. The term "computer network" thus covers, in the present description, any type of system in which at least two computer terminals are
5 communicating with each other.

Parallel to computer terminals 1.1 to 1.3, the system further includes a server 5, connected to the computer network 30, which houses applications and data that a user is capable of downloading from one or the other of computer terminals 1.1 to 1.3. This server 5 is further capable of receiving data emanating from computer terminals
10 1.1 to 1.3. Server 5 may for example house different types of predetermined virtual objects that the user can download on his computer terminal and can cause to evolve in his own interactive environment.

By means of the system according to Figure 7, it will be understood that multiple interactive environments are thus interconnected. In this system, a virtual
15 object can thus be affected, when it evolves in a main interactive environment supported by a first computer terminal, for example computer terminal 1.1, by other virtual objects or other users acting on another computer terminal, for example computer terminal 1.2 or 1.3. Likewise, the virtual object or the user connected to a first computer terminal 1.1 can affect the evolution of a virtual object evolving in the
20 main environment supported by another computer terminal 1.2 or 1.3 connected to this first terminal 1.1 via computer network 30.

Figure 7 also shows a diagram of a first portable unit 2.1 and another portable unit 2.1' capable of exchanging data in accordance with what was stated with reference to Figure 4.

25 It will be understood that various modifications and/or adaptations can be made to the embodiments described in the present description without however departing from the scope of the invention defined by the annexed claims.

CLAIMS

1. System for making at least a first and a second virtual object (150) evolve in an interactive environment, this system including at least a first (2.1) and a second (2.1') portable unit and at least a computer terminal (1; 1.1, 1.2, 1.3) each including wireless transmitting and receiving means (26) for, on the one hand, 5 permitting the exchange of a first so-called evolving parameter (155), representative of at least a part of said first virtual object between said first portable unit (2.1) and the computer terminal and, on the other hand, permitting the exchange of a second evolving parameter (155') representative of at least a part of said second virtual object between said second portable unit (2.1') and the computer terminal, so that said first 10 and second virtual objects (150) are each capable of evolving, either, in a first so-called main interactive environment (100), supported by the computer terminal (1; 1.1, 1.2, 1.3), or, in a second so-called secondary interactive environment (200), supported by said first (2.1), respectively second (2.1'), portable unit,

characterised in that said transmitting and receiving means (26) of said first 15 and second portable units (2.1, 2.1') are also adapted to transmit at least a part of said first and second evolving parameters (155, 155') of said portable unit (2.1) to the second portable unit (2.1') respectively from the second portable unit (2.1') to the first portable unit (2.1),

each of said first and second portable units (2.1, 2.1') further including means 20 (20) for generating a new evolving parameter (155*) which is a function of the preceding evolving parameter (155; 155') of the portable unit and of said at least part of the evolving parameter (155'; 155) transmitted by the other portable unit.

2. System according to claim 1, characterised in that said at least one computer terminal (1; 1.1, 1.2, 1.3) is adapted to execute a computer program 25 allowing interaction with said first and/or second virtual object (150) in said main interactive environment (100) and to extract said evolving parameter (155, 155') representative of at least a part of said virtual object (150).

3. System according to claim 1, characterised in that each portable unit (2.1, 2.1') further includes interface means (24, S1 to S5) for interacting with the 30 virtual object (150) in said secondary interactive environment (200).

4. System according to claim 1, characterised in that said new evolving parameter (155*) further is a function of a variable or random parameter (160).

5. System according to claim 4, characterised in that said variable or random parameter (160) is provided by a clock means (23) of the portable unit (2.2, 35 2.1').

6. System according to any of claims 1 to 5, characterised in that said evolving parameters (155, 155', 155*) are binary words.

7. System according to any of claims 1 to 5, characterised in that this system includes at least one other computer terminal connected to said at least one
5 computer terminal via a computer network (30).

8. System according to any of claims 1 to 5, characterised in that said system further includes a server (5) connected to said at least one computer terminal via a computer network (30) and in that said server (5) houses a plurality of predetermined virtual objects capable of being downloaded on said at least one
10 computer terminal.

9. System according to any of the preceding claims, characterised in that at least one of said first and second portable units is a device capable of being worn on a user's wrist, such as a watch.

10. Method for making at least a first and a second virtual object (150)
15 evolve in an interactive environment, this interactive environment being supported by a system including at least a first (2.1) and a second (2.2') portable unit and at least a computer terminal (1; 1.1, 1.2, 1.3),

a first so-called evolving parameter (155), representative of at least a part of said first virtual object being exchanged between said first portable object (2.1) and
20 the computer terminal, and a second evolving parameter (155') representative of at least a part of said second virtual object being exchanged between said second portable unit (2.1') and the computer terminal, so that said first and second virtual objects (150) are each capable of evolving, either, in a first so-called main interactive environment (100), supported by the computer terminal (1; 1.1, 1.2, 1.3), or, in a
25 second so-called secondary interactive environment (200), supported by said first (2.1), respectively second (2.1'), portable unit,

characterised in that this method further includes:

- transmitting at least a part of said first and second evolving parameters (155, 155') of the first portable unit (2.1) to the second portable unit (2.1'), respectively from
30 the second portable unit (2.1') to the first portable unit (2.1); and

- generating, by each of said first and second portable units (2.1, 2.1'), a new evolving parameter (155*) which is a function of the preceding evolving parameter (155; 155') of the portable unit and of said at least part of the evolving parameter (155'; 155) transmitted by the other portable unit.

35 11. Method according to claim 10, characterised in that the new evolving parameter (155*) further is a function of a variable or random parameter (160).

12. Method according to claim 10 or 11, characterised in that at least a part of said first and/or second evolving parameter (155, 155') is also exchanged with another computer terminal connected to said at least one computer terminal via a computer network (30).