

Canine Anatomy VR Training V1.3.2_User and Customer Support Guide

Jiangxi KMAX Industrial Co., Ltd.

All rights reserved

Table of Contents

1. Introduction	1
1.1. Objective	1
1.2. Background	1
1.3. Definition	3
1.4. References	3
2. Purpose	3
2.1. Functional Features	3
2.2 Performance Features	7
3. Runtime Environment	7
3.1. Hardware Environment	7
3.2. Software Environment	9
4. Operating Instructions	10
4.1. Installation and Uninstallation	10
4.2. Operating Instructions	15
4.2.1 Main interface	15
4.2.2 Scenario switch	17
4.2.3 Main operating menu	19
4.2.4 Operating sub-menu	22
4.2.5 Explanation text box	25
4.2.6 10-system menu	25
4.2.7 Main interface of the heart	26
4.2.8 Interactive operation of the interactive pen	29

5. Application Notes 37

1. Introduction

1.1. Objective

This manual provides operating instructions for users of VR Animal Anatomy Training System V1.3.2.

1.2. Background

Animal anatomy is a basic introductory course in the Animal husbandry and Veterinary Medicine in secondary and higher vocational schools, colleges, and universities. However, the course content is often boring, teachers only use pictures or specimens, and thus students are less interested.

Virtual reality (VR) technology is a new integrated information technology emerging in the end of the 21st century, which incorporates multiple information technology branches including digital image processing, computer graphics, multimedia technology, sensor technology, etc. It generates 3D visual and sound effect, and harmonious human-computer interaction. VR allows us to experience a variety of "personal" extreme scenarios, thus providing a new tool of learning. The VR technology is regarded as an important technology that changes the future world second only to the internet.

Japan and UK take leading positions in VR research. The application of VR technology in human medicine has gradually taken shape. For example, 3D human body has become an end product recognized and applied in medical science. However, veterinary is an emerging industry, and its market demand is not as wide as that of the human medicine. However, with increasing popularity of the pet industry and animal husbandry, the potential market value of the veterinary will soar in next years.

Characterized by multi-perception, immersion, interaction and operability, the VR technology is quite useful to learning and teaching in experimental teaching. In contrast with current insufficiency of experimental resources in colleges and universities, the students are extremely increasing. Virtual anatomy experiment can effectively reduce this contradiction. Virtual anatomy experiment highly simulates real world instrument and specimen operation through man-machine dialogue. Free from the limits of traditional experimental teaching model, time and space, students can dissect various parts of animals via the experiment operating system anytime. Most importantly, it allows repeated operations, thus effectively solving the problem of non-repeatability and insufficient resources. In addition, VR technology makes abstract issues concrete, static objects dynamic and complex problems simplified in virtual anatomy laboratory, thus reducing the difficulties of teaching and greatly improving the teaching.

1.3. Definition

Term	Definition or description
	Jiangxi KMAX Industrial Co., Ltd.
VR	Digital 3D/ three-dimensional / stereoscopic technology based on computer / internet, that is, three-dimensional digitization
Training Simulation	Training by simulating the real-world work environment and equipment

1.4. References

Materials or other documents that are mainly referenced in the preparation of this manual include:

1. VR Canine Anatomy Software - Initiation Report
2. VR Canine Anatomy Software - Interaction Scheme
3. VR Canine Anatomy Software - Customer Requirements Specifications

2. Purpose

2.1. Functional Features

Function Name		Description
Model Effect	Absorption	When the split structure is moved near its original position of the entire model, the original position will become semi-transparent. If user releases the left button of the interactive pen, the structure will automatically go back to its original position. Display of the semi-transparent area in shadow:

		<p>When there is no split structure, the split structure is selected, or the entire model is dragged, the semi-transparent area in shadow will not appear. Only when the single structure is dragged for splitting or restoration, can the semi-transparent area in shadow appear.</p> <p>Trigger for absorption: When the split structure is dragged, the semi-transparent area in shadow appears. When the structure keeps contact with the semi-transparent area in shadow, the color of the area will turn darker. If the button of the interactive pen is released to cancel the dragging, the structure will automatically go back to its original position (semi-transparent area in shadow).</p>
	<p>Canine Standby animation</p>	<p>Canine standby animation shows a sitting husky. When user opens the software, the standby animation is the default. When the ray of the interactive pen moves to the canine, the animation stops playing and the model is ready for anatomy.</p> <p>If the interactive pen does not execute any action (move or click) for one minute (the time can be set in the Settings interface, and the default is 1 min), the canine standby animation will start in the model display area.</p>
<p>Function of the Interactive Pen</p>		<p>Left button: Click - select a structure or cancel the selection; Drag –split a single structure</p> <p>Right button: Click - select a structure or cancel the selection; Drag forward and backward - zoom in or out the entire model</p> <p>Middle button: Click - select a structure or cancel the selection; Drag - move the entire model</p> <p>When user moves the heart using the middle button of the interactive pen, he can feel the heartbeat vibrations (the vibration can be activated /</p>

		deactivated in the Settings, and activated is the default).
10-System Functional Interface		Click on certain physiological system can display or hide the system. Function keys include Integumentary System, Skeletal System, Muscular System, Digestive System, Respiratory System, Urinary System, Circulatory System, Lymphatic System, Endocrine System, and Nervous System. When the interactive pen hovers over certain function key, the related system name will be offered.
Operator Sub-interface	Heart function key	Click on the button and the interface turns to the new heart model. There are no 10-system function keys, and some function keys such as Return and Hide Unselected are in gray and unavailable. When user moves the interactive pen to the heart structure, he can feel the heartbeats. In addition, there is a display screen which keeps playing the heart flash animation.
	Male / female switch	There exist male and female buttons respectively. If the current model is male, the corresponding button lights and turns blue; If the current model is female, the corresponding button lights and turns pink. The default is male model.
Main Operator Interface	Exit	Close the software
	Settings	In the Settings interface, user can set the language (Chinese and English), vibration (activate or deactivate the vibration of the interactive pen), and stand-by animation time (no animation, 1-min stand-by, and 5-min stand-by). The 'OK' button can confirm all settings in the Settings interface, while the 'Cancel' button can cancel all settings and go back to the original settings.
	Initialize	Click on the 'Initialize' button can restore the model to the original status, i.e. front view of the

		original complete unsplit model with visible integumentary system.
	Return single structure	Click on the 'Return' button can return the selected part to its original position in the model (return the single split part back to the original position in the entire dragged structure if the entire structure has been dragged)
	Hide	Click on the 'Hide' button can hide the selected module.
	Hide Unselected	Click on the 'Hide Unselected' button can hide the unselected modules, and only the selected module visible.
	Previous	Click on the 'Previous' button can go back to the previous operation.
Function Key Interfaces		3 function key interfaces (10-system function interface, main operator interface, and operator sub-interface) can be hidden and displayed.
Scenario Switch		Currently two scenarios are available, i.e. laboratory scenario and blue background scenario. For the laboratory scenario, the horizontal visual angle (left to right) falls within 180 degrees, and necessary items are equipped. The lab bench is below the canine model, and has an appropriate size for the model. For the blue background scenario, the model has shadow, and the scenario shows stereoscopic effect.
Explanation text box		The explanation text box, which can be visible or hidden, lies in the top left corner of the interface. It describes the name and function of the selected model structure. The default status is hidden and only an icon left. When the interactive pen clicks on a structure, the corresponding explanation text box will pop up. When the interactive pen clicks on a blank space, the text box remains but no contents displayed.

2.2 Performance Features

1. Intended for teaching demonstration and practical training, the VR Animal Anatomy Training System is sound, reliable, accurate, easy to use and excellent in performance.

2. The VR Animal Anatomy Training System contains 10 systems: Integumentary System, Skeletal System, Muscular System, Digestive System, Respiratory System, Urinary System, Circulatory System, Lymphatic System, Endocrine System, and Nervous System. For each system, males and females are both available. In addition, it displays important structure of the heart.

3. The VR Animal Anatomy Training System can display the animal model systematically, and the model can also be split into single structures. With explanation texts, it can present the comprehensive canine anatomical structure.

3. Runtime Environment

3.1. Hardware Environment

zSpace300 (All-in-One):

Parameter	Description		Specifications
Hardware Configuration	CPU	Intel(R) Core(TM) i3-4370 CPU @ 3.80GHz 3.80GHz	
	Hard Disk	500GB	
	Memory	8.00GB	
	Monitor	24-inch, resolution: 1920 x 1080; supporting 2D and 3D Brightness: 2D \geq 250cd / m ² ; 3D \geq 150cd / m ² , Horizontal visual angle \geq 170°	

		<p>Vertical visual angle $\geq 160^\circ$</p> <p>Contrast: 800 : 1 or above</p> <p>Color ≥ 16700000</p> <p>Pixel defect: ≤ 7.</p>	
	Capture Locator	<p>Equipped in the monitor, the locator can achieve a 3D effect and localization by means of 3D glasses. Available capture range: 1.2m in length, 1.5m in width, and 1m in height based on the center of the motor</p>	
	Tracking 3D Glasses	<p>The 3D glasses can be used to view the 3D scenario. There are five tracking points, so that the capture locator can accurately achieve a 3D effect and localization. A set of tracking 3D glasses includes complete tracking glasses and legless tracking Clip-ons.</p>	
	Stylus	<p>It can move, rotate and split the objects in the 3D scenario. It offers movement and rotation data in 3 degrees of freedom coordinate axes, and the related resolution, accuracy and refresh rate are required as follows:</p> <p>3D axial resolution: X axis $\leq 2\text{mm}$, Y axis $\leq 2\text{mm}$, Z axis $\leq 2\text{mm}$.</p> <p>Accuracy: spacing accuracy $\leq 2\text{deg}$, swing accuracy $\leq 2\text{deg}$, deflection accuracy $\leq 2\text{deg}$.</p> <p>3D axial accuracy: X axis $\leq \pm 3\text{mm}$, Y axis $\leq \pm 3\text{mm}$, Z axis $\leq \pm 3\text{mm}$.</p> <p>3D axial refresh rate: X axis $\geq 100\text{Hz}$, Y axis $\geq 100\text{Hz}$, Z axis $\geq 100\text{Hz}$.</p>	
	Port	<p>Display Port (1.2): ≥ 1; DVI port: ≥ 1;</p>	

		positioning processing unit interface	
--	--	---------------------------------------	--

3.2. Software Environment

Operating System	Windows 10 Pro (64-bit)	
3D Software System	<p>3D software system consists of three parts: desktop virtual reality system driver platform, 3D desktop system software platform, and desktop virtual reality interactive system.</p> <p>Desktop virtual reality system driver platform: it provides basic VR application architecture and system parameter adjustment and management. It also offers the control panel for parameter adjustment, function detection, and firmware upgrade of accessory hardware system, as well as diagnostic information export.</p> <p>3D desktop system software platform: functioning as 3D desktop, it offers desktop management such as adding, deletion, change, and arrangement of desktop icons.</p> <p>Desktop virtual reality interactive system: It is a 3D display platform providing a real virtual 3D environment with the capture locator. The stylus can zoom in/out, rotate and split the virtual objects in virtual 3D space. Meanwhile it also provides various 3D interactive tools and multi-view function such as multi-angle and composite view.</p>	

4. Operating Instructions

4.1. Installation and Uninstallation

The software is a one-click installation and configuration pack. The installation steps are as following,

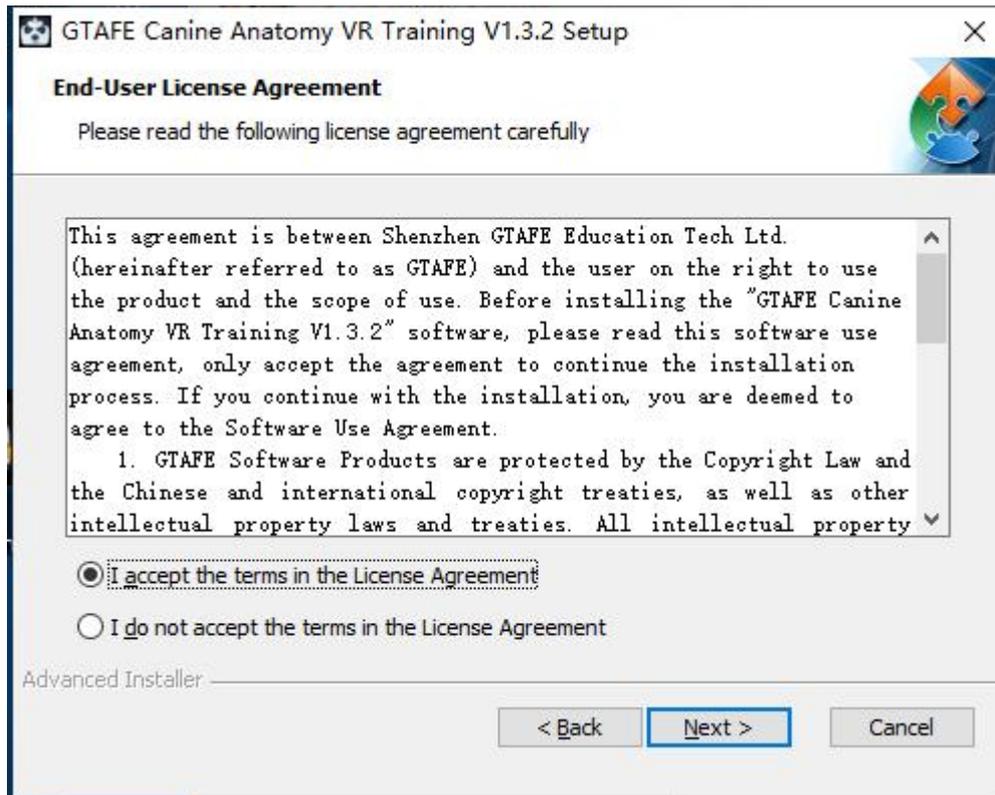
Double click on the software



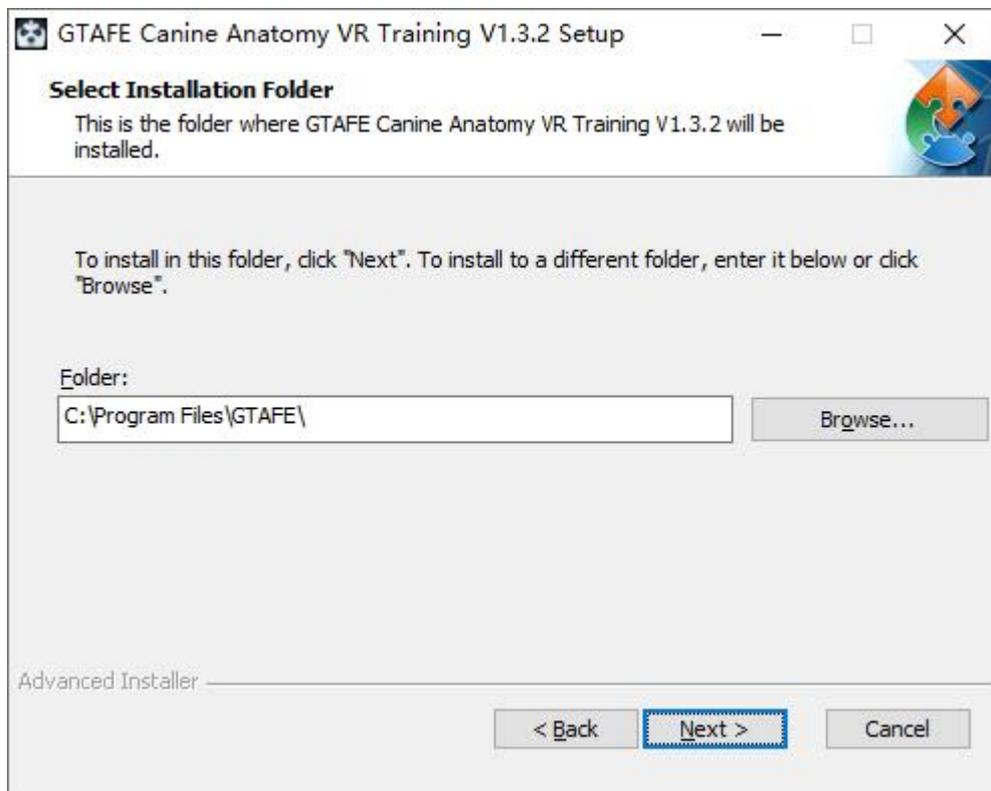
Click on 'Next' .



Select as below, and then click on 'Next' .

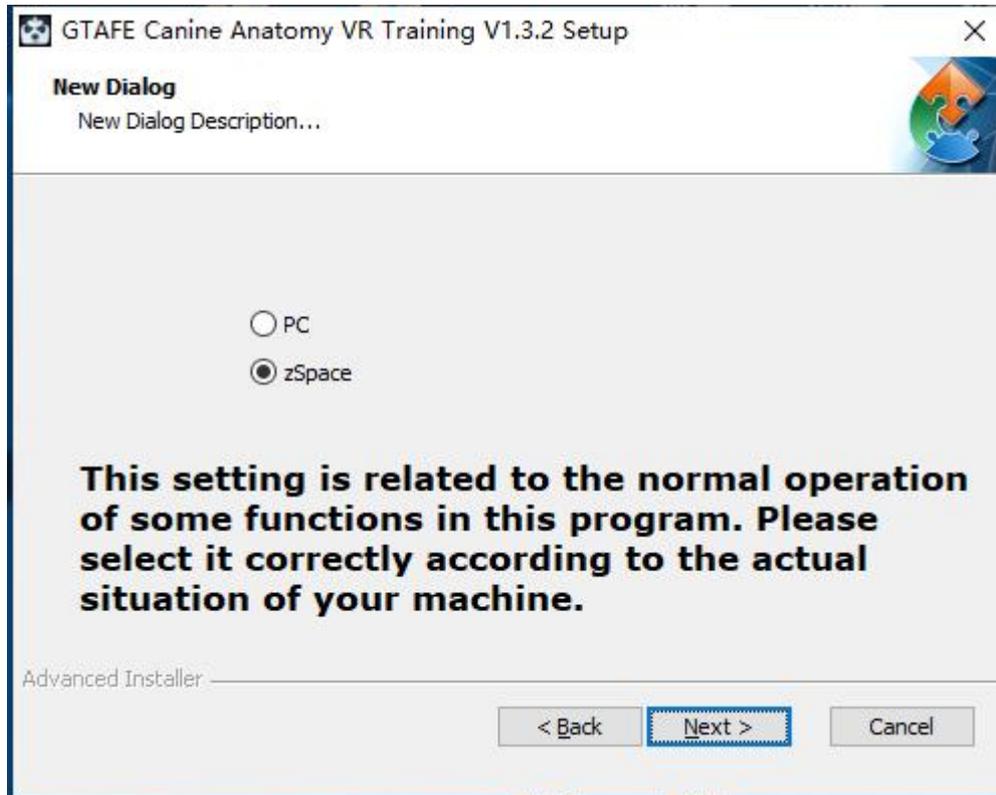


Set the installation directory, or use the default directory as below. Click on 'Next' .

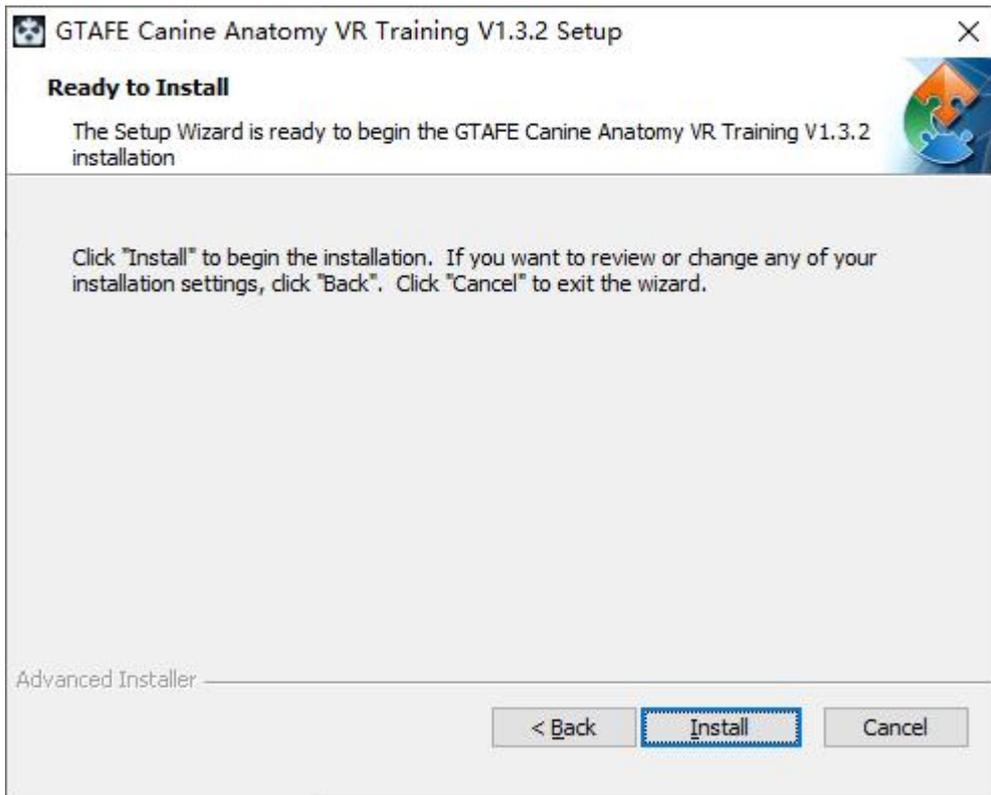


This setting is related to the normal operation of some functions in this program. Please select it correctly according to the actual situation of your machine.

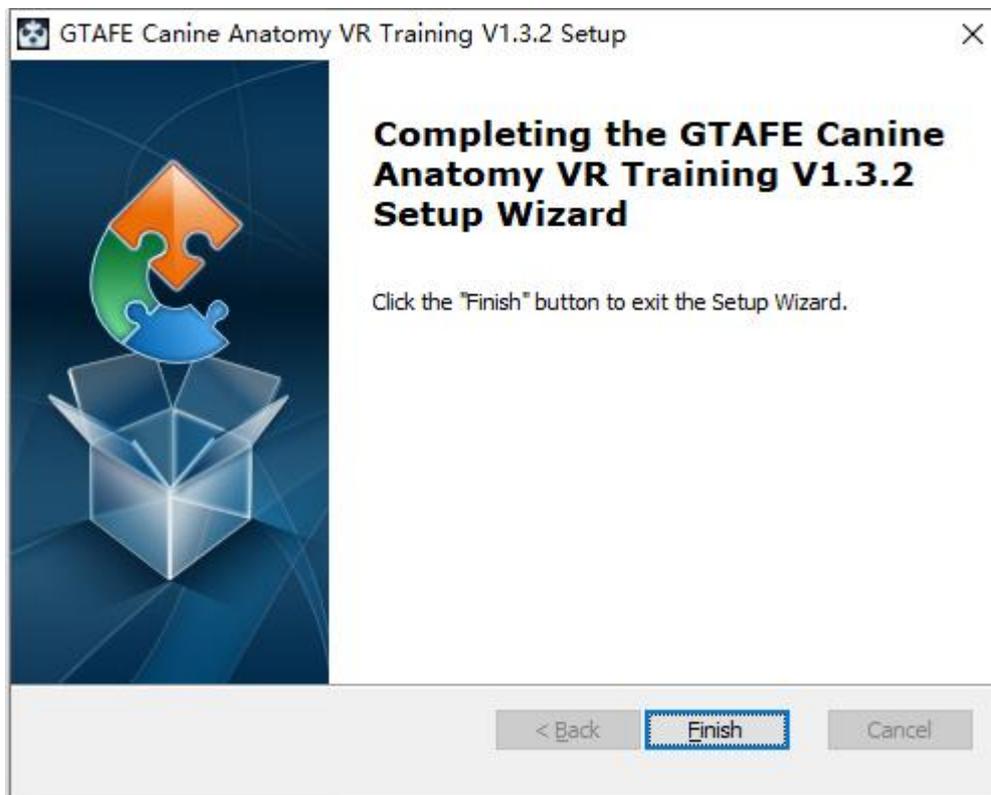
Click on 'Next' .



Click on 'Install' .



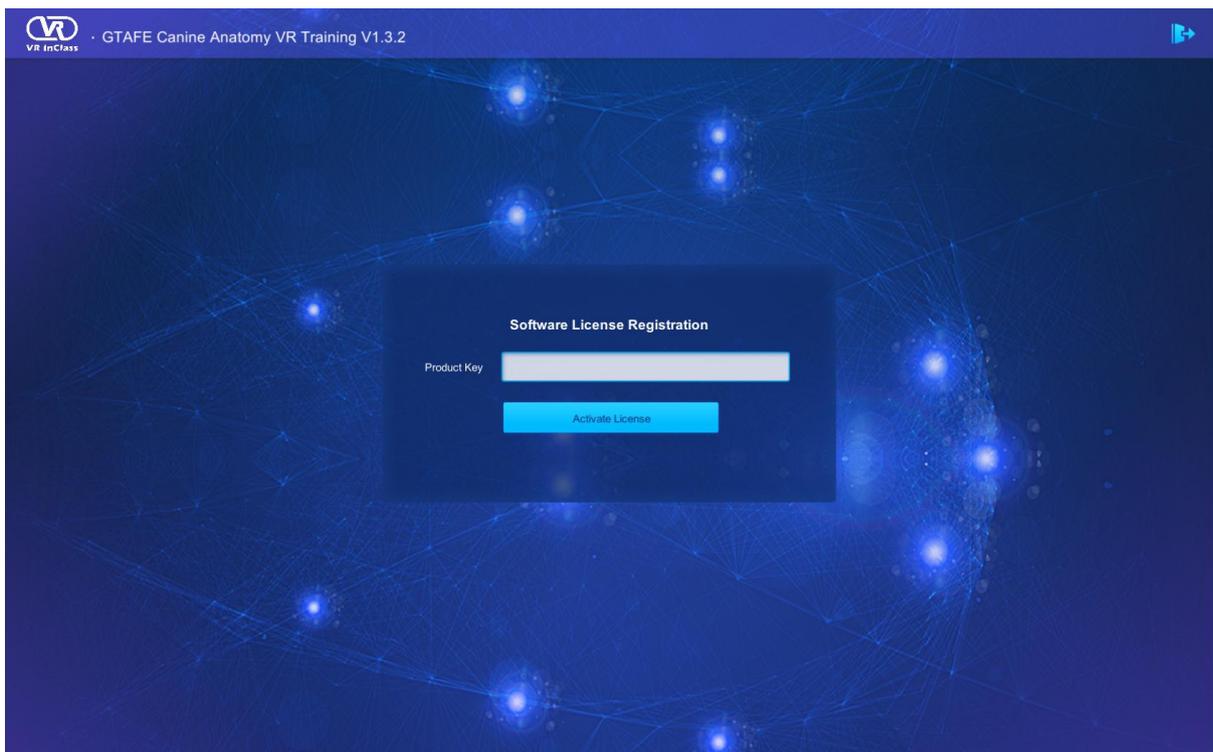
Click on 'Finish' .



After installation, the shortcut icon will appear on the desktop. Double click on it.



Apply for the authorization now.

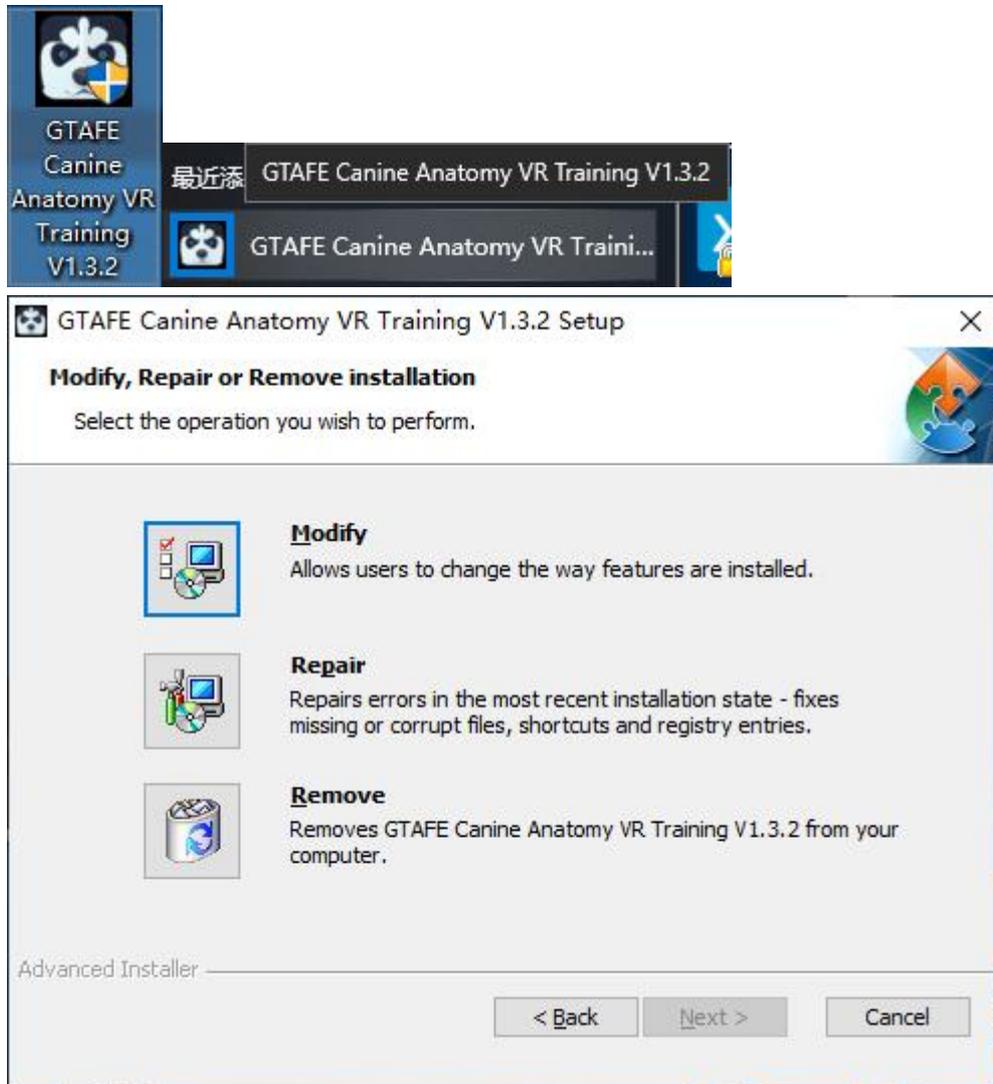


Enter the software registration interface, and send the application code to the product management center to generate the registration code and authorization code. Click on the 'Activate' button to complete the authorization.

After the authorization is complete, user can start using the software.

The uninstallation steps are as following,

Double click on the software or find the software from the All Programs to uninstall according to the instructions.



4.2. Operating Instructions

4.2.1 Main interface

The main function areas include scenario switch area, main operator interface, operator sub-interface, and 10 physiological systems switch area.

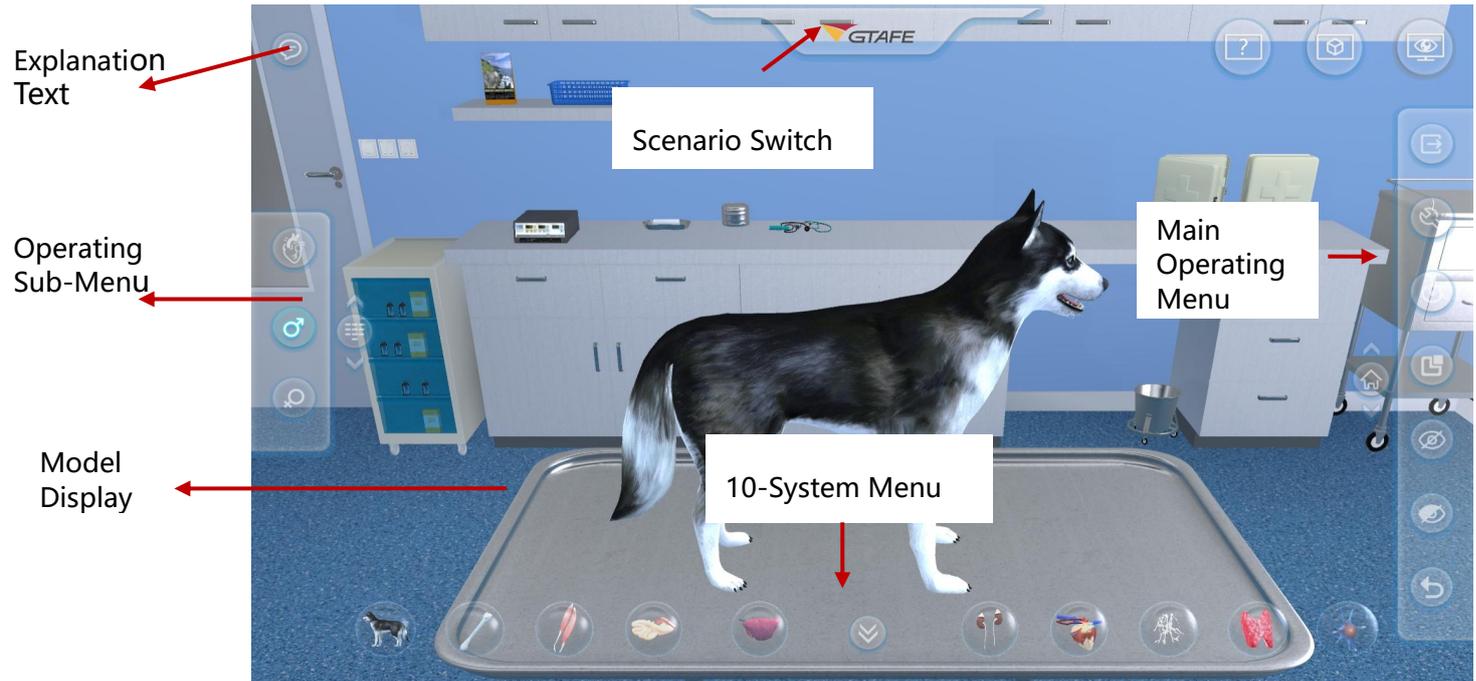
After opening the software, user will enter the laboratory scenario. The canine anatomy model stands by at the center. User can use the interactive pen to click or hover over the canine animation, to start the anatomy operation.

The canine stand-by animation is as below,



The main interface includes six areas: scenario switch area, explanation text box, main operating menu, operating sub-menu, 10-system menu, and model display area.

The main interface of canine anatomy is as below,



4.2.2 Scenario switch

Function icon:



When user hovers the interactive pen over the logo, two interactive icons will appear.



User can click the icon to switch the scenario. Currently two scenarios are available, i.e. laboratory scenario and blue background scenario. The laboratory scenario offers a

real anatomy platform for a more lifelike experience. The blue background scenario makes it easier to know the model structure.

Laboratory scenario



Blue background scenario

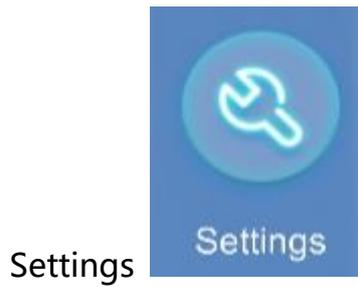


4.2.3 Main operating menu

The main operating menu lies in the right of the interface, including Exit, Settings, Initialize, Return, Hide, Hide Unselected, and Previous. When user moves the interactive pen to hover over a function key, the key will be highlighted in blue.



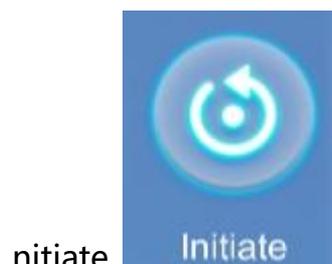
Click on the 'Exit' button to close the software.



Click on the 'Settings' button, and the settings interface will pop up. User can set the language, vibration (activate or deactivate the vibration of the interactive pen), stand-by animation time (no animation, 1-min stand-by, and 5-min stand-by),

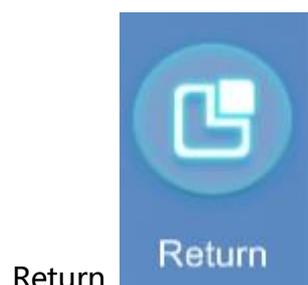


and deactivate license(user can click the 'Deactivate license' button to select whether or not to deactivate license)



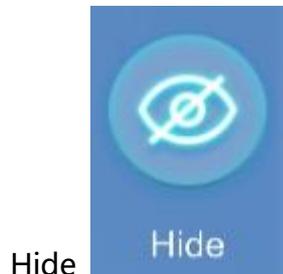
nitiate

Click on the 'Initialize' button to restore the model to the original status, i.e. front view of the original complete unsplit model with visible integumentary system.

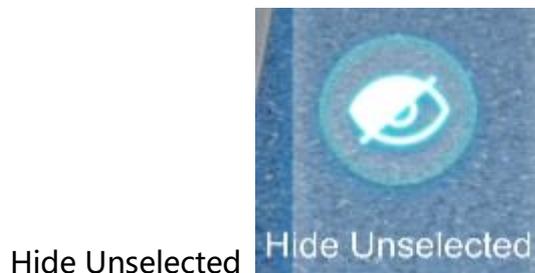


Return

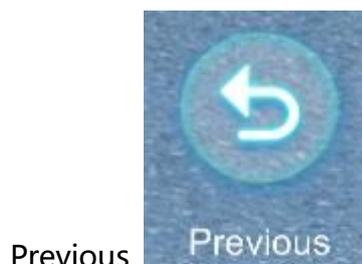
Click on the 'Return' button to return the selected part to its original position in the model (return the single split part back to the original position in the entire structure regardless of whether the entire structure has been dragged)



Click on the 'Hide' button to hide the selected module.



Click on the 'Hide Unselected' button to hide the unselected modules, and only the selected module visible.



Click on the 'Previous' button to go back to the previous operation.

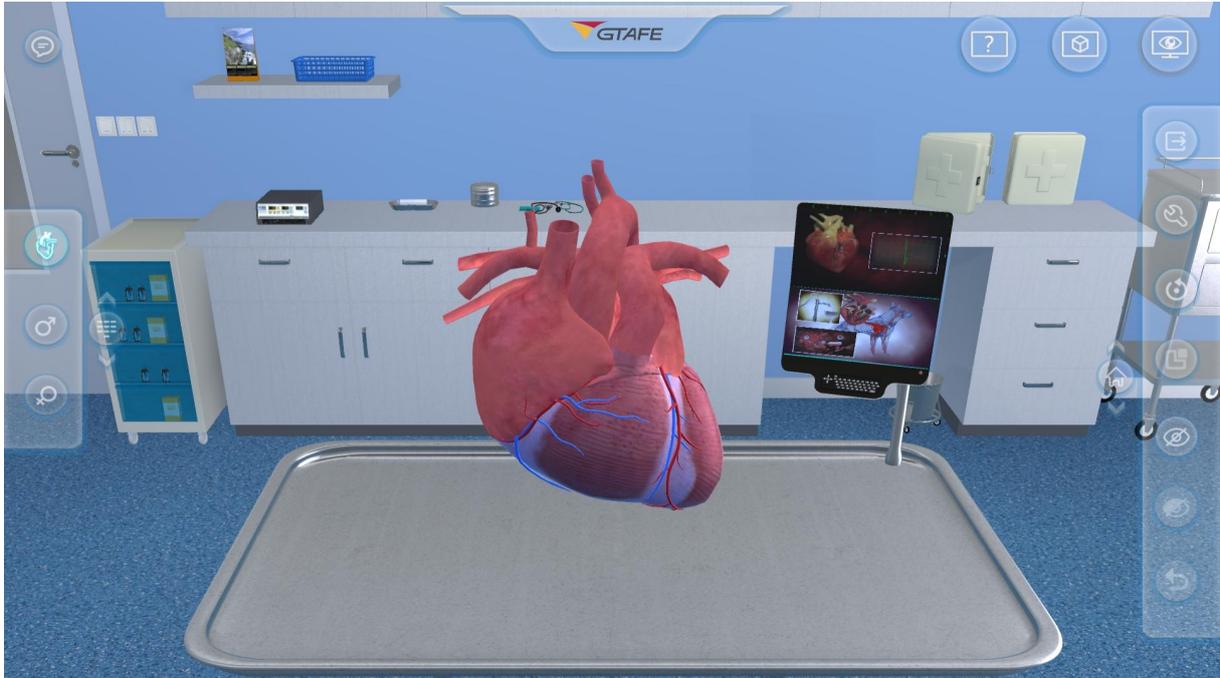
4.2.4 Operating sub-menu

The main operating menu lies in the left of the interface, mainly used for the male / female switch and heart display.



Heart

Click on the 'Heart' button to go to the heart interface, as below.



Male

Click on the 'Male' button to go to the male canine interface, as below.



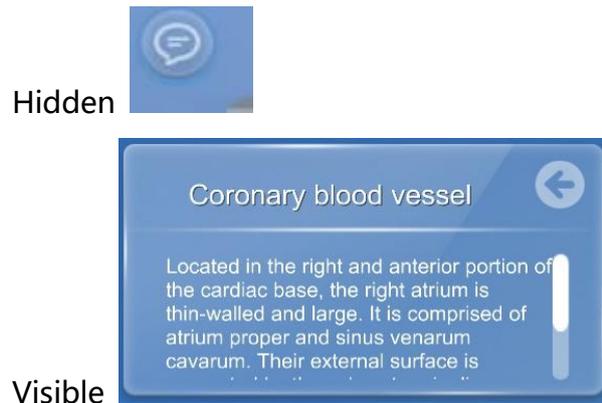
Female

Click on the 'Female' button to go to the male canine interface, as below.



4.2.5 Explanation text box

The explanation text box, which can be visible or hidden, lies in the top left corner of the interface. It describes the name and function of the selected model structure. The default status is hidden. When the interactive pen clicks on a structure, the corresponding explanation text box will pop up.



4.2.6 10-system menu

The 10-system menu lies in the bottom of the interface, used for system display and initiation. Click on certain physiological system can display or hide the system. When the interactive pen hovers over the function key, the key will be highlighted and the related system name will also be offered.

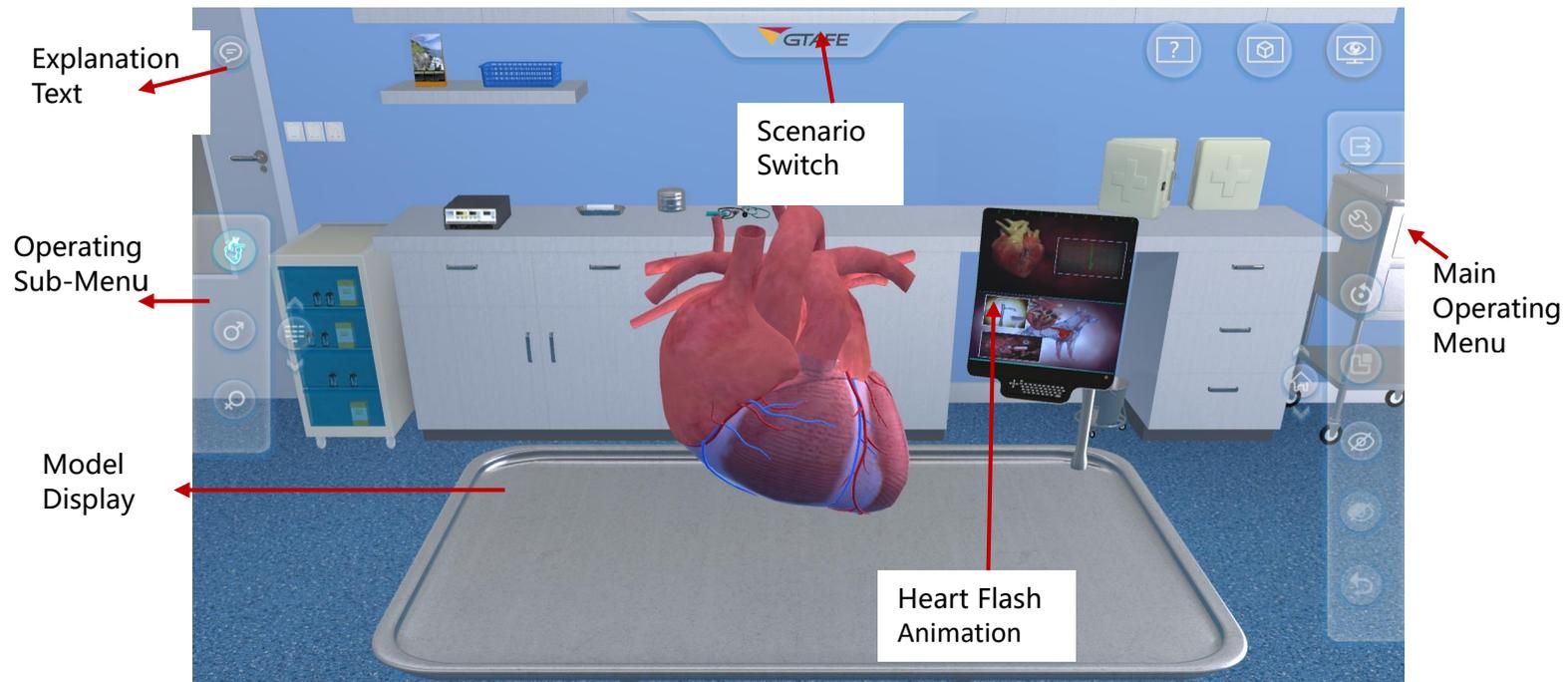




4.2.7 Main interface of the heart

The main interface includes six areas: scenario switch area, explanation text box, main operating menu, operating sub-menu, heart flash animation, and model display area.

The main interface of the heart is as below,



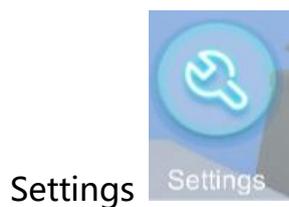
The heart interface shares the same scenario switch, explanation text box, and operating sub-menu as the canine anatomy interface. But some function keys of the main operating menu are unavailable (marked in gray), and the heart flash animation is a new function.

The main operating menu includes Exit, Settings, Initialize, and Hide, while Ret, Hide Unselected, and Previous are not applicable.

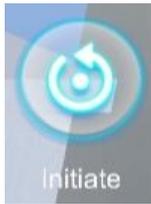
The following buttons are valid,



Click on the 'Exit' button to close the software.



Click on the 'Settings' button, and the settings interface will pop up. User can set the language, vibration (activate or deactivate the vibration of the interactive pen), stand-by animation time (no animation, 1-min stand-by, and 5-min stand-by), and deactivate license(user can click the 'Deactivate license' button to select whether or not to deactivate license)



Initialize

Click on the 'Initialize' button to restore the model to the original status, i.e. front view of the original complete model with visible integumentary system.



Hide

Click on the 'Hide' button to hide the selected model.

Heart flash animation interface:

The heart interface is supplemented with canine heart status animation and blood circulation animation, to help users understand the heart movement and direction of blood flow and master the heart function.

The flash animation interface is as below,



4.2.8 Interactive operation of the interactive pen

The interactive pen is shown as a yellow arrow  on the interface.

Left button: Click - select a structure or cancel the selection; Drag - split a single structure

Right button: Click - select a structure or cancel the selection; Drag forward and backward - zoom in or out the entire model

Middle button: Click - select a structure or cancel the selection; Drag - move the entire model

Directing toward the interface:



When the interactive pen is directed toward a structure, the color of the structure will turn darker.

Clicking on the model:



When the interactive pen clicks on a structure, the structure will be outlined in blue.

Splitting the model:



Click on the left button of the interactive pen can split a single structure, and the structure remains selected while it is moved.

Restoring the model:



When the interactive pen selects and moves a structure, the original position of the structure will become semi-transparent. If user releases the left button

when the structure is moved near its original position, the structure will automatically go back to its original position and complete the restoration.

Moving the model:



Click on the middle button of the interactive pen can move the entire model.

Zooming in or out the model:



If no structure is selected, click on the right button of the interactive pen can zoom in or out the entire model (close to the screen for zoom-in, and far away from the screen for zoom-out).



If a structure is selected, click on the right button of the interactive pen can zoom in or out the structure (close to the screen for zoom-in, and far away from the screen for zoom-out).

When the interactive pen moves the model to come into contact with the lab bench, the model will bounce, and the structure will be split on the bench.

The model contacts the bench, as below,



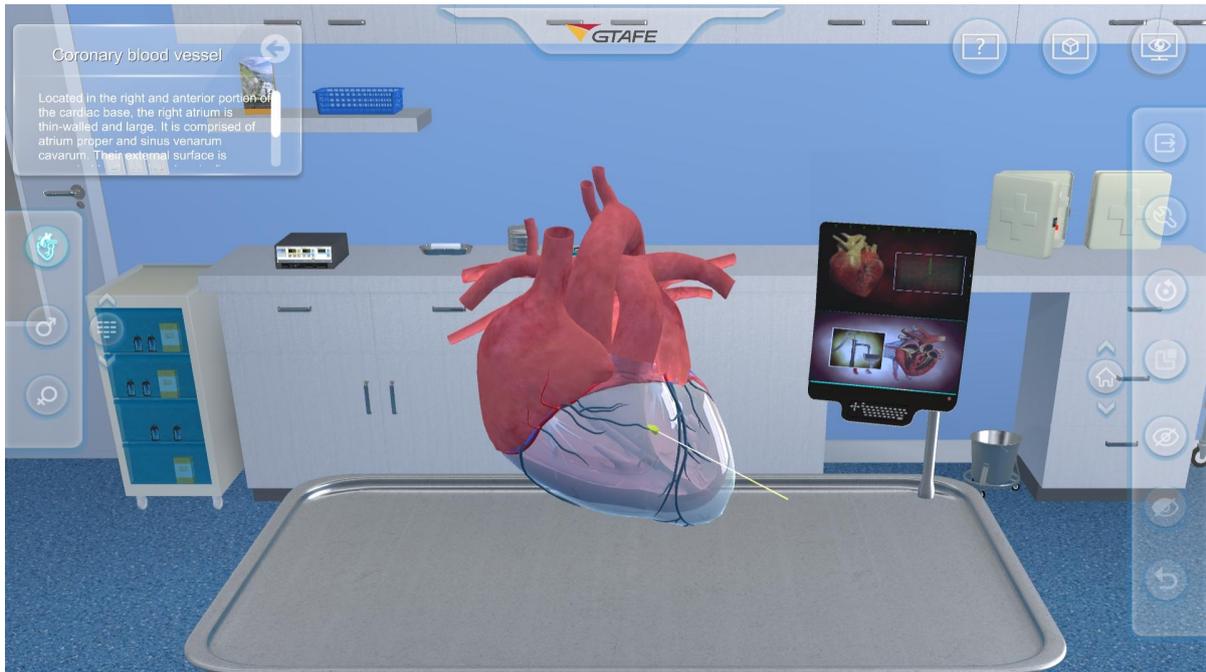
The model bounces off the bench, as below,



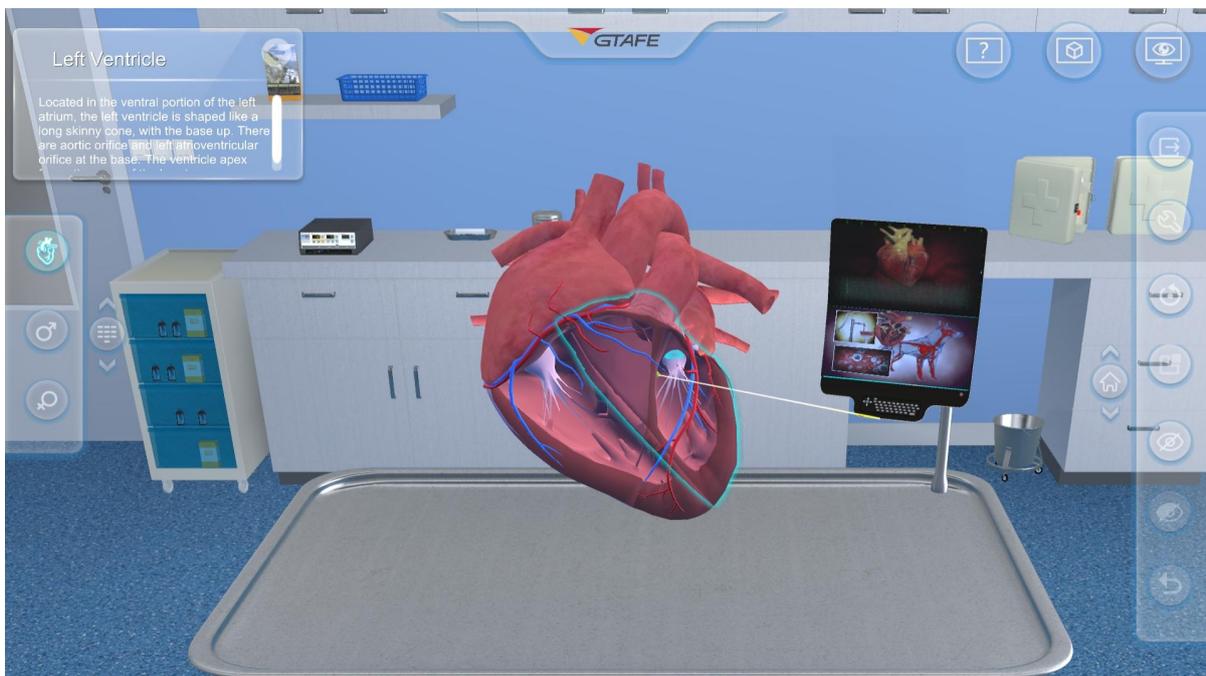
Viewing the internal structure of the heart:

When the interactive pen is directed toward the anterior aspect of the heart, the ventricle becomes semi-transparent. Left click on the anterior aspect of the heart can hide it and show the internal structure of the heart.

Directing toward the anterior aspect of the heart:

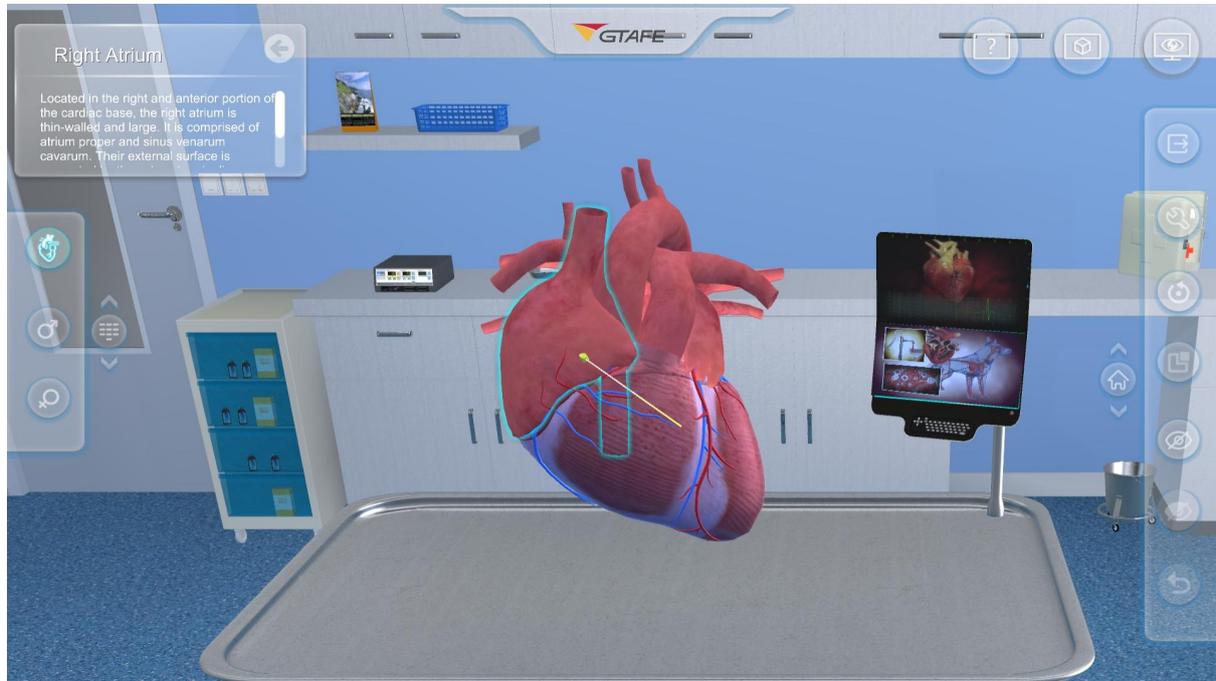


Clicking on the anterior aspect of the heart:



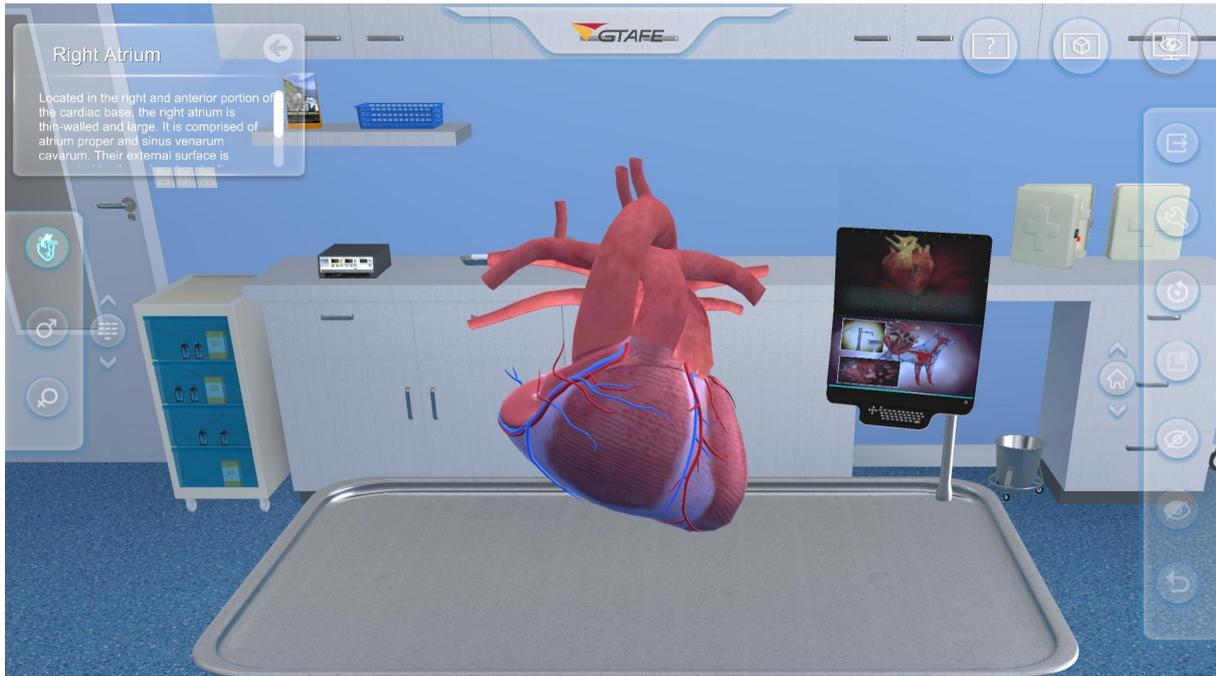
Moving the heart:

When user moves the heart using the middle button of the interactive pen, he can feel the heartbeat vibrations (the vibration can be deactivated in the Settings).



Hiding the heart:

While selecting a structure with the interactive pen, click on the 'Hide' button can hide the structure. This process is irreversible. Only click on the 'Initialize' button can restore the hidden structure.



5. Application Notes

1. The system simulates the real scenario, and the model will bounce in case of coming into contact with any object. If the model is stuck, please press the 'Initialize' button to reset its position.
2. If there is no 3D effect, please create a shortcut, and open its Properties dialog box. Find 'Target' in the 'Shortcut', and fill in '-enable-steroscopic3d -force-opengl -screen-width 1920 -screen-height 1080 -screen-fullscreen 0 -popupwindow -always-windowed' following the exe. Then click on the 'Apply' and 'OK'.

