

# Research on the Development of Sensor Tracking Technology under the Guidance of Artificial Intelligence

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**Abstract:** The development and application of artificial intelligence from before heavy calculation to today's parallel processing, has a qualitative leap, for the experience of human experts can predict the conclusion, the integration of chip development has been artificial intelligence to create economic benefits of a big research topic, and combined with the analysis of all kinds of indicators to sensor data technology also more directional in artificial intelligence, modern research and development of all kinds of tracking equipment and drone equipment to a certain extent, integrated the sensor detection technology, and on the development of programming language, have the updated research field.

**Keywords:** Smart sensor; visual VR tracking; evolutionary algorithm; sensor data acquisition

## 1. Introduction

Due to the extensive promotion of the expert system, Experienced experts to analyze the diversity of AI, And the algorithm evolution of artificial intelligence and brain-like thinking under the condition of stable programming structure, This is of great benefit to the application and development of artificial intelligence, Algorithm generators are also the mainstream development direction in recent years, Combining the evolutionary algorithm of artificial intelligence, The results generated by the algorithm and the adversarial comparison algorithm have a game effect, This allows humans to build on the inference of intelligent algorithms, With the new lines of thinking, From a developmental perspective, The social structure of human-computer interaction will become one of the increasingly mature topics, The use of sensing tracking technology will be greatly improved technology[1].

## 2. Research on VR in visual sensing technology

### 2.1 Preparation of VR technology

In the computer vision generation technology, the visual VR transmission of sensors is a way to have an immersive experience of high-quality visual sensing information[2], Back in the 1980s, The concept of virtual reality has been advocated by many scientists, Generating vision technology for computers, In the effect of stereo vision to meet the multi-dimensional needs of users, During the transformation of the visual field, VR's visual sensing

technology has also been improved somewhat, Virtual reality devices that meet the needs of their users, Performed the information collection of the sensors, Experiencers use a variety of output devices to complete the digital information experience, And get the multi-dimensional sense of space, The research and development of closed head display has a more authoritative guiding significance in this field, Since the location of the sensor deployment of the head display is somewhat related to the neural network distribution designed in brain-like studies, So the head collected by the sensor has a corresponding relationship with the brain module controlling the movement process[3], The sensors on the virtual reality devices analyze the data, transmit it to the computer, and generate real-time constructed multi-dimensional visual images, so as to improve the pleasure of users' experience content under the action of the visual sensor.

### 2.2 Development process research of VR application

When applying sensors to collect VR information, it is usually necessary to prepare models, video resources, audio output and other resources. In the actual development process, the sensor needs to be combined with the Unity program compiler to integrate and compare. In the whole process of VR interactive development, the software produced also changes with the collection information content of the sensor[4], To a certain extent, this makes the sensor information has the basis of multi-dimensional information collection.

### 2.3 Development process of multi-dimensional vision sensor model establishment

Among the many software that establish multi-dimensional model, the application of Blender is the most mainstream. Under the 3D content that provides open source information, the production process is relatively recognized by the studio. In terms of the modeling parameters of sensor acquisition, the design of bone binding and animation is the 3D characteristics of the software in the production process, rendering the physical simulation process around the design demonstration, so that the user's visual experience can rise. In the later synthesis process, the software has the synchronization function of sensor information.

## 3. Acquisition of sensing and tracking data

### 3.1 Introduction of the acquisition and tracking controller

In the actual background, the controller of virtual works binds objects in the real world according to the parameter requirements of the tracking system, which completes the fundamental information import in the function of tracking objects[5]. In the mainstream products, VIVE Tracker as VIVE VR accessories, with stronger control tracking sense, it has a strong with chase function, in many experiments, its control parameters is more like the embedded controller handle operation terminal, but no entity button failure, in the case of no design button, implement 6 DOF tracking function, VIVE Tracker volume of short lean, sensor data only by binding it to the human body any joint sensor data acquisition[6]. Thus, it accurately realizes the expected effect of motion capture and tracking in the virtual world.

### 3.2 Rendering design after tracking data collection

Using Substance Designer can be material rendering design, using the software's advantage of the traditional material on the material provide open source, and in the late rendering, the exported file and related parameters set more valuable, file is smaller, conform to the requirements of the import file, and for exposure parameters, often can set necessary parameters to complete the node parameters design, node parameters exposed output, analyzed by the engine, and make a VR content limited content and attributes[7]. The output and display of the engine should be checked after rendering. Under the control of the Inspector panel, the engine can complete the primary automatic modification state, but the relatively large revision requires further benchmarking to perform. In addition, the software can also change the effect of the user experience requirements. After the computer data collection, by replacing multiple material material to complete the comprehensive design, in the design process, there is undoubtedly a lot of program parallel call, the software parallel file processing ability put forward new requirements, rendering design also support for network files, in the case of tracking data

existing, rendering design is to enhance software beautification effect, the best way to improve the user experience.

### 3.3 Setting of the parameter module of the tracker

- (1) In the experiment, the whole matching mode is used for position tracking, and the switching mode of the equipment should be the same as the VIVE controller;
- (2) Sensor module, the total sensor needs to exchange information with the base station to receive the base station signal and feedback to the equipment. The subsensor needs to be connected to the object to generate a synchronous signal and send it to the equipment;
- (3) Standard camera bracket interface, set the same parameters as the SLR camera, with a 1 / 4 inch screw hole to complete the fixation, generally using the standard tripod cloud head for access;
- (4) Fixed needle slot, produce concussion in the experiment, use fixed needle slot to complete and strengthen the stability of the equipment and bracket;
- (5) Electrical connect the spring pin. During the experiment, when the electrical signal is transmitted, the spring contact interface is used to complete the electrical transmission;
- (6) anti-skid equipment, used for the connection between VIVE tracker and accessories, to prevent the two skid phenomenon, providing greater friction;
- (7) USB Port, for the transmission of sensor signals, and provide serial links for the open source update of devices[8].

## 4. Algorithm fusion in sensing technology

### 4.1 Overall design

Since the sphere is the most representative of the multiple stereo devices, assume that in the scene, the 3D sphere is used as the research object, for the rendering design, the sensing data of the sphere to the image is the sensor probe project content.

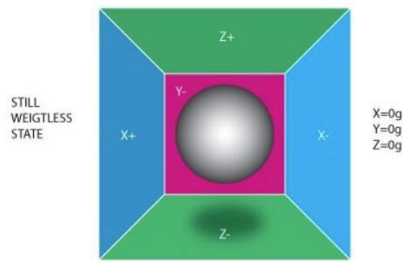
$O = (ka, kb, kc)$  Set the center of the sphere and the radius of the sphere  $r$ , there is a tracing design equation:

$$(a - ka)^2 + (b - kb)^2 + (c - kc)^2 = r^2 \quad (1)$$

When tracing, limiting one point to a random point  $T$ , the above equation (1) can be rewritten as:

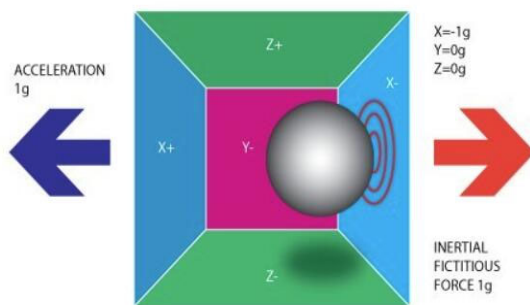
$$(T - K) * (T - k) = r^2 \quad (2)$$

When considering the multidimensional tracking system, set in a sphere in three-dimensional scene, the sensor needs through the form of photoelectric induction signal acquisition, let the acquisition of random points with the movement of the light signal feedback sensing signal, the acquisition output many times, can render the outer boundary of the sphere, so as to determine its position for tracking. As shown in Figure 1.



**Figure 1.** Sphere simulation in 3 D scenes

After determining the position of the sphere is determined, the comprehensive scene carries out diversified feedback. If there are other spheres somewhere in the scene, that is, the unknown amount is not unique, then the emitted light of the collected sensor will cross the feedback with the feedback light source of the known spheres. This is not unique to the number of feedback objects on the tracking results. This is all related to the movement state of the sphere. Assuming that the sphere movement is left and right swing, it is shown in Figure Figure 2.



**Figure 2.** Analysis of the sphere movement state

Then the following question is how to use the sensor to collect information to determine whether there is a cross of the set light with a sphere in a specific scene, and whether the cross beam is unique. Set the contact point where the light meets the sphere as, and the determination formula can be derived from the following formula: $T(u)$

$$\begin{cases} (T(u) - K) * (T(u) - k) = r^2 \\ (J + uL - K) * (J + uL - k) = r^2 \end{cases} \quad (3)$$

#### 4.2 Hardware design

In the hardware module, there is a data transmission interface at the cover plate designed at the top of the head, which opens the interface for data transmission. The internal interface device is mainly composed of USB, which increases the possibility of users to the external device[9]In the current device, the input of gestures and foot sense can be completed by the hardware. In addition, the parameters of the waist can be collected and transmitted, and the hardware interface set as open source interface also has a certain market prospect. In the scene of certain circumstances, the user can apply for open light Angle visual mode, generally adopts the field of view positioning value in around 110, in accordance with the

escort of the guidance, as far as possible to use the front-facing camera to complete the image acquisition of the work, sensors, mainly dominated by Steam VR tracking technology, and equipped with G-sensor correction system for auxiliary work, the gyroscope gyroscope configuration is the necessary objects in high-end stability equipment, from a certain extent, solve the problem of position instability.

### 5. Application of sensing and tracking technology guided by artificial intelligence

In view of the diverse applicability of sensing tracking technology[10]Under the guidance of artificial intelligence, it is also widely used, which is mostly related to the artificial intelligence measurement of tracking data.

#### 5.1 Medical treatment and rehabilitation work

In medical work, medical staff can use sensor tracking means to complete the process of simulation operation, in order to improve the success rate of surgery, using virtual tracking technology with sensor can complete the transmission of 3D imaging technology, when tracking pathogens and target, using simulation surgery can be completed for fear of heights, autism treatment, in addition, tracking sensor for the potential parameters of the nervous system also has certain contribution, this has a new breakthrough in remote medical subject[11].

#### 5.2 Social networking platform

In the context of complex social networks, virtual reality experience with sensors can also complete the basic needs of human beings on mobile platforms. In the process of human-computer interaction, VR experience is mostly received by the new generation of social experts.

### 6. Challenges for the future development of intelligent sensing and artificial intelligence

#### 6.1 Price war competition

The hardware cost of tracking sensors is currently relatively expensive on the market<sup>[12]</sup>, The implantation of mobile devices makes the market price of hardware not accepted by consumers, thus reducing the desire to consume, which to a certain extent inhibits the development of intelligent sensing tracking technology.

#### 6.2 Limitations of computing technical capabilities

For the high requirements of computing capacity and artificial intelligence parameters, there is a widespread mismatch between effect and technical capabilities. A large number of technologies are supported by the research and development requirements of high pixel and high precision positioning tracking equipment, which is

undoubtedly a huge test for the computing speed and ability of the internal chip of the equipment.

### 6.3 Future development

In today's world, with the rapid development of artificial intelligence, the trend of human-computer interaction is imperative. Under the premise of artificial intelligence oriented, providing simulation scenes and using intelligent sensing tracking technology to carry out necessary human actions, which will become increasingly intense in the future of the technology development.

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