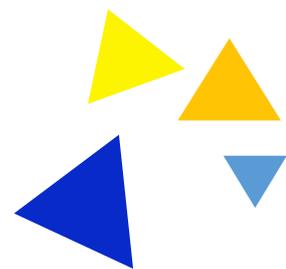


# Test Project (Offline)

## BRICS-FS-19\_Augmented and Virtual Reality

**2022 BRICS Skills Competition**



## 1. Competition Form

The Augmented and Virtual Reality event is a team skills competition, with each team consisting of two contestants.

## 2. Competitive Events

The competitive events are completed by four modules in sequence: virtual module design and production, virtual module rendering and production, UAV cognitive function development and UAV operation function development.

- 1) Virtual module design and production
- 2) Virtual module rendering and production
- 3) UAV cognitive function development
- 4) UAV operation function development

## 3. Competition Modules and Time

**Table 1 Competition Modules List**

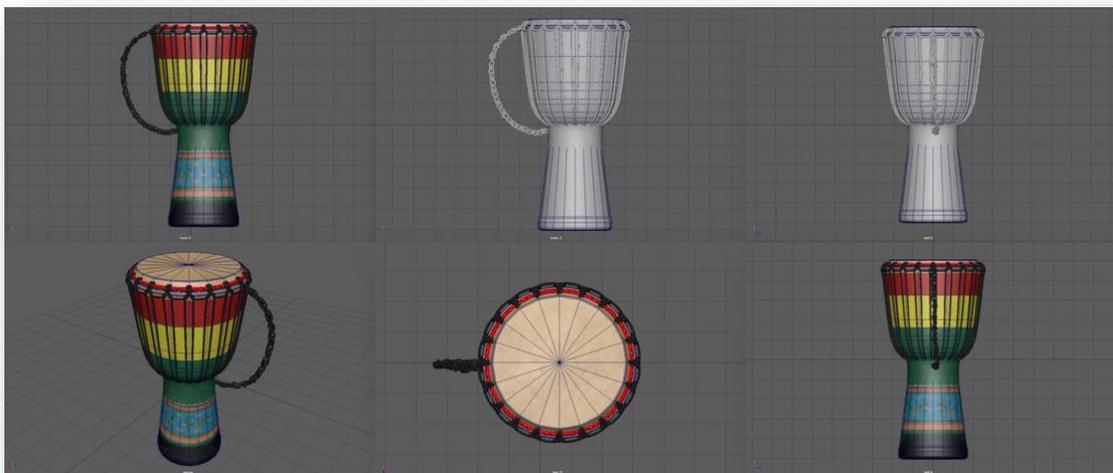
S/N	Module Name	Competition Duration
1	Module A: Virtual module design and production	210 minutes
2	Module B: Virtual module rendering and production	210 minutes
3	Module C: UAV cognitive function development	210 minutes
4	Module D: UAV operation function development	210 minutes

**Table 2 Competition Schedule**

Date	Working Items
C1	Module A Task Competition
	Module A Task Competition Results Scoring
C2	Module B Task Competition
	Module B Task Competition Results Scoring
C3	Module C Task Competition
	Module C Task Competition Results Scoring
C4	Module D Task Competition
	Module D Task Competition Results Scoring

### Module A: Virtual module design and production

The competition teams must complete the design and production of the model according to the requirements of the three views given; the model should match the three views, and reasonably control the number of faces of the model, in line with industry production standards.



## **Module B: Virtual module rendering and production**

The competition team must UV unfold the produced model and use a reasonable UV unfolding method to match the UV map with the textures provided to give the model the correct texture for the mapping. The ratio of UV coverage, mapping seams, and texture size need to meet industry specifications. After the model texture is created, the model needs to be rendered, at least one set of lights built, and rendered using the default renderer.



## **Module C: UAV cognitive function development**

The competition team must complete the development of a UAV cognitive virtual simulation software and require the software to be able to run and use in a browser. The software must meet the following four

requirements:

- 1) Reasonable construction of the virtual space of the software.
- 2) Reasonable design of the software interface and functions.
- 3) Diversified cognitive functions.
- 4) Knowledge testing function.

**Content 1: Reasonable construction of the virtual space of the software**

- 1) The scale of the model in the software should be reasonable and in line with people's perception of the object.
- 2) The user's observation view should be centered on the UAV and can be operated by zooming, rotating and panning.

**Content 2: Reasonable design of the software interface and functions**

- 1) The main interface of the software should have the function module buttons of Explosion Observation, Structure Cognition, Component Cognition and Knowledge Testing.
- 2) The software should have a home button after entering the functional modules (Explosion Observation, Structure Cognition, Component Cognition, Knowledge Testing), and click the home button can return to the main interface of the software.
- 3) The location, size and layout of the UI in the software should be neat and beautiful.

**Content 3: Diversified cognitive functions**

- 1) After entering the Explosion Observation function module, the UAV is in the combined state, click the explosion button can observe the explosion state of the UAV structure. Click the recovery button can restore the UAV explosion state to the combined state. Explosion and recovery process need to have obvious movement effects, and at least four components explode.
- 2) After entering the Structure Cognition function module, the UAV components are introduced by lead-out wire (arrows, labels). The introduction of different components of the UAV can be achieved by clicking the switch button. The number of UAV components introduced in each group is required to be no less than three.
- 3) After entering the Component Cognition function module, click on any UAV component can highlight the component object and introduce it with voice and subtitles, and click on other UAV components can switch the component introduction effect. The number of components introduced is no less than five.

#### **Content 4: Knowledge testing function in the software**

- 1) Click the Knowledge Test module button in the main interface of the software to enter the Knowledge Test module.
- 2) There are no less than five multiple-choice questions in the test, and the user needs to be reminded whether the answer is correct or not after answering the question, and the score can be counted

correctly.

#### **Module 4: UAV operation function development**

The competition team must complete the development of a UAV operation virtual simulation software and require the software to be able to run and use in a browser. The software must meet the following four requirements:

- 1) Reasonable construction of the virtual space of the software.
- 2) Reasonable design of the software interface and functions.
- 3) The software shall have the content of UAV assembly.
- 4) The software shall have the content of UAV control.

#### **Content 1: Reasonable construction of the virtual space of the software**

- 1) The scale of the model in the software should be reasonable and in line with people's perception of the object.
- 2) The UAV in the software should be placed on the ground in an open and unoccupied place before taking off.
- 3) The user control perspective is first-person perspective, with position movement and perspective steering. The initial state can observe the full view of the UAV.

#### **Content 2: Reasonable design of the software interface and functions**

- 1) The main interface of the software should have the function module buttons of UAV Assembly and UAV Control.

- 2) After entering the function modules (UAV Assembly, UAV Control), the interface should have a home button, you can click the home button to return to the main interface of the software.
- 3) The location, size and layout of the UI in the software should be neat and beautiful.

**Content 3: The software shall have the content of UAV Assembly**

- 1) Click the UAV Assembly button in the main interface of the software to enter the UAV Assembly module.
- 2) Click on propeller 1 and the installation position, then the propeller 1 moves to the installation position and screwed tightly. As above, propeller 2, propeller 3 and propeller 4 will be installed in turn.
- 3) Click the PTZ camera and the installation position, then the PTZ camera moves to the installation position.
- 4) Click the PTZ latch, remove the gimbal latch from the PTZ camera and put it on the ground.

**Content 4: The software shall have the content of UAV Control.**

- 1) Click the UAV Control button in the main interface of the software to enter the UAV Control module.
- 2) Click on the UAV boot button, the boot sound will be played, the light will be on and the propeller will start rotating.
- 3) After the UAV is turned on, the first-person view should be

switched to third-person view and follow the UAV movement.

- 4) After the UAV is turned on, press W, S, A, D to control the UAV to move forward, backward, left and right respectively.
- 5) After the UAV is turned on, press Z and X to control the rise and fall of the UAV respectively.
- 6) After the UAV is turned on, press Q and E to control the left and right steering of the UAV respectively.
- 7) The UAV propeller speed should follow the UAV operation to make reasonable changes.

#### 4. Scoring Standard

**Table 3 Scoring Standard**

S/N	Module	Score		
		Subjective	Objective	Total
A	Virtual module design and production	4	16	20
B	Virtual module rendering and production	4	16	20
C	Development of cognitive functions of virtual products	6	24	30
D	Development of operational functions of virtual products	6	24	30
Total:		20	80	100