2025

BRICS SKILLS COMPETITION

(BRICS+ FUTURE SKILLS & TECH CHALLENGE)

Intelligent Agriculture

BRICS-FS-32

Technical Description

(International Finals-Offline)

August, 2025

Catalogue

1. Project Introduction

1.1 Project description

Project number: BRICS-FS-32

Name of competition: Smart Agriculture

Industry of competition: electronic information industry, strategic emerging industry

1.2 Purpose of the Competition

To advance the implementation of the spirit regarding skills development outlined in the BRICS Xiamen Declaration, Johannesburg Declaration, Brasilia Declaration, Moscow Declaration, and New Delhi Declaration, as well as to realize President Xi Jinping's initiative to "host BRICS Vocational Skills Competitions to build a platform for exchange and cooperation between vocational colleges and enterprises," we aim to establish a high-standard competition platform with distinctive vocational education characteristics. This initiative will facilitate in-depth educational collaboration and cultural exchanges among BRICS countries, pragmatically promote the "Education Follows Output" concept, and advance the "Vocational Education Globalization" action plan alongside international industry-education integration. Focusing on key areas such as advanced manufacturing, digital economy, emerging industries, new business models, and cutting-edge technologies, we seek to enhance the capabilities of teachers and students in BRICS+ countries' vocational institutions across innovation, coordination, organization, and collaboration. By enriching the content of exchanges and cooperation between BRICS+ vocational colleges and enterprises, we strive to cultivate internationally competitive technical professionals and cultural exchange talents for BRICS nations.

1.3 Participants

(1) Registration requirements for participants

The 2025 BRICS Vocational Skills Competition will have no age or category restrictions. Eligible participants include vocational college students (including higher vocational and technical institutions), undergraduate students, faculty members, and employees from enterprises and public institutions aged between 16 (born before January 1, 2009) and 35 (born after January 1, 1990).

(2) Team formation of competitors

Teams must not be formed across different organizations. Each participating team must consist of contestants, certified instructors, and team support staff (team leader), with contestants and instructors being mandatory registration requirements. This is a two-person competition, with each team limited to 2 certified instructors. The same individual cannot serve as both instructor and contestant. Each organization may enter only 2 teams in the same category.

1.4 Promotion

The rules for the advancement of each event to the international finals are as follows:

1. If the number of valid registration units is less than or equal to 10, two seats will be promoted;

2. If the number of valid registration units is more than 10, they will be promoted by 20%;

3. Only one team is allowed to advance from the same competition in the same unit.

2. The abilities that the contestants need to have

This competition is designed for smart agriculture scenarios, focusing on comprehensive project implementation tasks. It evaluates contestants 'integrated application of IoT, AI, and agricultural knowledge, with particular emphasis on adaptability. Key assessment areas include: smart farming equipment selection and engineering design capabilities, hardware/software installation and debugging skills, system integration and construction proficiency, platform configuration management expertise, application development competencies, and professional ethics. Participants must utilize specialized tools and instruments to design, install, build, debug,

configure, and develop a stable smart agriculture system that meets project requirements. Through real-world task implementation, the competition assesses contestants' holistic professional capabilities.

3. Competition items

3.1 Competition module

The competition includes modules A, B, C, D and E, and the total time of the competition is 6 hours.

module	Module name	Duration of competition	Score percentage
A	theoretical examination	1 hour	10%
B	item design	2 hours	30%
C	Cloud platform environment construction and deployment	3 hours	20%
D	Embedded application software development		30%
E	professional quality	/	10%

3.2 Module description

Module		Primary coverage
Module A	theoretical examination	The assessment of contestants' theoretical examination on smart agriculture combined with the Internet of Things mainly focuses on the principle, application, architecture and related practice of the Internet of Things technology in smart agriculture.

Module B	Item design	Assess the overall design of smart agriculture engineering projects by contestants, including scheme design, equipment selection table, site design diagram, system framework diagram and intelligent control system design according to the provided equipment list and task requirements.
Module C	Cloud platform environment construction and deployment	Assess the content related to cloud platform construction, including database, JDK, Tomcat, nginx and other related environment construction and operation.
Module D	Embedded application software development	The competition evaluates the ability of contestants to develop embedded application software using development tools. They are required to complete prototype design, function development and debugging according to the requirements of application scenarios.
Module E	professional quality	Assess the professional quality of the players during the competition, including but not limited to standard archiving documents, abide by the discipline of the competition, etc.

3.3 Questioning mode

The proposition work of this competition is responsible for the proposition expert group designated by the executive committee of the competition, which designs according to the content requirements of the technical documents of the competition, combined with the training requirements of intelligent agriculture talents and the needs of enterprise positions.

After completing the proposition, the proposition experts are submitted to the experts designated by the executive committee of the competition for review.

3.4 Competition process

(1) Competition time: 360 minutes.

(II) Competition schedule:

The competition process is as follows: the competitors register—— introduce the competition rules and draw lots—— organize the competitors to get familiar with the venue before the competition—— the official competition—— the expert judges evaluate the results—— the closing ceremony and the award ceremony.

Specific competition schedule:

Date	Time	Item	Participant
C-2	08:30-17:30	Construction of the stadium and arrival of facilities and equipment	Site manager and assistant Implementation guarantee unit Exhibition service unit
C-1	08:30-17:30	Construction of the stadium and commissioning and acceptance of facilities and equipment	Site manager and assistant Implementation guarantee unit Exhibition service unit
C-1	15:30-17:00	Pre-competition briefing	Expert team and all participating units
C1	08:00	Get to the arena	Team of experts Technical support units of each participating unit
	08:00-08:40	Contestants shall present their entry certificate, ID card and student card to the staff for registration	
		The entry number is determined	Site manager and assistant

		once and for all	implementation support unit
		Participants compete with one encrypted entry The number is encrypted by a second lottery to determine the race item	
	08:40-09:00	The player enters the work station, equipment and materials affirm	
	09:00-12:00	Official competition	
	12:00-14:30	Module scores	
	14:30-15:00	The date is confirmed on the same day	
	15:00-16:00	Summarize the results	
	16:00-18:00	Results announced, closing ceremony	

4. Scoring rules

4.1 Evaluation method

After the end time of the competition, the judging team will evaluate the participating teams in groups, with at least three judges per group. Each judge has a scoring sheet and will install equipment according to the requirements on the sheet and submit results along designated paths for evaluation based on the standards specified in the sheet.

4.2 Scoring procedure

The evaluation consists of subjective (subjective) and objective (objective) scoring. Scoring panels are established according to the scoring tables for each module, with chief experts appointing judges for each panel to evaluate the respective modules. Each scoring panel

is responsible for on-site scoring of all participants under the same criteria, and must sign to confirm the scoring results.

4.3 Performance calculation

(1) Evaluation score (subjective)

Judgment Scoring Method: Three or more (N) judges form a panel. Each member independently evaluates the item, calculates the weighted average score, divides by three (N), and then multiplies by the sub-item's assigned value to determine the final score. The difference between any judge's scores must not exceed 1 point. If discrepancies occur, specific reasons must be provided and the score adjusted under the supervision of the team leader or chief specialist.

(2) Measurement score (objective)

Scoring Method: Establish multiple scoring groups per module, each consisting of three or more judges. All members within a group must collectively determine the contestant's actual score for that event before finalizing a single score. When there are multiple judges, alternative grouping methods may also be implemented.

4.4 Composition and grouping of the panel

Expert group leader:

The competition implements the chief expert responsibility system, which is fully responsible for the competition and adjudication of the event. The expert leader is selected and approved by the organizing committee of the event.

Conditions and composition of the referees:

(1) Referees shall comply with the working management standards of referees. Before the competition, the executive committee of the event shall organize training for referees.

(2) Referees shall comply with the management of the chief expert. Their assignments are determined either through the chief expert's directives or by a random draw. During working hours,

referees must not engage in favoritism, be absent without cause (including late arrivals, early departures, or leaving their post prematurely), or abandon their duties. Violations will result in disciplinary actions based on the severity of the offense, which may culminate in disqualification from officiating duties and formal documentation in the case records.

(3) According to the work needs, the chief expert divides the judges into several groups such as on-site judging group and result scoring group. The on-site judging group is divided according to the competition positions and sessions, and each group carries out corresponding work under the unified arrangement of the chief expert.

Judicial professional competence requirements:

	Professional and technical direction	**Judicial, teaching and working experience**	**Professional and technical qualifications (Professional qualifications)**
1	Internet of things	Have provincial-level experience in refereeing relevant competitions and be a guide teacher	Intermediate and above professional titles
2	Electronics, communications		
3	computer		

4.5 Evaluation basis

In the process of event design, the selection of criteria and evaluation methods will be determined by scoring scheme and competition questions.

Evaluation basis, including but not limited to:

Module	Competitive tasks	Scored points	Code of points	Partition
A	theoretical examination	schematic diagram	There are 100 multiple choice questions and true or false questions, each worth 0.1 points.	10 minutes
B	item design	conceptual design	According to the test requirements, complete the design of a smart agriculture scenario scheme, which requires the design to be standard and reasonable, and correctly submit the	30 minutes

Module	Competitive tasks	Scored points	Code of points	Partition
			word file.	
		Equipment selection table	Complete the equipment selection form according to the test requirements. The form should include equipment name, unit, quantity, brand and model, etc., and submit the excel file correctly.	
		Site design drawing	Use autocad tools to complete the CAD drawings, which are required to meet the test requirements, including equipment location and consistent with the selection table, including signal transmission mode and power supply mode, and correctly submit the CAD source files and PDF drawings.	
		System framework diagram	It is completed by VISO software, and the three-layer architecture system diagram of the smart agriculture system is included, and the VISO file is correctly submitted.	
C	Cloud platform environment construction and deployment	Environment building	Complete the environment and configuration required for the cloud platform operation, including JDK, MySQL, Tomcat, ngix, etc. Save screenshots of key steps according to the test requirements, and submit them with correct names.	20 minutes
		Add devices	Add and configure the device on the WEB end, save screenshots of key steps according to test requirements,	

Module	Competitive tasks	Scored points	Code of points	Partition
			and submit them with correct names.	
D	Embedded application software development	Engineering creation	Use QT software to complete the Gui application engineering creation.	30
		interfacial design	According to the test requirements, select appropriate materials to complete the UI design of the application program, and the interface should be consistent with the test requirements.	
		Data display and control	According to the provided protocol document, it can process the sensor data in the electronic product and display it on the program interface, and at the same time, it can control the equipment in the electronic product with correct instructions.	
		Scenario applications	According to the test requirements, the sensor and control equipment should be linked in the scene with a response time of no more than 1s, and the linkage function can be normally withdrawn.	
D	professional quality	Data archiving	During and after the competition, all digital assets such as schematic diagrams and codes can be systematically sorted out, named and archived in accordance with professional norms and requirements, with clear directory structure for easy access.	10 minutes

Module	Competitive tasks	Scored points	Code of points	Partition
		professional quality	They strictly observed the discipline and safety regulations of the competition, demonstrated good team spirit and communication skills, participated in the competition in a civilized manner, calmly dealt with emergencies, and maintained a high sense of safety.	
amount to				100 points

5. Competition related facilities and equipment

5.1 Competition technology platform standards

The competition technology platform and the proposition of the competition project combine the talent training needs of enterprise smart agriculture related vocational positions, and are formulated with reference to the following relevant standards:

ISO/IEC 29182-5-2013 Information Technology-Sensor networks: Reference Architecture for sensor networks

GB T 33474-2016 Internet of Things Reference Architecture

GB50311-2016, engineering design code for integrated cabling system

GB21671-2008 Acceptance and evaluation specification of LAN system based on Ethernet technology

GB/T 34068-2017 Intelligent Sensor Interface Specification

5.2 Environmental requirements

The venue shall ensure adequate natural lighting, proper illumination, and ventilation systems, along with stable water supply, electricity, and emergency power equipment. A

dedicated lounge for all instructors will be provided. Each work area within the competition zone shall be equipped with single-phase AC power supply exceeding 220V/3A. Every workspace must include a workstation for placement of computers and debugging tools

2. Work chairs (stools). The technical support area provides competitors with public spare parts and other competition-related equipment. The service area provides medical services and other service guarantees.

5.3 Equipment list

The technical platform used in this competition is the "Smart Agriculture Training Platform" competition platform selected by the cooperative enterprise Shandong Shiru Information Technology Co., LTD.

Competition platform

(1) Software environment

order number	Name of main equipment	quantity
1	Smart agricultural training platform	1
2	Microsoft Windows 10 (64-bit) trial edition	1
3	WPS	1
4	Microsoft Visio 2016 (trial)	1
5	VMware16	1
6	Qt Creator4.8	1
7	Tomcat, JDK, mysql, nginx, etc	1

(2) Hardware equipment

No.	Name of main equipment	unit	quantity
3	staging	fix	2
4	computer	short for Taizhou	2

6. Competition Information

6.1 Safety operation regulations

(1) Participants shall confirm the safety and integrity of their work stations, equipment and tools according to the regulations, strictly abide by the rules and regulations of the competition, pay attention to personal and equipment safety, accept the supervision and warning of the judges, and compete in a civilized manner.

(2) When installing the equipment, the contestants should understand the performance parameters of the equipment in advance to ensure the correct use of the equipment.

(3) When installing sensors and other equipment, the contestants must pay attention to the short circuit of the positive and negative poles of the power supply to avoid burning out the equipment and causing safety accidents.

(4) When installing equipment, the contestants should keep the power supply of the work station off and do not connect the equipment with electricity. If leakage is found, they should report to the judges in time and contact technicians to check the equipment.

(5) Contestants should pay attention to anti-static safety during the installation of equipment, and should not put the circuit board on a metal surface or without protective stacking.

(6) Participants should not touch or open the power distribution box of the training station, and pay attention to the safety of using 220V strong power behind the station.

(7) Contestants shall not enter the work station of other teams or interfere with the competition of other teams during the competition.

6.2 Information for Teams

(1) Each team shall purchase personal accident insurance for the participants during the competition.

(2) Each team shall manage and educate the participants and team leaders for safety, and the team leaders shall keep communication open during the competition.

(3) All participating teams shall obey and implement the arbitration results. Any malicious appeal, once verified, the organizing committee will investigate the responsibility of relevant personnel.

(4) The team leader is responsible for the management and organization of the team during the competition.

6.3 Leader's Notes

(1) The team leader shall resolutely implement the competition and various rules, obey the arrangement and management of the event executive committee, strengthen the management of the participants, and make all preparations.

(2) The team leader is responsible for drawing the number of the participating team and shall not enter the competition site during the competition.

(3) The team leader is responsible for coordinating and communicating with the executive committee of the competition during the event.

(4) If the team considers that there is any non-compliance with the competition rules, the team leader shall submit a signed written appeal to the arbitration group of the event within 2 hours after the end of the competition. Oral appeal is invalid and the arbitration group will not accept it.

6.4 Instructions for Participants

(1) Participants should strictly abide by the rules and regulations of the competition, ensure personal and equipment safety, accept the supervision and warning of the judges, and compete in a civilized manner.

(2) Participants shall enter the competition with the entry certificate issued by the organizing committee and valid identification documents (ID card or passport).

(3) Participants shall enter the competition site at the prescribed time, confirm the on-site conditions and sign. They shall operate according to the unified instructions. Each team shall decide the division of labor, working process and time arrangement of participants in accordance with the regulations

Complete the competition at the designated workstation within the time limit. Do not enter the workstation of other teams at will.

(4) After entering the competition, the participants shall confirm whether the equipment and tools are safe and intact according to the regulations, strictly abide by the rules and regulations of the competition and operating procedures, and ensure the safety of their own person and equipment.

(5) During the competition, if the equipment fails due to reasons other than the players, please inform the on-site referee in time, and the technical staff will repair or replace the equipment. The referee team may give additional time according to the specific situation.

(6) When installing and deploying the competition equipment, the contestants should understand the performance parameters of each equipment in detail, such as power supply input, to ensure the normal use of the equipment.

(7) When connecting sensors and other equipment, contestants should pay attention to prevent short circuit between positive and negative poles and avoid burning out the equipment. Do not touch or open the power distribution box of the training station, and pay attention to the safety of using 220V strong electricity behind the station.

(8) Food and drinking water will be provided in the stadium during the competition. The rest, food and toilet time of the competitors will be counted in the competition time.

(9) After the end of the competition, the participating team shall clean up the site and restore the venue to the state before the competition.

(10) During the competition, if the competitors do not obey the instructions of the referee or disrupt the order of the competition, the chief expert will deduct the score of the team at discretion; in serious cases, the team will be disqualified. If there is cheating, the team will be disqualified directly.

6.5 Staff information

(1) The competition staff shall be uniformly employed and assigned by the competition executive committee.

(2) Obey the leadership of the organizing committee, observe professional ethics, adhere to principles and follow the rules. Do a good job with a high degree of responsibility, serious attitude and meticulous style.

(3) Be familiar with the Competition Rules and implement the competition rules carefully.

(4) Stick to the post, do not be late, do not leave early, do not leave without permission.

(5) The staff of the competition should actively maintain the order of the competition, so as to facilitate the normal performance of the competitors.

(6) The staff shall not answer any technical questions raised by the players during the competition. In case of any dispute, it shall be reported to the executive committee.

(7) Those who bring influence or losses to the competition due to violation of regulations will be given necessary treatment.

7. Requirements for stadium layout

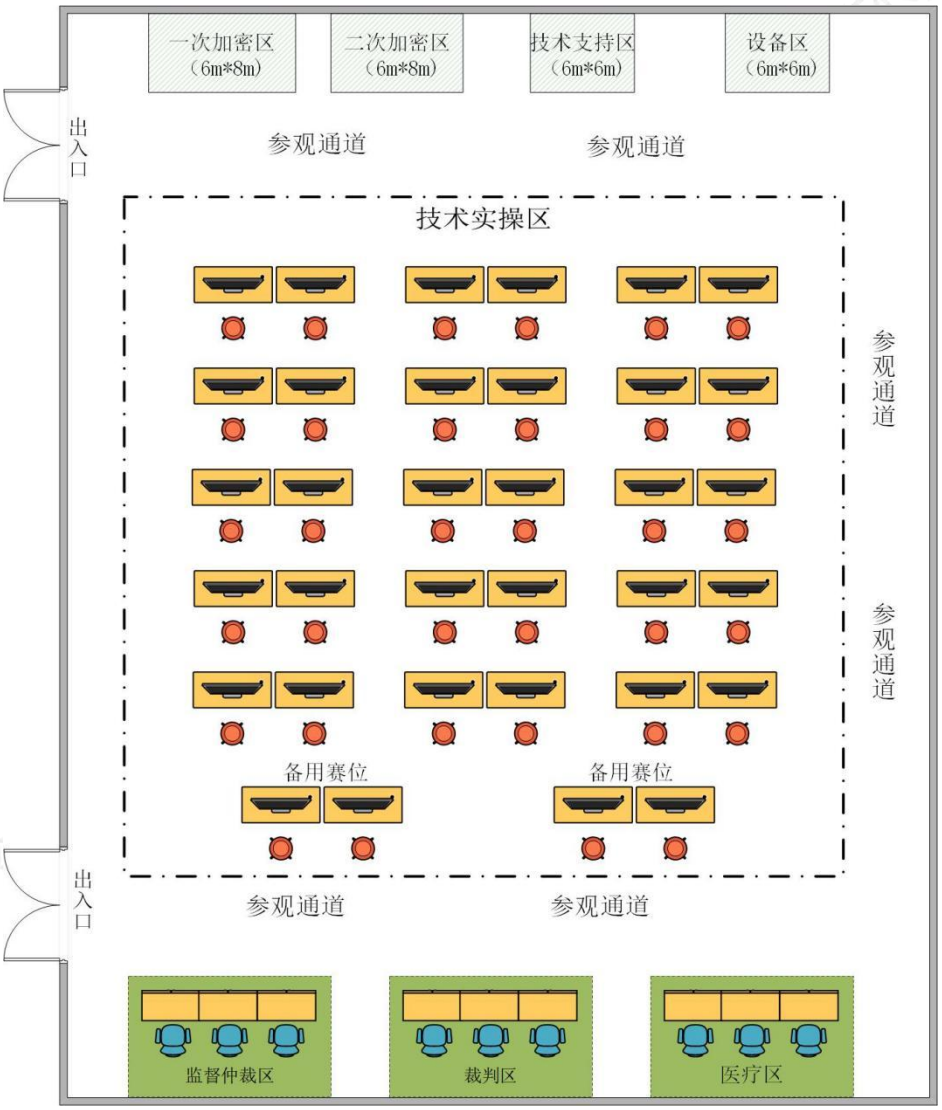
(1) Competition Venue. The venue is equipped with a competition zone, referee area, service area, and technical support zone. It ensures adequate lighting, ventilation, and stable water, electricity, and emergency power supply. Additionally, there is one designated lounge for all instructors.

(2) Competition equipment. All competition equipment shall be provided and guaranteed by the competition executive committee. The competition area shall prepare the required hardware and software platforms according to the number of participating teams, and provide standard competition equipment for the participating teams.

(3) Competition Workstations. Each work area at the competition venue is equipped with a single-phase 220V/3A or higher AC power supply. Each workstation is clearly numbered. Each competition room contains a workbench for placing computers and other debugging equipment tools, along with two work chairs (stools).

(4) The technical support area provides the participants with public spare parts and other equipment related to the competition. The service area provides medical services and other support.

Suggest the layout of the competition area and the race position


一次加密区
（6m*8m）
二次加密区
（6m*8m）
技术支持区
（6m*6m）
设备区
（6m*6m）
出入口
参观通道
参观通道
技术实操区
参观通道
参观通道
备用赛位
备用赛位
出入口
参观通道
参观通道
监督仲裁区
裁判区
医疗区

8. Health, safety and environmental protection

8.1 Competition environment

The site shall meet the floor area of each functional area and the number of workstations corresponding to the number of teams with parameters. Good lighting, illumination and ventilation; stable water, electricity and emergency power supply equipment shall be provided.

8.2 Safety requirements

(1) The layout of the competition site, the equipment and equipment in the competition site comply with relevant national safety regulations, the installation of competition equipment and facilities is strictly in accordance with safety construction standards, the power wiring and electrical installation are constructed according to specifications. Before the competition, the simulation test of the competition site is carried out to find out the possible safety problems.

(2) Each set of competition equipment uses a separate power supply to ensure safety. Contestants should save their computer operations or document editing in time to avoid data loss caused by sudden power failure.

(3) Fire extinguishers shall be configured according to fire safety requirements, and the safety responsible person of the competition shall be designated to use them in case of emergency.

(4) Set up a cordon around the stadium to prevent irrelevant personnel from entering and accidents.

(5) The site layout is divided into areas, evacuation channels are set according to safety requirements, and the safety evacuation channels and route diagrams are posted in prominent places on the walls. In case of safety problems, the site safety responsible person will be instructed to evacuate the site quickly along the emergency evacuation route.

(6) During the race, all vehicles and personnel entering the competition area shall enter with certificates and actively show valid certificates to the staff.

(7) In the areas with dense crowd and traffic flow, the organizing committee of the competition will set up complete indicators, increase the number of guides, and open up backup channels.

8.3 Environmental protection

(1) Nothing in the competition should damage the environment around the venue.

(2) Promote the concept of green environmental protection, all recyclable materials should be classified and collected.