2025

BRICS SKILLS COMPETITION

(BRICS+ FUTURE SKILLS & TECH CHALLENGE)

Internet of Things

BRICS-FS-16

Technical Description

(Online International Final)

Jun, 2025

Contents

1. Introduction

1.1 Name and Description of the Skill Competition

1.1.1 Skill Competition Name

Competition Name：Internet of Things

Competition Number：BRICS-FS-16

1.1.2 Skill Competition Description

The online competition of the 2025 BRICS Skills Competition (BRICS Future Skills and Technology Challenge) - Internet of Things event is a platform built on the Internet of Things competition platform, consisting of the Internet of Things cloud platform, the Internet of Things competition platform, the AOT platform system, the virtual simulation system and other parts. Contestants need to complete relevant assignment assessments through computers and tools. The Internet of Things event is a team skills competition, with each team consisting of two contestants.

The skills assessed include : IoT equipment selection and engineering design capabilities, IoT software and hardware installation and debugging capabilities, IoT system integration and construction capabilities, IoT platform configuration management capabilities, IoT application development and debugging capabilities, and professional qualities.

1.2 Relevance and importance of this document

This document contains the criteria required for this skills competition, as well as

information on the evaluation principles, methods and procedures governing the competition.

Every expert and player must know and understand this technical description.

In the event of any conflict between technical specifications in different languages, the English version shall prevail.

2. Skill Standards

2.1 General description of skill standards

Skills standards set out the knowledgeand specific skills that are international best practice in technical and occupational performance. It will reflect a global consensus on what the relevant job role or occupation represents in industry and business.

Skills competitions are designed to reflect international best practice as described in this skills standard, and to the extent it can be achieved. As such, the standard is a guide to the training and preparation required for skills competitions.

The criterion is divided into different sections. Each section is assigned a percentage of the total score to indicate its relative importance within the criterion. This is often referred to as the "weight". The sum of all percentages adds up to 100. The weight determines how the score is allocated within the criterion.

The competition content will only assess the skills listed in the standards, reflecting the standards as comprehensively as possible.

Marking schemes will be evaluated according to the points allocated in the standard to the extent practicable, with a 5% variation allowed, but the weights assigned by the standard specification shall not be changed.

2.2 Skill Standards

Skill Standards		Proportion(%)
1	**Work organization and management**	**2**
Basic Requirements	● Technical specifications and terminology related to safe production operations, as well as special requirements for specific positions ● Basic knowledge of lean production Honesty and integrity ● Self-motivation, teamwork problem solving, self-protection, effective work under pressure ● Best practice in relation to health and safety regulations, obligations and documentation and skills ● Principles of safe use of electricity	
Skills	● Work professionally in the relevant environment and other factors ● Collaborate with colleagues and teams in local and remote environments ● Present ideas to the team or clients and respond to client needs ● Take care of yourself and others' safety in the workplace ● Take appropriate preventive measures to minimize accidents and impacts ● Use process records that meet international standards to provide traceability for development and revision ● Interpret and recognize international symbols, diagrams and other international languages used by standards bodies ● Assist engineers in preparing reports and records on test techniques, laboratory equipment and procedures ● Communicate effectively with customers ● Train others to use facilities and equipment ● Professional performance at the client's premises ● Enable documented process maintenance policy	
2	**Internet of Things Theory Assessment**	**18**

Basic Requirements	● Communication and design of user needs ● Basic knowledge of common IoT application software ● Knowledge of installation and wiring standards ● Basic concepts, structure and functions of IoT terminals. Methods of reading and writing IoT identification information ● Basic theory of computer operation and communication ● How to download and install the application ● Common electrical equipment symbol recognition ● Knowledge of electrical equipment installation ● Safety knowledge of working in strong and weak current environments and knowledge of using drawing tools	
Skills	● Have communication needs and cooperative communication skills ● Ability to read system requirements documents ● Ability to read electrical schematics ● Be proficient in using drawing design software ● Ability to write program design documents and reports using normative documents that comply with international and national standards ● Ability to test network jumpers using testing instruments	
3	**IoT device selection and configuration**	
Basic Requirements	● Common professional tool usage and skills Common testing instrument operation and measurement methods Application of electrical and debugging tools ● Build and debug wired and wireless network environments; IoT terminal equipment circuit working principles; troubleshooting, testing and maintenance environment conditions ● Knowledge of limitations and usage of testing equipment and tools ● Preventive judgment of application scenarios and inspection and measurement technology of unreliable terminal equipment for maintenance of electrical equipment ● Cloud platform system software technology network environment construction, configuration	**50**

	and connection ● Modbus RTU/Modbus TCP standard communication protocol data collection display method	
Skills	● Select network cables and use tools to make network cable jumpers ● Correctly select routers and be able to build and configure wired and wireless network environments ● Correctly add, manage IoT devices and set parameters ● Be able to correctly configure and use serial port debugging tool software ● Can realize real-time data display and scene linkage ● Ability to read software and hardware manuals ● Determine the cause of the operation error and the measures to be taken ● Use professional tools and testing instruments to detect, debug and replace defective and malfunctioning terminals and application modules	
4	**IoT device data collection**	**30**
Basic Requirements	● Internet of Things platform private cloud, public cloud architecture knowledge, communication protocol standards and IoT protocol hardware driver development technology for industrial equipment ● Web API, Android API, and desktop application development ● Common data analysis methods ● Basic database operation methods ● Rules engine knowledge ● Basic knowledge of Python, SQL, Java, C#, and C++ ● Application of security algorithms and encryption algorithms ● Basic principles and methods of user interface design	
Skills	● Prepare system development and application documentation ● Able to read technical documents and draw development and testing processes	

	● Able to use Python, C, C++, Java, C# and other programming languages ● Ability to troubleshoot software system failures and problems ● Be familiar with the linkage rules of IoT edge devices ● Use SQL statements to query the database ● Design user-defined product prototypes	
Total		**100**

3. Scoring Plan

3.1 Scoring Method

The scoring of this competition will be completed online by the referee team. If a contestant cheats or commits other violations during the competition, the referee will handle it according to the violation, and the score will be cancelled if the violation is serious.

3.2 Scoring Rules

1. Those with higher total scores will be ranked first;

2. For candidates with the same total scores, the order of Module A, Module B, and Module C will be followed, with the candidate with the higher module score being ranked first.

If the above two rules cannot be used to rank the competitors, the one with the shorter cumulative race time will be ranked first.

3.3 Evaluation Basis

During the competition design process, the selection of standards and evaluation

methods is determined through the scoring scheme and competition questions.

Evaluation basis includes but is not limited to:

- Accuracy and standardization of equipment selection
- Correctness of indicator process, correctness and standardization of code
- Visual APP displays the completeness and correctness of the page
- Proficiency in using online competition platforms

4. Competition Questions

4.1 Common Precautions

Whether consisting of a single module or a series of independent or interrelated modules, the competition questions are capable of assessing the application of knowledge, skills, and behaviors outlined in the relevant standards.

Combined with the scoring scheme, the purpose of the competition questions is to provide a comprehensive, balanced, and authentic opportunity for evaluation and scoring in accordance with established standards. The relationship among competition questions, scoring schemes, and standards serves as a key indicator of quality, much like the relationship between standards and actual job performance.

The competition questions do not extend beyond the defined standards and do not compromise the balance of scoring within those standards.

The assessment of knowledge and understanding is conducted solely through their application in real-world scenarios as reflected in the competition questions.

4.2 Competition Question Format/Framework

The competition consists of three relatively independent modules:

Module A: Internet of Things Theory

Module B: IoT device selection and configuration

Module C: Collection of IoT device data

4.3 Competition time allocation and score weight

Module	Time(min)	Score Weight(%)
Module A: Internet of Things Theory	90	20
Module B: IoT device selection and configuration	90	50
Module C: Collection of IoT device data	60	30
Total	240	100

4.4 Competition Content and Requirements

The IoT competition consists of three modules, including: IoT theory, IoT device selection and configuration, IoT device data collection, and comprehensive assessment of the IoT technical capabilities of the contestants.

Module A: Internet of Things Theory

The theoretical knowledge test is mainly in the form of closed-book written test or computer-based test, mainly testing the basic requirements and relevant knowledge requirements that contestants should master. The content of the test includes electronic circuit knowledge, sensor knowledge, computer network knowledge, sensor network knowledge, etc.

Module B: IoT device selection and configuration

According to business needs, select appropriate hardware, software and services, and select, connect and configure various IoT devices such as sensors, identification devices, wireless sensor networks, and smart gateways.

Module C: Collection of IoT device data

Analyze the needs of IoT scenarios and use integrated environment tools to collect data for IoT platform applications on the competition computer. Obtain specific data required by the topic from the IoT platform through configuration and display the data on the terminal device in the specified mode.

4.5 Competition Questions Announcement Plan

The competition questions will be announced through the official website of the competition or other methods approved by the organizing committee.

4.6 Competition Questions Adjustment Plan

Before the official competition, the competition questions will be modified by approximately 30%.

5. Skills Management and Communication

5.1 Expert Group

The skill expert group is composed of the chief expert, deputy chief expert and expert members, who are responsible for further revising the technical documents for the final of this competition and daily skill management.

5.2 Communication and discussion

Use WhatsApp as the online communication tool (alternative: WeChat International Edition), and use Zoom as the conference communication tool (alternative: Tencent Conference International Edition).

6. Security Requirements

1. Participants must strictly abide by the competition rules and operating procedures, pay attention to personal and equipment safety, accept the supervision and warnings of the referees, and compete in a civilized manner.

2. Participants should understand the performance parameters of the equipment in advance to ensure the correct use of the equipment.

3. Participants 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.

5. Participants must pay attention to anti-static safety and must not place circuit boards on metal surfaces or stack them without protection.

6. Contestants should pay attention to the safe use of high voltage electricity at their workstations.

7. Participants are not allowed to interfere with other teams during the competition.

7. Equipment and Materials

7.1 Infrastructure List

The infrastructure list details all the equipment and facilities that participants need to prepare, see "Infrastructure List for the Online Remote Finals of the BRICS Skills Competition (BRICS+ Future Skills & Tech Challenge)".

7.1.1 Software Environment

No.	Category	Software Title
1	software	Microsoft windows 10（64 bit）Trial
2	software	Google Chrome
3	Operating Environment	.NetFramework 4.5

7.2 Site and workstation layout

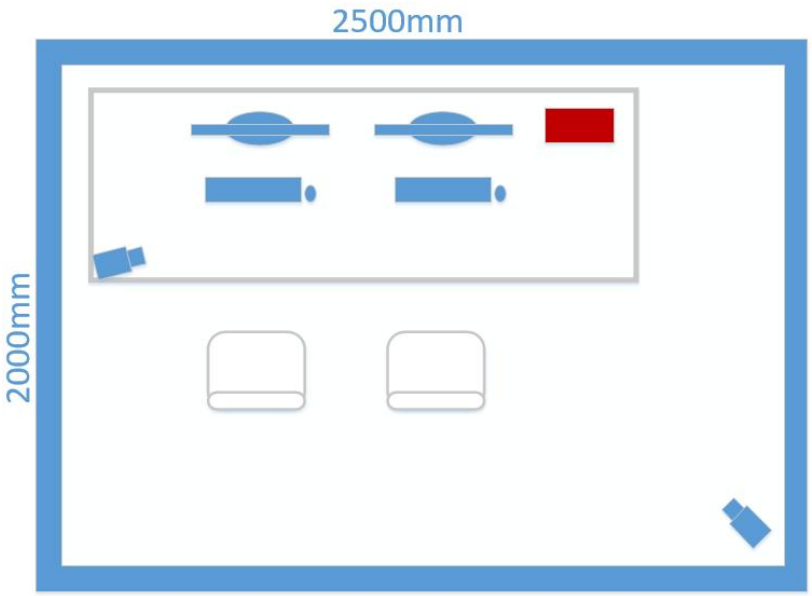
7.2.1 Requirements for workstation layout

The work desk should be arranged in a quiet, undisturbed, well-lit, and unobstructed environment. The computer should be placed in the middle of the desk, with chairs for two people placed in front of the desk. The national flag of the country should be placed on the desk.

7.2.2 Requirements for the layout of mobile Camera

The center line of the mobile camera 1 is required to be at a 45° angle to the plane of the competition operation display, so that it can monitor the competition operation display and the side faces of the players. The monitoring distance ensures that it can monitor the 1-meter range around the examination seat and the height is about 1.5 meters.

The mobile camera 2 is placed on the examination table, with its center line required to be at an angle of about 45° to the plane of the game operation display, and it is required to present the complete display game screen to the maximum extent (the display game screen fills the screen of the mobile camera 2 as much as possible).



: Work desk

: Computer and Monitor

: Chair

: National flag

: Camera

Competition layout

7.3 Prohibited Materials and Equipment

Participants must declare (show) their own equipment and materials to the Experts. Experts may prohibit participants from using any items that are not relevant to the task or that may bring unfairness to other participants.