LEVEL UP 2026 - 2027

NYS SkillsUSA

INTERNET OF THINGS AND SMART HOME

PURPOSE

To evaluate each competitor's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of home technology integration.

ELIGIBILITY

Open to active NYS SkillsUSA members enrolled in programs with computer networking, telecommunications cabling, home theater installation, electronics applications, and/or electronics technology as the occupational objectives.

CLOTHING REQUIREMENTS

NYS SkillsUSA Business Professional

- White polo shirt (plain or with SkillsUSA or SkillsUSA NY monogram) or White dress shirt with plain black tie with no pattern or a SkillsUSA black tie, or business like white collarless blouse or white blouse with small plain collar.
- Black dress slacks or black dress skirt (knee-length). Note: Wearing socks or hose is no longer required. If worn, socks must be black dress socks, and
- hose must be either black or skin-tone and seamless/nonpattern.

  Black leather shoes that are not backless or open toe

Note: **Contestants must wear their contest clothing to the contest orientation meeting. Also bring #2 pencil, resume, and safety assurance form.**

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
    a. All necessary information for the judges and technical committee
2. Supplied by the contestant:
    a. Multimeter
    b. Telephone buttset
    c. Toner
    d. Signal generation
    e. Cable tester
    f. Laptop computer 5G Wi- Fi and Ethernet connection (Both 5G Wi-Fi and Ethernet adapters can be found on Amazon, if needed).
    g. Coax (Hex) Crimpers
    h. RJ11/RG 45 Crimpers
    i. Coax Compression Tool (BNC, F & RCA)
    j. Coax Strippers
    k. High Gauge wire strippers (20-25 AWG)
    l. Diagonal cutters (small)
    m. Needle Nose Pliers (small)
    n. Safety glasses
    o. Pen and Pencil
    p. All competitors must create a one-page resume. See "Resume Requirement" below for

RESUME REQUIREMENT

Competitors must create a one-page resume to submit at orientation.

DEVICES

Cell phones or other electronic devices not approved by the NYS Chairperson will be collected by the contest chair during the competition. Chairpersons will announce their acceptance by listing it on their standard or at the orientation meeting. In case of emergencies advisors should allow the competitors to take their phones to the contest areas.

If the competitor uses their device in a manner which compromises the integrity of the competition, the competitor's score may be penalized.

SCOPE OF THE COMPETITION

The competition is defined by industry standards as set by the current industry technical committee. The competition will be divided into two parts: a general knowledge test and skilled performance.

KNOWLEDGE PERFORMANCE

All competitors are required to take the SkillsUSA professional development test at orientation.

The competition will include a written exam assessing general knowledge of installation, configuration, troubleshooting, and maintenance of various smart home devices. Written portions may also exist during the skills portion of the competition.

SKILLPERFORMANCE

The skills performance event assesses the ability of the competitor to install, configure, troubleshoot, and maintain a variety of smart home devices encountered in a residential setting. A practical problem(s) will be given to evaluate the competitor's ability to function on a basic entry level.

COMPETITION GUIDELINES

1. The competitions will have several hands-on skill scenarios that demonstrate one's ability to perform jobs or skills selected from the list of competencies as determined by the SkillsUSA Championships technical committee. Scenarios may include any or several of the following:
   a. Diagnose and service personal residential smart home systems.
   b. Diagnose and resolve operational and startup problems.
   c. Locate and identify defective modules within residential smart home equipment.
   d. Demonstrated ability to use diagnostic utility software and equipment.
   e. Install, configure, and demonstrate proper operations of devices within the residence.
2. The hardware problems will relate to any residential networked smart home systems.
3. Competitors will be awarded points based on their ability to solve the problems provided within the allotted time. Partial points can be awarded for solving partial problems.
4. Competence in the tasks provided is considered when a competitor acquires 75% of the available points.
5. Competitors will be provided, as required, with manufacturers' documentation of the devices to be installed and/or serviced.
6. Winners will be determined based on their total scores (regardless of result on certification test), which includes diagnostic procedures, speed, standard industry procedures, accuracy of adjustments and correct component replacements.
7. Specific penalties will be assessed for the failure to properly use anti-static straps at all times when in contact with the computers and for the introduction of computer viruses into the competition computers. Penalties will be assessed at one point per occurrence and notice of infractions will be communicated to the competitor when they occur.

STANDARDS AND COMPETENCIES

Networking

RSIM 1.0 — Identify basic networking protocols and their uses and know when/how to apply them

1.1. DHCP
1.2. UDP
1.3. DNS
1.4. TCP/IP
1.5. Subnet masks

RSIM 2.0 — Recognize and implement methods of network security

2.1. Personal computer (PC) security
2.2. Antivirus
2.3. Home networking security
2.4. Firewall knowledge

RSIM 3.0 — Configure setup and maintain a residential LAN (Local Area Network)

3.1. Client configuration
    3.1.1. Resource sharing
    3.1.2. Peer-to-peer
3.2. Remote access setup
3.3. Network device setup and integration
    3.3.1. Broadband configuration (e.g., DSL, cable, and satellite)
    3.3.2. Routers
    3.3.3. Hubs
    3.3.4. Switches
    3.3.5. PoE (power over ethernet)

RSIM 4.0 — Configure setup and maintain a secure wireless network

4.1. Differentiate applications of hardwired vs. wireless networks
4.2. Assess networking security and encryption standards
    4.2.1. WEP
    4.2.2. WPA
    4.2.3. MAC filtering
    4.2.4. SSID

4.2.5. WPA2

4.3. Wireless networking integration and troubleshooting

4.3.1. Frequencymanagement

4.4. Wireless protocol standards

4.5. 4.4.1. 802.11 a/b/g/n

RSIM 5.0—Identify and define network cabling characteristics and performance

5.1. Cable types

5.1.1. CAT5

5.1.2. CAT5e

5.1.3. CAT6

5.1.4. Fiber

5.1.5. COAX

5.2. Cable length limitations

5.3. Protocols

5.3.1. 10BaseT

5.3.2. 100BaseT

5.3.3. 1000BaseT

5.4. Shielded (STP) vs. unshielded (UTP)

5.5. Plenum vs. non-plenum

5.6. Importance of conductor colors

Audio/Video

RSIM 6.0—Implement, maintain and troubleshoot multi-room audio systems. Identify common interference sources

6.1. Control devices

6.1.1. Keypads

6.1.2. Rotary volume controls

6.1.3. Sliders

6.1.4. Push button controls

6.1.5. Touch screen

6.1.6. Wireless keypads

6.1.7. Handheld devices

6.2. Differentiate and define single source, multi-source, and local source.

6.2.1. Analog audio system

6.2.2. Analog CAT5 audio system

6.2.3. Digital CAT5 audio system

6.3. Proper cable use

6.3.1. Line level vs. speaker level

6.4. Amplification

6.4.1. Ohm's Law (e.g., impedance matched, or non-impedance matched)

6.4.2. Watts vs. dB

6.4.3. Local amplification

6.4.4. Centralized amplification

6.5. Speaker types

6.5.1. In wall

6.5.2. Surface mounted
6.5.3. Ceiling mounted
6.5.4. Freestanding
6.5.5. Fixed
6.5.6. Animated

6.6. Speaker specifications
6.6.1. Frequency response
6.6.2. Efficiency
6.6.3. Power handling

RSIM 7.0 — Install, configure, and maintain a residential home theater system

7.1. Audio components
7.1.1. Define basics of acoustics (e.g., sound reflection, speaker placement, sound cancellation, sound balance)
7.1.2. Audio/Video components setup and integration (e.g., digital signal cables and lengths, legacy devices)
7.1.3. Multichannel surround (e.g., SACD, DVDA, DTS, DTSES, DDEX, DD, etc.) (e.g., crossovers and speaker setup)

7.2. Video components
7.2.1. Display types (e.g., plasma, DLP, LCD, LCOS, CRT, rear projection, front projection, direct view)
7.2.2. High-definition resolution options (e.g., 720p, 1080i, 1080p, etc.) Tuner
7.2.3. types (e.g., NTSC, PAL, ATSC, QAM, cable card, VSB, DVB-T, DVB-S)
7.2.4. Video processing (e.g., scalers, processors, up-conversion)
7.2.5. Aspect ratios
7.2.6. Video setup (calibration e.g., color balance, contrast, brightness, etc.)
7.2.7. Digital video cable and connector types (e.g., DVI and HDMI — compatibility and interoperability issues)

7.3. Use MRAV (Multi-Room Audio/Video) standards if/when applicable

RSIM 8.0 — Assess, install, and configure content management systems and describe their applications in a residential environment

8.1. Describe typical applications and physical connections of sources
8.1.1. Media servers
8.1.2. Media PC
8.1.3. MP3 players
8.1.4. DVD players
8.1.5. Satellite
8.1.6. Cable
8.1.7. DVR
8.1.8. Gaming systems
8.1.9. Satellite radio
8.1.10. Legacy devices
8.1.11. Streaming media

8.2. Summarize types of media storage, methods to transfer and backup data
8.2.1. Memory cards

8.2.2. NAS devices (Network Attached Devices)
8.2.3. Remote storage
8.2.4. Local storage
8.2.5. Frequency of backup
8.3. Other connection considerations
8.3.1. Digital rights management

RSIM 9.0 — Implement, maintain and troubleshoot multi-room video systems.

9.1. Define signal types and their applications
9.1.1. Digital distribution (e.g., analog to IP converters, IP to analog converters, wireless distribution, IEEE 1394)
9.1.2. RF distribution characteristics. Identify and troubleshoot noise and interference. (e.g., splitters and taps, active and passive, attenuators, bidirectional, modulation and filtration, amplification, IR over COAX)
9.1.3. Analog Distribution (e.g., Composite, Component, and S-Video, Balun.)
9.2. Identify cable types and their applications
9.2.1. COAX (e.g., RG-59, RG-6, RG-6 QS, DV, Serial data, CCS, BC)
9.2.2. CAT5/5e/6
9.3. Termination (e.g., RCA, BNC, and F)
9.4. Satellite
9.4.1. Multi-switches
9.4.2. Diplexer
9.4.3. LNB (Low Noise Block Down Converter)

Security and Surveillance Systems

RSIM 10.0 — Maintain, configure, and troubleshoot basic security systems and applications

10.1. Define monitored and notification methods
10.1.1. Phone line
10.1.2. Cellphone
10.1.3. Radio frequency
10.1.4. IP based
10.1.5. IoT based / Smart speaker controlled

RSIM 11.0 — Describe basic security terminology and apply installation procedures and methodologies

11.1. Installation and configuration of security panel
11.1.1. Zone types
11.1.2. Delays
11.1.3. Battery backup and power supply requirements
11.2. Monitoring formats
11.2.1. SIA and Contact ID
11.2.2. 4/2 and 3/1
11.3. Define types of peripherals and accessories
11.3.1. Motion sensors
11.3.2. Glass-break detectors
11.3.3. Magnetic contacts

11.3.4. Smoke fire (e.g., smoke detection, heat detection)
11.3.5. Environmental sensors (e.g., carbon monoxide, gas, water, temperature)
11.3.6. Vehicle detection
11.3.7. Photoelectric beam devices
11.3.8. Microwave beam devices
11.3.9. Pressure sensors
11.3.10. Sirens, strobes
11.3.11. Security keypads
11.3.12. Key fobs
11.3.13. Panic buttons

11.4. Describe security infrastructure types
11.4.1. Wired, 22/4- standard power devices, 22/2- Magnetic contacts, 2 and 4 conductor fire wire (e.g., keypads, sounders, power supplies, smoke, and fire detectors), Power supervision relays, Polarity reversal relays, Line seizure, End of line resistors)
11.4.2. Wireless

11.5. Identify access control devices and protocols
11.5.1. Devices (e.g., keypads, card readers, biometric readers, proximity readers, door strikes, electronic deadbolts, magnetic locks)
11.5.2. Protocols (e.g., Weigand)

RSIM 12.0—Identify, configure, install, maintain and troubleshoot security and surveillance cameras

12.1. Camera types
12.1.1. IP
12.1.2. Analog
12.1.3. Hybrid
12.1.4. IoT / Plug and play

12.2. Camera specifications
12.2.1. Lens type
12.2.2. Lux rating
12.2.3. Resolution
12.2.4. B&W vs. color
12.2.5. IR illumination
12.2.6. Power consumption

12.3. Camera applications
12.3.1. Indoor/outdoor
12.3.2. Day/night
12.3.3. Fixed vs. animated
12.3.4. Surveillance (e.g., door cams, nanny cams)
12.3.5. Recording (e.g., DVR, triggers –internal vs. external detection)
12.3.6. Sequencing vs. multiplexing

Home Controland Management

RSIM 13.0 — Identify user interfaces and their appropriate applications

13.1. Device types
- 13.1.1. Remote controls
- 13.1.2. Keypads
- 13.1.3. Touchscreens
- 13.1.4. Key fobs
- 13.1.5. Telephones
- 13.1.6. Smartphones
- 13.1.7. Cellphones
- 13.1.8. PDAs
- 13.1.9. Web tablets
- 13.1.10. Personal computers
- 13.1.11. Laptops

13.2. Describe the importance of simplicity and ease of use as it pertains to the end user

RSIM 14.0 — Define and recognize control systems that integrate subsystems in the home. Describetheirfunctionality, characteristics,andpurpose

14.1. Embedded control systems and personal computer (PC) based control systems
- 14.1.1. Compatibility and interoperability issues

RSIM 15.0 — Identify commonly used communication protocols and their application

15.1. IR
15.2. Serial
15.3. IP
15.4. RF
15.5. Bluetooth
15.6. Contact closure
15.7. Inputs (zones)
15.8. Z-wave and Zigbee
15.9. ASCII
15.10. Proprietary protocols

RSIM 16.0 — Describe basic HVAC (Heating, Ventilation and Air Conditioning) terminology and installperipheral control devices

16.1. Control layer
- 16.1.1. Compatibility

16.2. Communication layer
- 16.2.1. Compatibility
- 16.2.2. IP based, wireless, serial, and proprietary

16.3. Zones HVAC
- 16.3.1. Master slave configuration
- 16.3.2. Microprocessor controlled configuration

16.4. Programmable thermostats
16.5. Importance of referencing manufacturer specification and compatibility

RSIM 17.0 — Describe basic lighting terminology and install peripheral control devices

17.1. Identify lighting control applications
- 17.1.1. Indoor and outdoor
- 17.1.2. Centralized and distributed
- 17.1.3. Dimming
- 17.1.4. Scenes
- 17.1.5. Relay/switching
- 17.1.6. Occupancy/motion sensing
- 17.1.7. Time- and event-driven
- 17.1.8. Window treatments
- 17.1.9. Energy management
- 17.1.10. Security interface
- 17.1.11. Lighting connectivity
- 17.1.12. Motor speed control

17.2. Communication interface/bridge
- 17.2.1. Power line phase couplers

17.3. Identify lighting control protocols (Open standards)
- 17.3.1. Z-wave
- 17.3.2. ZigBee
- 17.3.3. Powerline carrier (X10 protocol/PLC)
- 17.3.4. UPB (Universal Powerline Bus)

17.4. Proprietary RF and proprietary low voltage
- 17.4.1. Recognize compatibility issues

RSIM 18.0 — Identify and install component power protection devices

18.1. Identify whole house protection options
- 18.1.1. Surge suppression
- 18.1.2. Power conditioning

18.2. Identify and install point protection
- 18.2.1. Surge protectors (high voltage and ancillary low voltage devices: e.g., satellite, CATV, etc.)
- 18.2.2. UPS (uninterruptible power supply)
- 18.2.3. Power conditioning

Troubleshooting Methodology and Documentation

RSIM 19.0 — Identify and apply the fundamentals of troubleshooting and diagnostics

19.1. Use of testing equipment
- 19.1.1. Multimeter
- 19.1.2. Telephone butt set
- 19.1.3. Toner
- 19.1.4. Signal generation
- 19.1.5. Cable tester

19.2. Refer to prior documentation

19.3. Demonstrate when to communicate with technical support and what information is relevant

19.4. Troubleshoot common wireless interference issues: infrared, radio frequency, etc.
19.5. Identify demarcation and responsibilities of associated trades and/or utilities

RSIM 20.0 — Given a scenario, demonstrate how to apply troubleshooting skills to integrate subsystems

20.1. Networking
20.2. Audio/video
20.3. Telephony
20.4. Security
20.5. Home control

RSIM 21.0 — List and describe the benefits of verification of installation

21.1. Properly label wires
21.2. Wire mapping
21.3. Importance of documenting work upon completion
  21.3.1. Input/output verification for all systems
  21.3.2. Document wire placement
21.4. Certification of cable installation

RSIM 22.0 — Deliver appropriate manuals and documentation to the end user upon completion of installation.

22.1. Select, archive, and appropriately distribute critical system information: Passwords, access codes, user IDs, credentials, etc.

RSIM23.0—Ability to safelymeasureAC andDC voltages

23.1. Measure AC and DC voltages using a digital multimeter (DMM)
23.2. Measure AC and DC current using a digital multimeter (DMM)
23.3. Measure the resistance of a circuit consisting of resistors using a digital multimeter (DMM)

RSIM24.0— Ability to test basic analog and digital circuits and repair them

24.1. Setup and operate test equipment for analog circuits
24.2. Troubleshoot switching power supplies
24.3. Analyze motor and phase control circuits
24.4. Apply logical and systematic approach to troubleshooting analog circuit devices

RSIM 25.0 — Ability to use multimeters and interpret results

25.1. Solve basic trigonometric problems as applicable to electronics (prerequisite to AC)
25.2. Identify properties of an AC signal
25.3. Identify AC sources
25.4. Analyze, construct, and troubleshoot AC capacitive circuits, AC inductive circuits, RLC circuits (series, parallel, complex) series and parallel resonant circuits, filter circuits and polyphase circuits
25.5. Analyze and apply principles of transformers to AC circuits