

# Changsha University of Science and Technology

China–Europe Science and Technology Innovation Camp

Barrier-Free World · Co-create the Future

April 27, 2026

## Theme:

China–Europe Youth Inclusive Technology Assistive Design Innovation Camp

## Core Proposition:

How to use AIoT technology to solve a specific pain point for people with disabilities

## Target Users:

Visually impaired / hearing impaired / physically disabled / elderly people with functional limitations (one group may be selected as the focus)

## Value Proposition:

Technology for good, enabling everyone to enjoy life equally

## Potential Highlights:

Human-centered public welfare + social impact + hard-core technology

## Duration:

14 days

## Overall Tone:

Design Thinking + Innovative Engineering Practice (Hardware Prototyping & MVP)

## I. Camp Structure and Timeline

A “dual-helix structure” will be adopted: methodology and Design Thinking workshops in the morning, engineering practice and group co-creation in the afternoon, with three “milestone reviews” interspersed throughout the program.

### Phase 1: Ice-breaking and Empathy (Day 1 – Day 3)

Objective: Break cultural barriers, build teams, and define real pain points.

Date	Faculty*1	Time	Content
Day -n Pre-camp Preparation	Team Formation	Self-arranged	Students will study in advance according to the Knowledge System and Learning Handbook; the organizer will purchase basic materials, set up the workshop environment, and build the teaching faculty–technical support–logistics supply chain.
Day 1 Opening and Integration	1 Chief Expert, 2 On-site Experts	Morning	Opening ceremony (remarks by provincial/university leaders, speech by a representative of the Hungarian Innovation Agency). “Speed Matching”: mixed grouping based on complementary disciplines (mechanical engineering / computer science / electronics / design / business / foreign languages), with 4–5 students per group and a 1:1 ratio of Chinese and Hungarian students. “Five Forms of Physical Inconvenience” extreme scenario experience workshop: students wear blindfolds to simulate visual impairment, earplugs to simulate hearing impairment, tie up their arms to simulate physical disability, and complete assigned tasks under conditions such as no language ability, wheelchair use / bedridden status, etc. (e.g., pouring water, finding a seat, answering a phone call), while recording pain points.
		Afternoon	Introduction to innovative engineering. Basic kits (Arduino/Raspberry Pi + sensors) will be distributed, followed by a “2-hour extreme challenge” (e.g., making an assistive device) to quickly familiarize students with the hardware environment.
Day 2 Design Thinking Workshop	1 Chief Expert, 1 On-site Expert	Full day	Introduce the full process of “Design Thinking”. Focus on the theme “Barrier-Free World · Co-create the Future”. Methods: critical thinking, empathy map, and real empathy experience: group field research / real pain-point sessions (community, hospital, government, schools for people with disabilities, and groups of people with disabilities).
Day 3 Definition and Ideation	1 User Research Expert	Morning	Pain point definition (POV). Each group will establish a specific direction (e.g., focusing on 3–5 high-frequency scenarios such as travel navigation, information access, home life, social communication, and corresponding cost data collection, etc.).

	1 User Research Expert	Afternoon	Crazy Eights and concept screening. Produce preliminary solution sketches (Storyboard). Examples of concept directions: smart obstacle-avoidance cane for the visually impaired, speech-to-text glasses for the hearing impaired, one-handed shoelace-tying assistive device, smart control system for wheelchairs.
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## Phase 2: Prototyping and Engineering Practice (Day 4 – Day 9)

Objective: Produce high-fidelity prototypes through hands-on work and combine AIoT (Artificial Intelligence of Things) technology to achieve a “hard-core” showcase.

Date	Faculty	Time	Content
Day 4 Technical Deep Dive and Task Allocation	2 On-site Experts	Morning	Technical mentoring system. Three parallel workshops will be offered: 1. Sensors and data visualization; 2. Edge deployment of AI models (e.g., gesture recognition, voice interaction); 3. 3D printing and structural design.
	2 On-site Experts	Afternoon	Each group selects a technology stack based on its solution, prepares a customized BOM (Bill of Materials), and submits it to the procurement team (supported by Changsha University of Science and Technology laboratories).
Day 5–6 Core Function Breakthrough	2 On-site Experts	Full day	Geek marathon mode. Focus: each group builds the core circuit and code logic of its “Minimum Viable Product (MVP)”.
	1 Chief Expert, 2 On-site Experts	Day 6 Evening	Key milestone: Mid-term Review (Gate Review). The review panel (university mentors + enterprise mentors) will conduct quality control, focusing on assessing technical feasibility and demonstration logic, eliminating overly imaginative concepts, and ensuring that the projects can be demonstrated at the final stage.
Day 7 Culture and Rest	1 Enterprise Expert	Full day	Urban cultural visit or enterprise visit (e.g., benchmark science and technology innovation enterprises in Hunan Province). Purpose: to help Hungarian students gain a deeper understanding of Hunan Province’s industrial environment, while allowing students to briefly step away from high-intensity development for “implicit iteration”.
Day 8–9 Productization and Appearance Design	2 On-site Experts	Full day	“Highlight Project” special session. Content: use laser cutting, 3D printing and other technologies to make shells; design the interaction interface (UI) and display boards (Poster); record a 30-second “product promotional video”. Innovation point: introduce a “Roadshow Visual Design” workshop to teach how to translate technical language into a “story” that leaders can understand and find interesting. Each group will intersperse simulation experience workshops: people with disabilities will participate as “user mentors” to experience the prototypes on site.

## Phase 3: Integration and Showcase (Day 10 – Day 14)

Objective: Refine details, conduct simulated rehearsals, and ultimately present an “immersive” achievements exhibition.

Date	Faculty	Time	Content
Day 10–11 System Integration and Stress Testing	2 On-site Experts	Full day	Simulate the on-site environment and require each group’s prototype to run continuously and stably for more than 2 hours without human intervention. Solve “last-mile” problems such as code merge conflicts caused by communication between Chinese and Hungarian students and poor hardware contact.
Day 12 Roadshow Coaching	2 On-site Experts	Full day	“Elevator pitch” training. Invite investors and media professionals to provide one-on-one coaching. Focus on refining the science and technology innovation plan: how to clearly present to provincial leaders the logical chain of “pain point – solution – technology/product highlights (including comparative analysis of cost reduction and efficiency improvement) – social value”.
Day 13 Exhibition Setup and Rehearsal	2 On-site Experts	Full day	Set up the “Innovation Camp Achievements Expo” scenario in the main hall or auditorium of Changsha University of Science and Technology. Each group will set up an interactive booth, requiring leaders/guests to be able to operate and experience the prototypes personally.
Day 14 Closing Ceremony and Achievements Report	1 Chief Expert, 2 On-site Experts	Full day	Format: “immersive roadshow + static exhibition”. Process: leaders’ tour of the exhibition (group presentations) → excellent project roadshows on the main stage (5 minutes per group) → awards (including “Best Technology Innovation Award”, “Most Commercially Valuable Award”, and “Model China–Hungary Cooperation Award”) → signing (excellent projects receive eligibility to enter the university incubator).
Day f Follow-up	2 On-site Experts	Self-arranged	Tracking services and value mining for outstanding project teams (becoming teaching faculty–technical support resources and experience-sharing lecturers for the next innovation camp, etc.); organizer: project review, reuse of resources/models, operationalization of the innovation camp project, operation of media traffic, etc.

### Note: Faculty Description

The expert team is currently planned as follows:

### 1. Chief Expert: Prof. Zhinan Zhang

Tenured Professor and PhD Supervisor at Shanghai Jiao Tong University. His main research areas include tribo-informatics, innovative design thinking and methodology, and digital twin testing technologies. He has received several major awards, including the China Patent Gold Award, the First Prize of Shanghai Technology Invention Award, the Gold Award at the International Exhibition of Inventions of Nuremberg, and the MUSE Design Gold Award.

Prof. Zhang has also supervised students who won top prizes in leading national innovation and entrepreneurship competitions, including the “Challenge Cup” National Special Prize, the Gold Award of the China International College Students’ Innovation Competition, and the First Prize of the National College Students’ Mechanical Innovation Design Competition. He has been recognized as a Baosteel Excellent Teacher and a Leading Educator in China’s Machinery Industry. He also serves as an executive council member of the China Machinery Industry Education Association and a council member of the China Machinery Industry Excellent Engineer Education Alliance. He is an Associate Editor of Research in Engineering Design and ASME Journal of Tribology, Chair of the International Conference on Design Science, and has been elected as an ASME Fellow and IAAM Fellow.

### 2. On-site Expert: Mr. Jing Shen

General Manager of Shanghai Huguan Data Technology Co., Ltd., Senior Engineer, and graduate of Mechanical Engineering from Tongji University. He previously worked at Apple, Philips Medical, IDEO, and other internationally recognized companies. He also served as Director of Innovation Technology and Chief Technician at China Industrial Design Institute Shanghai Co., Ltd.

Mr. Shen has around 30 years of experience in innovative design and development of electromechanical products. He has led the development of various mechanical, medical, and smart hardware products. He has received several honors and awards, including Leading Talent of Yangpu District, Top Ten Advanced Figures in Industrial Design Promotion in Chongqing, the MUSE Design Gold Award, and the Silver Award of the China International Industry Fair Innovation Design Competition.

### 3. On-site Expert: Mr. Lei Wang

Further details can be provided later.

### 4. Online Expert Support Team

The program will also be supported by an online expert team with practical experience in electronic circuits, mechanical structure design, software development, and competition coaching. The experts will generally have senior professional titles or master’s degrees and above. The number of supporting experts can be adjusted according to the actual needs of the student projects.

### 5. Student Support Team from Shanghai Jiao Tong University

A student support team from Shanghai Jiao Tong University, with practical experience in competitions, innovation, and entrepreneurship, will participate throughout the program and provide hands-on support to the student groups.

### Expected Possible Outcomes:

Project Direction	Technical Solution	Showcase Highlight
Smart Blind Cane	Ultrasonic distance measurement + vibration feedback + GPS positioning + voice broadcast	Obstacles are set on-site; the cane automatically vibrates to alert the user and announces by voice: “Obstacle 1 meter ahead.”
Sign Language Translation Glove	Flex sensors + gyroscope + Bluetooth + mobile APP voice output	Perform sign language; the mobile phone automatically reads out: “Hello, do you need help?”
Smart Wheelchair Assistance	Tilt sensor + motor assistance + one-click emergency call	Demonstrates automatic assistance when going uphill; sends an emergency message automatically when falling
Doorbell for the Hearing Impaired	Vibration wristband + flashing light alert + camera-based visitor recognition	When the doorbell rings: wristband vibrates + lights flash + visitor photo is displayed on the mobile phone
One-hand Daily Life Assistant	Voice control + mechanical gripping mechanism (simplified version)	Say “Help me get the cup”; a simple robotic arm pushes the cup closer

## II. Strategy for Upgrading the Showcase Effect

In order to achieve an “upgrade” and make the outcomes “more showcase-oriented”, it is recommended to work on the following three aspects:

### 1. Upgrade from a “functional device” to a “scenario-based device”:

- (1) Traditional approach: make a screen that can display temperature and humidity.
- (2) Upgraded approach: make a “micro-environment guardian for historic buildings” — combining digital twin technology, display the 3D models of a building in Hungary and a building in Hunan Province (such as a building of Yuelu Academy) on the screen. When the sensor detects abnormal temperature or humidity, dynamic light effects appear on the model and protection suggestions are automatically sent. The visual effect and sense of interaction are stronger.

### 2. Introduce “dual carbon” or “AI” elements:

- (1) Provincial leaders are usually sensitive to “green and low-carbon” and “artificial intelligence”. The camp equipment should include edge computing terminals (such as Jetson Nano and Sophgo), so that the works have computer vision capabilities (e.g., recognizing tourists’ gestures for guided tours, recognizing garbage categories, etc.). This has more “technological value” than works based solely on microcontrollers.

### 3. Make the outcome presentation “ceremonial”:

- (1) Do not only make display boards or PPTs. Each group must produce a physical prototype + a “2–3-minute immersive experience video” to be played on loop.
- (2) The leading teachers will integrate the outcomes of all groups and produce a bilingual Chinese-English album titled China–Europe Innovation Camp Achievements Bluebook, including the technical white paper of each project, member stories, and mentor messages. It will be presented to provincial leaders on site as tangible evidence of the “highlight project” that can be taken away.

## III. List of Materials to Be Purchased/Prepared by Changsha University of Science and Technology (Reference)

To achieve the above “hard-core” and “highly showcase-oriented” effects, it is recommended to purchase the following equipment (configured for 4–6 groups, with 4–6 people per group):

No.	Category	Item	Remarks	Quantity
1	Controller	Arduino Nano	NANO V3.0 development board, TYPE-C interface, large chip (pin headers soldered)	10 pcs
2		Arduino UNO R3	arduino uno r3 improved version (plug-in board) + data cable	10 pcs
3		esp32	Original module ESP-32 type-c interface + expansion board	10 pcs
4		Raspberry Pi	Basic kit (pi5/4G motherboard)	10 pcs
		Edge AI Development Kit	Such as Raspberry Pi 5 + AI acceleration module), such as Jetson Nano, Sophgo	5 pcs
5		STM32	[Original chip] STM32F103C8T6 core board (soldered-Typec port) + power cable + downloader	10 pcs
6		UNIHIKER Board	UNIHIKER M10 + full sensor set	10 pcs
7	Actuator	Motor	12V 1580 rpm	10 pcs
8		Servo	MG995 servo 360-degree metal gear reinforced version	20 pcs
9		Speaker buzzer	0.5W speaker buzzer sound module with power amplifier PWM drive	10 pcs
10		RGB light strip (ws2812b)	5V-WS2812B [white board sleeve, 1 meter/strip] (alloy wire)	10 pcs
11		LCD display	Original 1.8-inch color TFT display HD IPS LCD module 128*160 SPI interface	10 pcs
12		LED beads	3mm LED, 10-type boxed set	5 pcs
13	Sensor	Camera	1-megapixel USB camera	10 pcs
14		Full sensor set	45-type module kit (boxed)	10 sets
15		EMG sensor		10 pcs
16		NFC	IC card sensing module	10 pcs
17		TDS detection sensor	TDS sensor module / analog signal / water quality detection source code 51/stm32	10 pcs
18		GPS/BeiDou positioning module	GPS/BeiDou positioning module	10 pcs
19		Flexible printed circuit board (FPC)		
20		Bluetooth module	4-pin	10 pcs
21	Machine	Bambu Lab H2D 3D printer	H2D laser all-in-one kit – 40W version	Several
22		Laser cutting machine		Several

23		Adjustable DC regulated power supply	SPPS-C1203 (120V3A) encoder precise adjustment + output switch + USB direct charging	5 sets
24		YIHUA 938BD+ hot air gun soldering station 2-in-1	938BD+11 hot air gun soldering station [standard package] 810W 2-in-1	5 sets
25		Multimeter	Official standard configuration	10 pcs
26		Oscilloscope		5 sets
27	Consumables	3D printer-related consumables	One roll of each color	Several
28		Laser cutting boards (wood boards)		Several
29		Acrylic sheets		Several
30		Solder wire		20 rolls
31		Breadboard	MB-102 breadboard	30 pcs
32		Universal PCB	2.54 single-sided tin-plated board 7*10cm (1 pc), 2.54 single-sided tin-plated board 6*8cm (1 pc)	30 pcs
33		Dupont wires	[Value version] Dupont wires 15cm/21cm/10cm, female-to-female + male-to-female + male-to-male, 120 wires total	Several
34		Heat shrink tubing	Bagged 328 pcs (bagged)	3 bags
35		Alligator clip wires	40cm double-ended alligator clip wire – copper (one wire)	1 pack
36		Battery box		Several
37		Lithium batteries	No. 5 batteries 24 pcs + No. 7 batteries 16 pcs combination	Several
38		Electrical tape	Mixed colors (10 rolls) 10m/roll [upgraded super adhesive]	1 box
39	Tools	Steel ruler	30cm long / 26MM wide / 0.8MM thick	10 pcs
40		Scissors	Thickened - medium size - 2 pcs	10 pcs
41		Gloves		24 pairs
42		Goggles		10 pcs
43		Tweezers		10+ pcs (1 basket)
44		Full set of screws		Several
45		Full tool kit		10 sets
46		Component storage box		50 pcs
47		Hot melt glue gun (with glue sticks)	C100240 (100-240W) glue gun + 30 glue sticks (large)	10 sets
48	Others	Blu Tack	Blue 50g [10 packs], 900 pieces in total	2 packs
49		KT board (for group divergent-thinking writing)	90x120 cm, 40x90 cm	30 sheets, 30 sheets
50		Erasable whiteboard markers		1 box
51		Sticky notes	76*76 square / 10 mixed-color pads	1 box
52		Power strips		10 pcs
53		Glue (502 and double-sided tape)	20mm wide * 10m long	30 rolls (1 box)
54		Water-based markers		1 box
55		Conductive fabric		
56		Conductive ink		
57		Velcro		
58		Elastic band		
59		Nylon hook-and-loop fastener		
Total				

#### IV. Risk Control and Highlight Assurance

##### 1. Language and collaboration risk:

Each group must be equipped with one “bilingual teaching assistant” (a postgraduate student from the School of Foreign Languages of Changsha University of Science and Technology), who is not only a translator but also a cultural coordinator, to ensure efficient technical discussions.

##### Technical difficulty control:

Before the camp opens, a “technical pre-study question bank” will be released in advance, so that Chinese and Hungarian students can form teams online and become familiar with the basic code framework first. After the camp opens, they can directly enter application-layer development and avoid getting stuck on environment configuration. Each group will be equipped with at least one person from Changsha University of Science and Technology with practical competition experience (teacher or experienced student).

##### 3. Preset reporting points for provincial leaders:

(1) Reporting Point 1 (International Cooperation):

To emphasize that Chinese and Hungarian students are not only learning together, but also jointly developing universal solutions for cultural heritage protection along the Belt and Road.

(2) Reporting Point 2 (Innovation and Entrepreneurship):

At the closing stage, invite several well-known local investment institutions / science and technology innovation enterprises to issue “innovation vouchers” or “internship offers” on site, reflecting the closed loop of “learning for application”.

(3) Reporting Point 3 (Hard Technology):

To emphasize that all works are not “simulations”, but deployable physical prototypes, which can subsequently enter the university science park for achievement transformation.