Integrated Systems Technologies

EDUCATOR TOOLKIT

Auto & Advanced Mobility Workforce Strategy

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EDUCATOR TOOLKIT

Preparing the Workforce for the Future

America's demand for a highly trained workforce is increasing faster than ever, driven by automation, advanced manufacturing, and emerging technologies. Today's students need more than textbooks. They need hands-on experience with the same tools, systems, and software used by manufacturers across the country.

IST partners with schools to deliver industry-grade equipment, curriculum, and professional training that connects classrooms to careers—bridging the gap between education and the workforce of tomorrow.

And now, we're joining forces with educators nationwide to advance the electric revolution.

The Future Is Electric

From electric and autonomous transportation to drone delivery and smart mobility systems, we are entering an era of rapid innovation in how we move people and products. In order to keep up with these emerging technologies, we need talent that's skilled, prepared, and ready to drive innovation forward.

IST is collaborating with educators and industry partners to prepare today's students for the future with tools, training, and technology needed to strengthen our talent pipeline, from Pre-K to PhD.

600%+

Job Growth by 2030

in Auto & Advanced Mobility Jobs

New Jobs, New Opportunities

Careers in the electric vehicle and advanced air mobility sectors are expected to boom nationwide over the next decade, generating hundreds of thousands of jobs.

In Ohio alone, it is anticipated that more than 25,000 new jobs will be created by 2030 through Electric Vehicle manufacturing and maintenance,[1] and the State of Ohio forecasted a growth of more than 15,000 jobs by 2045 related to Advanced Air Mobility.[2] We expect to see similar growth across the great lakes region.

Revolutionized Learning Experience

Hands-on, immersive learning is no longer a bonus, it's essential to prepare students for the careers of tomorrow.

IST helps transform classrooms into dynamic environments that engage students with cutting-edge technology, experiential content, and collaborative problem-solving.

Students will explore real-world challenges, design innovative solutions, interact with industry tools, and develop future-ready skills in areas like:

- Electric Vehicles + Charging Stations
- Automated Vehicles + Delivery Robots
- Drones, Advanced Air Mobility + Vertiports
- Connected Vehicles + Intersections
- Smart City Planning

Meeting the Needs for Our Auto & Advanced Mobility Industry

Together, we will upskill our workforce to meet the demands of the auto and advanced mobility industry. Here's how:

- Establish auto and advanced mobility workforce sector partnerships.
- Raise awareness about careers in the auto and advanced mobility industry.
- Broaden the auto and advanced mobility workforce talent pool.
- Scale education and training to meet auto and advanced mobility demand.

Electric Vehicle Fundamentals

TOOLINGU | sme

AS OF 2022, THERE WERE NEARLY 20 MILLION ELECTRIC VEHICLES (EV) ON THE ROAD AROUND THE WORLD[3]

To help meet the growing demand for EVs and battery-operated devices, SME is introducing its first Electrification Certification, Electric Vehicles Fundamentals, to increase talent in the EV industry. This credential is designed for entry-level positions in the areas of automotive assembly and production for electric vehicles.

The EV Fundamentals will also provide the necessary skills for individuals with no background in vehicle production and assembly or for individuals who have experience in this area but need to tailor their knowledge to the EV market.

The credential is ideal for high school and college students, dislocated workers, under-employed individuals, veterans, at-risk youth, and others who are seeking new employment in a new, fast-growing industry.

Build a Comprehensive Foundation of Knowledge

This program focuses on the fundamentals of electric vehicles required as a starting point for any career pathway a candidate may pursue in the field of EV:

- EV Production and Assembly
- Safety
- Quality Measurement Math Fundamentals Blueprint Reading
- Robotics
- Electrical Units
- Power Sources and Variables
- Battery Components and Management
- Fundamentals of Electric Mobility

Earn a Nationally Recognized Certification

The SME Electric Vehicles Fundamentals (EVF) is focused on the fundamentals of Electric vehicles. The credential can help individuals begin a lifelong career in a growing industry where there is opportunity for advancement and good-paying jobs.

sme.org/EVF

Gain Visibility With a Digital Badge

Upon passing the certification exam, individuals will earn

a digital badge, providing enhanced opportunities to share their qualifications and get discovered by employers.

[1] Auto & Advanced Mobility Vehicle Workforce Strategy, Ohio Governor's Office of Workforce Transformation

[2] Ohio Advanced Air Mobility Framework Ohio Department of Transportation

[3] Alliance for Automotive Innovation's 2022 Industry Report

Hybrid & Electric Vehicles

LUCAS-NUELLE

CERTIFICATION // ASE L3 LIGHT DUTY HYBRID/ELECTRIC VEHICLE SPECIALIST

The way that CarTrain unites in a single system five different drive configurations, including all the relevant measuring points for a high-voltage installation, is unique in the world. This renowned training system has been improved still further to meet levels 1 and 2 of the recommendations from the German insurers' organisation DGUV. Trainees can easily grasp the various drive modes and energy flows with the help of the new touchscreen. Thanks to the fault simulation capability which allows various HV faults to be activated, they can learn vital diagnostic skills on a training system which has been specifically designed for safety.

Training contents

- Drive concepts in HV vehicles
- Energy flows in high-voltage systems
- On-board power supply for high-voltage vehicles
- Measurement of equipotential bonding and screening
- Charging sockets for vehicles
- Structure and function of electrical machines
- Preparations for inductive charging
- Diagnostics on HV systems similar to authentic practice, including use of fault codes
- Tester-based disconnection
- Manual (emergency) disconnection
- CAN communication in HV systems
- Genuine interlock systems
- Emulation of pre-load phase using testers

CERTIFICATION // DIAGNOSIS AND MAINTENANCE OF A HV BATTERY

More and more manufacturers carry out repairs on high-voltage batteries. This is a new challenge for mechanics and requires a special understanding of the systems involved. This training system makes it possible to work directly with a real high-voltage battery. Trainees can carry out measurements inside the battery, work at cell level and even change actual cells.

An extensive system which is nevertheless easy to use. Fault simulation capability enables study of many potential problems. While trainees work out the right ways to carry out diagnostics, they also gain practical skills for the latest workshop challenges.

Training contents

- Structure and analysis of a real high-voltage battery
- Diagnostic work on HV battery via fault simulation activation
- Disconnection (isolation) via service / maintenance plug
- Extra training for first responders (fire service, police)
- Various measurements including high voltage and temperature sensors
- Charging infrastructure (AC, CCS DC)
- Disconnection as carried out in practice using high-voltage diagnostic tester
- Dealing with damaged HV batteries (accident-damaged vehicles)
- Classification of HV batteries according to potential hazards

Practical Training System for High Voltage Vehicles

LUCAS-NUELLE

REAL EXPERIENCE LEARNING WITH PRACTICAL APPLICATIONS

Diagnostic flow charts *Based on real workshop practices*

Insulation testing *for HV cables, AC compressor and drive motor faults*

Testing of motor windings

Comprehensive testing of system main relays/contactors:

- *Three relay types: HV+ pre-charging, HV- pre-charging and pre-charging via DC/DC converter via 12V battery*
- *Testing for welded relays*

Replacement of faulty relays *(on simulated live HV battery)*

Voltage handling: *400V with high impedance for the trainee safety*

Defective high voltage fuses: *identification and replacement*

Vehicle isolation methods:

- *Manual Service Disconnect on HV battery with live-dead-live test*
- *Low voltage disconnect*
- *First responder cutting loop and fuse*
- *Scan tool guided isolation*

Acoustic feedback: *Alerts for incorrect actions, e.g. opening the interlock when the ignition is on*

Energy flow analysis: *For various hybrid and electric vehicles, including fuel cells*

Real HV signal measurements:

- *Motor voltage and current during driving and regeneration*
- *Charging communication*
- *Motor position sensors (resolver and Hall effect)*
- *DC/DC converter for 12V system*
- *DC/DC converter fault*
- *2V battery fault requiring a jump start*

Measurements of motor and insulation faults: *Using measuring adapters*

Testing the potential equalisation: *On real metal components including faulty components for diagnosis and repair*

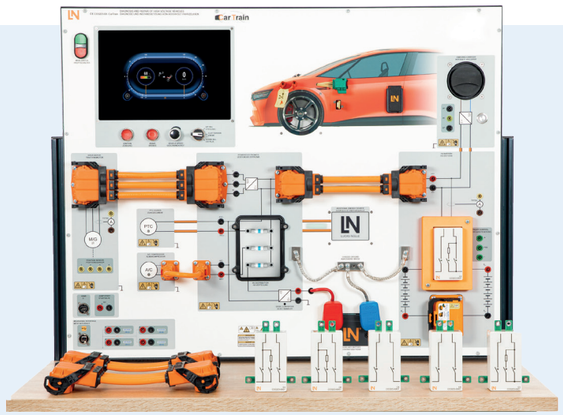
Abnormal noise simulation: *For motor, gearbox or shielding*

High voltage vehicle operation testing: *Via virtual cockpit on the touchscreen with HDMI output*

Country specific charging plug: *Type 2 or type 1*

Integrated scan tool with fault diagnosis *and live data streaming*

Interactive course material: *Curriculum and experiments, projects and workshop assignments*



Features

- Real components from real vehicles
- 400V High Voltage with integrated protection
- HV system deactivation
- Replaceable main relays modules
- Safe and secure working environment – student proof
- Virtual cockpit - integrated diagnostic scan tool
- Different drive configurations
- Potential equalization - measurements on real metal components
- Realistic energy flows
- Integrated fault simulation
- Curriculum and projects - complete coverage of the ASE L3 test
- Acoustic feedback – warning of hazardous actions

EMT 4 Electric Vehicle Charging Station Trainer

LUCAS-NUELLE

A charging station, also called a charge point or Electric Vehicle Supply Equipment (EVSE), supplies power for charging plug-in electric vehicles like cars, trucks, and hybrids. These stations can be installed in public areas, private homes, and parking lots. With the rise of electric vehicles, Electric Vehicle Charging Stations (EVCS) have become vital to the infrastructure, offering different charging levels (Level 1, 2, and 3) with varying speeds. Wallboxes, compact high-performance stations for private and semi-public use, can be integrated into energy management systems and smart homes. The Lucas-Nuelle training system teaches the installation, safety testing, and code compliance of charging stations, making it easy to integrate them into smart building systems.

Wallboxes provide a safe and reliable EV recharging solution for homes, workplaces, retail stores, parking facilities, and the hospitality industry. They can be integrated into energy management systems, smart homes, photovoltaic systems, or smart meters. Regular electrical safety certification is required, and the equipment also trains personnel to inspect hardwired charging infrastructure and portable charging cables.

Training contents

- Understanding the structure and function of charging infrastructure systems
- Identifying the various types of charging columns and connection cables
- Determining the energy and power requirements for charging systems
- Learning about load management and assessing the energy and power requirements at the site
- Understanding the technical and legal requirements for installation
- Learning about the technical standards for connecting charging stations
- Testing communication signals (Cp) in mode A, B, C, and E
- Understanding the protective equipment of charging stations
- Learning about testing and maintenance according to national regulations
- Start/stop charging w/RFID Card, or NFC enabled smart watch/phone
- Troubleshooting potential issues

Hardwired charging infrastructure

- Learning project, general overview
- Adaptation of charging infrastructure to the upstream installation
- Electrical hazard
- Protective measures against electric shock
- Selection of components for charging infrastructure systems
- EV charging methods
- Inspection and testing of electrical charging stations in compliance with currently applicable standards
- Preparing an inspection report
- Setting up communication with the Wallbox
- Commissioning and configuration with the app
- Setting up various interfaces, WiFi, Bluetooth, LAN, RS485
- Troubleshooting wallboxes
- Documentation, hand-over and test report

Portable charging infrastructure

- Learning project, charging cable
- Selection of suitable charging cables for specific applications
- Relationship between cross-section, charging current and line designation/labelling
- Connector variants for charging cables
- Inspection and testing of charging cables as portable devices
- Use of emergency charging cables
- Special issues regarding the inspection and testing of emergency charging cables as portable devices
- Preparation of inspection and test reports for charging cables

CERTIFICATION // FAA PART 107 CERTIFIED DRONE PILOT

Small Unmanned Aircraft Systems

ROCKET DRONES™

REVOLUTIONIZE LEARNING WITH ROCKET DRONES

Rocket Drones is the first drone education company built by drone professionals for schools. We understand educators can purchase drones from anywhere, but finding a drone educational program and pathway to career readiness has been hard to find. We heard you, and we are excited to introduce the Rover Classroom Drone Kit from Rocket Drones. Students 3rd grade and up can fly these drones and advance their skills while logging hours towards industry certifications. Teacher input has been integrated at every turn of the kit from endless flight challenges and gamification to one charger connection type for all components. Kits also include storage cases, standards based curriculum, safety equipment, and a pathway for students who are hungry for more. You can even conveniently resupply your drone game supplies at any office supply store. There is something for everyone!

The Rocket Drones Student Pathway to Drone Careers

Step 1

Classroom Rover Drone: Introduces students to the basics of drone flight with gamified flight activities through proprietary curriculum without leaving the classroom and begin logging real flight hours.

Step 2

Drone Racing: Students begin to sharpen manual FPV flight skills without sensors, preparing them for future employment through competitive racing all while continuing to build a portfolio and log flight hours.

Step 3

Commercial Drone Training Course: Pilots 16 and older who want to transition in a drone career become FAA certified and become more qualified for real job opportunities upon graduation.

Step 4

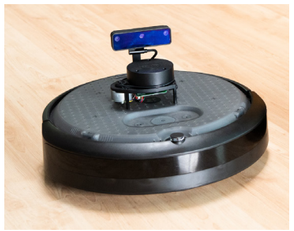
Portfolio Building & Logged Hours: Students continue to build a comprehensive portfolio and logged flight hours to show employers that they are certified and qualified with the ability to back it up.

Turtlebot 4 Robotics Learning Platform

MOBILE ROBOT PLATFORM FOR LEARNING AND DEVELOPMENT

TurtleBot 4 is the next-generation of the world's most popular open-source robotics platform for education and research, offering superior computing power, more payload capacity, improved sensors and a world-class user experience at an affordable price.

TURTLEBOT® 4
ROBOTICS LEARNING PLATFORM



Get Started Quickly

TurtleBot 4 ships assembled with ROS 2 installed and configured along with detailed user documentation, a Gazebo simulation model, demo code and tutorials, allowing you to get started quickly with learning and developing robotics applications. Tap into the thriving open-source ROS developer community and get started learning robotics on day one.

Sensor Packed

TurtleBot 4 is built on the iRobot® Create® 3 mobile base which comes with a charging dock and an array of integrated ROS supported sensors ideal for many SLAM and AI-based robotics applications. Sensors include a spatial AI stereo camera, 2D LiDAR, IMU, optical floor tracking sensor, wheel encoders, infrared, cliff, bump, slip detection and more.

Build & Expand

Once you have mastered the basics, easily expand the capabilities of TurtleBot 4 by adding your own sensors and custom payloads. Accessible USB ports, user power breakouts and a top mounting plate make it easy to integrate third-party hardware and fully customize your robot.

Autonomous Workforce

INDUSTRIAL MOBILE ROBOT (IMR)

Industrial mobile robots or "mobile manipulators"—robot or cobot arms mounted to an Automated Guided Vehicle (AGV) or Autonomous Mobile Robot (AMR)— give students hands-on experience with the same advanced automation systems used in modern manufacturing. By working with mobile robotics, students develop critical skills in machine tending, order fulfillment, palletizing, part transfer, and more — preparing them for high-demand careers in robotics and automation.

5 Key Mobile Robot Applications

- Goods to Person
- Person to Goods
- Autonomous Forklift
- Material Transport
- Sortation

FANUC Robotics: EV / Battery Assembly

EARN A FANUC ROBOTICS HANDLING TOOL OPERATIONS AND PROGRAMMING CERTIFICATION

This cart provides a hands-on learning experience for the student to integrate a PLC, robot, and many industrial devices, such as sensors, area scan, & intelligent pneumatic devices. The system comes with your choice of a PBL, and additional PBLs can be purchased. Students will learn to call robot programs from the PLC. They will test I/O, motor operation, safety inputs, and vision.

Learning Objectives

- Robot/cobot programming
- 2D vision guidance
- Machine operation
- Maintenance & troubleshooting
- Production processes
- Application of electromechanical concepts
- Project engineering methods
- Plc to robot integration

Project-Based Learning Options

Dry Erase Marker Packaging

This operation utilizes a smart color sensor to venty the marker ceo color to determine the location in a two color package tray. The marker can also be rejected by being the wrong cap color, or loaded backwards.

Includes: Red, Blue, & Black Markers (12 each), Reversible Packout Tray with

*A" Packout Nest and '8" Packout Nest,

(4) Erasers

EV Assembly

The EV Assembly project-based learning module sits on & integrates creating a very nice teaching tool for student will understand the assembly of batteries for the EV automotive manufacturers today.

Includes: (18) 18650 Battery Cells, (3) Battery Pack Top Housings, (3) Battery Pack Bottom Housings, (2) Battery

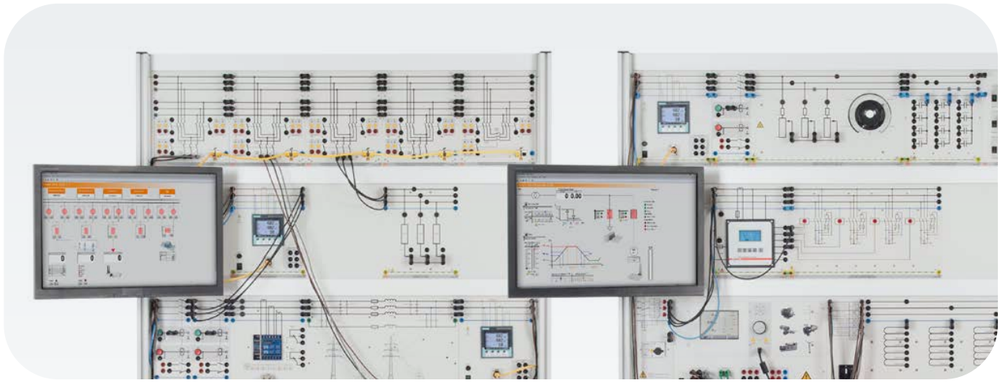
Power Bank Bus Bar

iRVision

FANUCs fully integrated visual detection system that enables robots to see. As a result, production flexibility increases because expensive positionina fixtures are not required 2D vision is suited for any material handling application including palletizing & depalletizing, as well as vision inspection.

Smart Grid Power Engineering Training

LUCAS-NUELLE



SMART GRID – CONTROL CENTRE - ENERGY MANAGEMENT

This equipment set is the heart of the smart grid inside the power engineering laboratory. In addition to power generation, transmission and distribution, the SCADA software is used to collect all the values and trigger corresponding switching operations. This can be done manually and also automatically via Soft PLC. The smart grid control centre detects and monitors the feed-in of generated energy and any load variations and also carries out corresponding countermeasures to keep the power grid stable.

Training Content

- Three-phase double busbar system
- Investigations on three-phase power lines
- Overcurrent time protection for power lines
- Complex loads, energy consumption metering and peak load monitoring
- Manually activated and automatic reactive power compensation
- Load management – demand-side management
- Intelligent control of power generators and consumers

We Build the Bridge. You Build the Future.

We're here to help your school connect to the resources, equipment, training, and curriculum you need to empower students for future careers in growing industries.

HOW IST HELPS YOU TRANSFORM YOUR CLASSROOM INTO CAREER LAUNCHPADS

Fund Your Robotics / Automation Lab:

IST empowers schools to build state-of-the-art labs by providing guidance and securing funding through grants and government programs.

Assess the Needs of Your Local Manufacturers:

IST connects local industry demand with the right equipment, credentials, and curriculum to drive student outcomes.

Develop a Comprehensive Plan for Your Lab:

Together, we'll consider your infrastructure and assess your budget, space, and instructors to design a plan for your lab.

Install Equipment and Train Instructors:

We coordinate installation, curriculum implementation, and instructor training so you can launch without a hitch.

Keep Your Lab Relevant and Agile for the Future:

Our team will be here to support your instructors and help you stay up-to-date in the rapidly-changing technology landscape.

STEM Curriculum Enhancement

IST also offers many existing STEM career education resources that align with the pathways in this catalog. Explore what IST has to offer your school. **Together, we can power the future of education.**

Integrated Systems Technologies

Partner with IST to Shape the Future

Your students are tomorrow's innovators, builders, and problem-solvers. Let's prepare them together. Connect with us today to explore how we can help you equip your students to thrive in a rapidly evolving workforce. Email **info@istus.com** to get started.

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