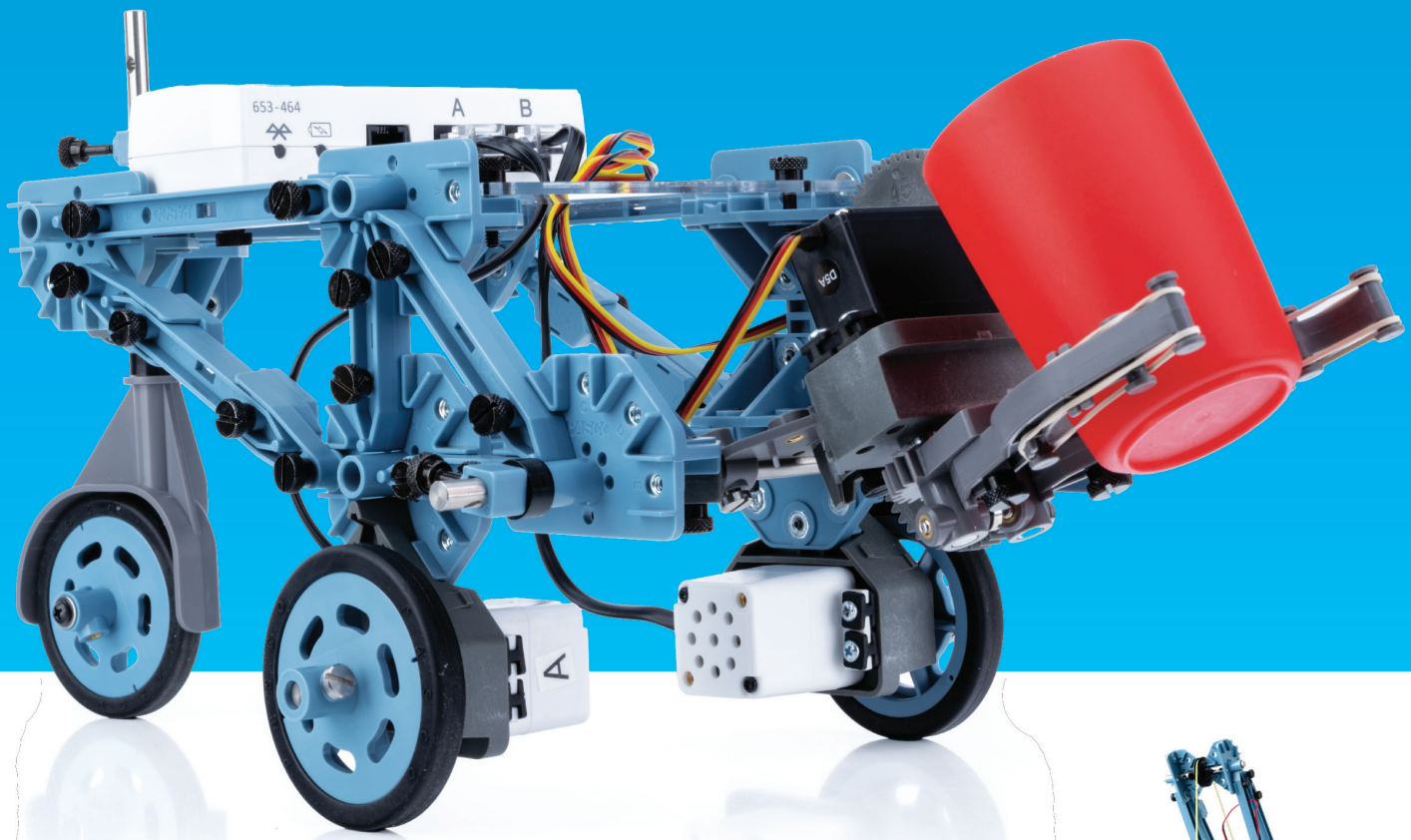
STEM SOLUTIONS

From Coding to Controlling Machines

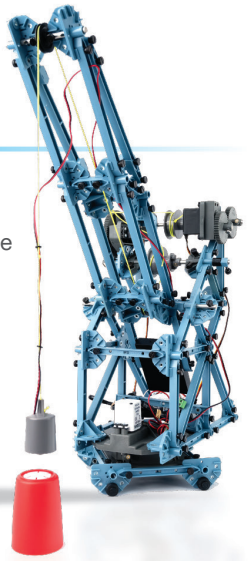
- Sensor Technology STEM Kits
- Motorized Structure Sets
- Sense & Control

Blockly PASCO's software integrates block-based coding for seamless STEM investigations



Bring STEM to life with hands-on coding kits and activities. Code without limits with **Blockly coding and SPARKvue**

Design, code, and create with **STEM SENSE** sense and control kits, or with our new line of **Motorized Structures** kits and accessories.



SINCE 1964 PASCO®

STEM SENSE SOLUTIONS

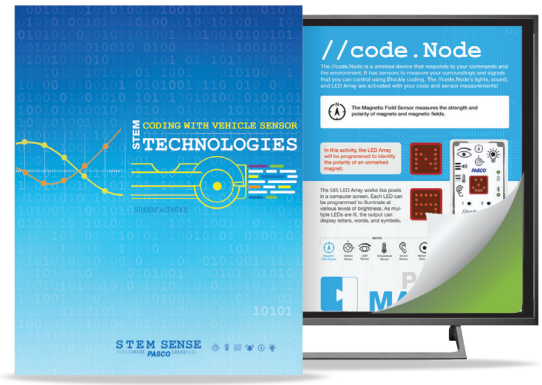
STEM Sense solutions help build early excellence in science and STEM education with cross-curricular investigations that help learners build strong foundations in science, programming, and data literacy. Each complete kit includes an easy-to-use coding device; award-winning software with Blockly coding; hands-on, phenomena-based investigations; and all the equipment and supplies students need to complete the investigations.

Coding With Sensor Technologies Kit

Coding With Vehicle Sensor Technologies Kit

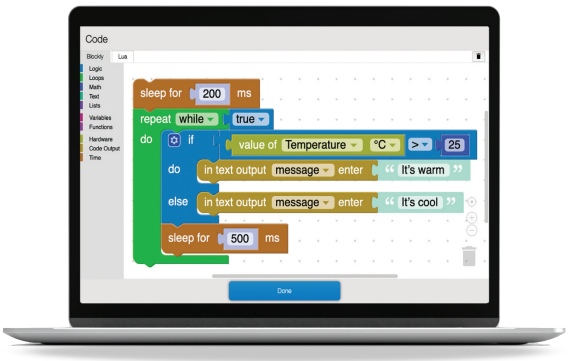
Coding With Sound & Light Sensor Technologies Kit

800.772.8700 (inside US) +1 916.786.3800 (outside US)



Student Activities and Teacher Resources

Whether they're new programmers or hobby hackers, STEM Sense Kits make it easy to support students of all learning levels with a variety of scaffolded activities and open-ended challenges. Each lesson is based upon the latest science standards and incorporates cross-curricular connections to reinforce key concepts in computer science, mathematics, and language arts.



SPARKvue + Block-Based Programming

SPARKvue offers all the benefits of a visual coding environment with additional features for data collection, visualization and analysis. When students execute a program in SPARKvue, they can monitor sensor data collection in real time, displaying it in digits, graphs and/or text. Students can also combine PASCO sensors and coding devices, such as the //code.Node, to create programs that interact with the physical world. With PASCO and Blockly, young students can learn how to create, modify, and execute block-based coding programs, while developing the skills they'll need to progress on to traditional text programming languages like Java, Python, and C++.

Coding & Control Devices + Equipment

The //code.Node and //control.Node bridge the gap between science and computer science to provide students with hands-on learning opportunities that promote literacy in science, programming and data collection. All PASCO coding devices integrate with our sensors and data collection and coding software, enabling students to perform basic coding with technology activities as well as more advanced sense and control investigations. STEM Sense Kits come ready-to-use with all the additional equipment and supplies required to do the activities, including magnets, tuning forks, the //code.Node Cart, the PASCObot, and much more.

PASCObot Sense & Control Kit

Greenhouse Sense & Control Kit

//control.Node Sense & Control Kit

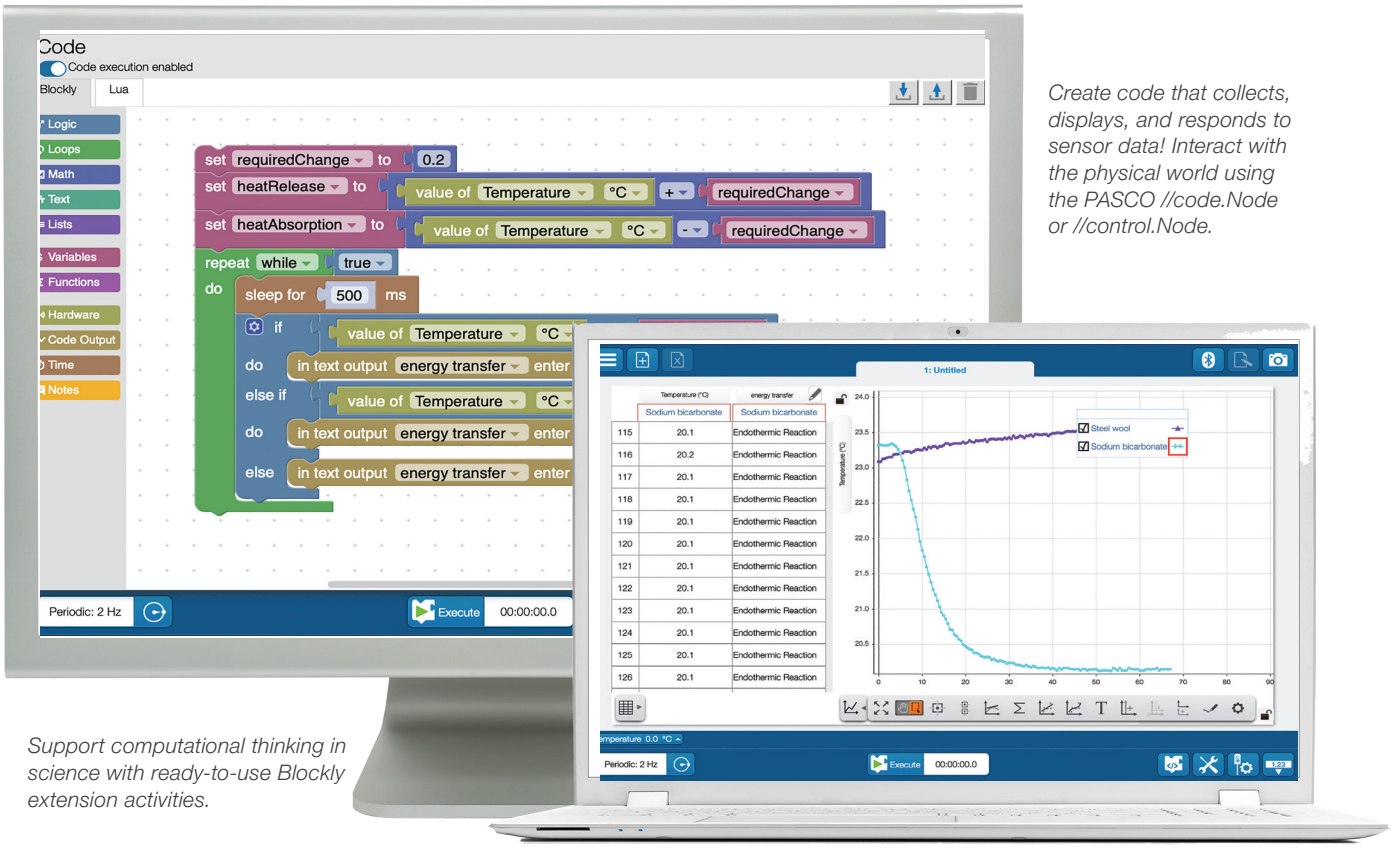
SPARKvue & Blockly Coding: Computational Thinking Meets Data Literacy

The Integration of Blockly into SPARKvue software provides science and STEM teachers with an intuitive coding platform that fits their needs. Rather than introducing students to coding independently, Blockly integrates computational thinking into the exploration of phenomena to provide learners with a new world of STEM opportunity.

With Blockly, students can create custom data collection parameters, feedback loops, data displays, and more—all without coding experience.

Use Blockly in SPARKvue to:

- Introduce students to computational thinking
- Investigate phenomena while learning to code
- Create data-driven feedback loops
- Program data collection parameters for any PASCO sensor or interface
- Control the PASCObot



Create code that collects, displays, and responds to sensor data! Interact with the physical world using the PASCO //code.Node or //control.Node.

Support computational thinking in science with ready-to-use Blockly extension activities.

Free award winning data collection and analysis software now runs in your browser!

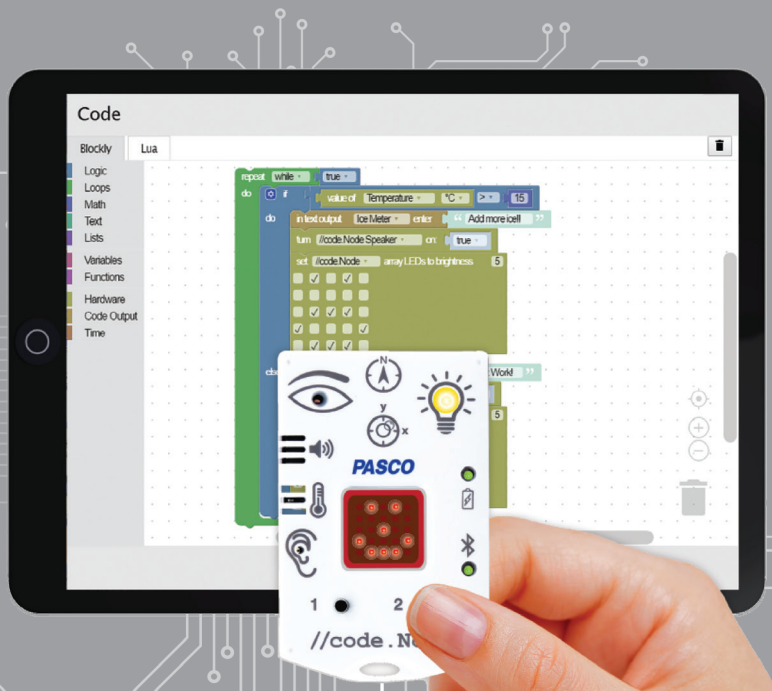
We're excited to announce SPARKvue is now available **FREE** of charge on all your devices as a browser-based application. This new version of our software as a Progressive Web Application (PWA) means you have free access to all the features of SPARKvue from Google Chrome and Microsoft Edge browsers. That's right: No download fees, subscription fees, or update fees, even for Windows® and Mac®. Plus, the app is always updated to the latest version automatically, so you never have to worry about it.

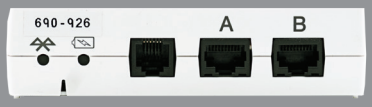
Go to sparkvue.pasco.com to access the PWA. SPARKvue is also available as a **FREE** app for Chromebook™, iPad®, Android™ tablets, and Apple® and Android™ smartphones.

SPARKvue® Launch now as a Web App PWA + Download on the App Store | Available in the Chrome Web Store | ANDROID APP ON Google play

This award-winning data collection and analysis software includes Blockly coding with data displays!

Getting started with //code.Node is quick and easy. Simply connect the //code.Node to SPARKvue and begin coding instructions for its sensor inputs and device outputs. As the code is executed, SPARKvue displays real-time data from the //code.Node's active sensors, which triggers a response from the //code.Node's lights and sounds. Other PASCO sensors may also be used in Blockly programs, enabling students to explore a new world of opportunity.



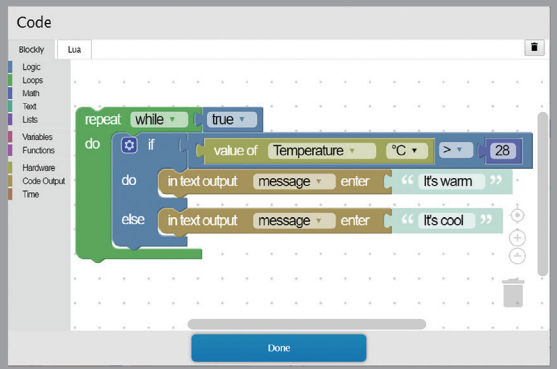


Explore more advanced coding applications with the //control.Node and Sense & Control Kits

INPUT

Select one or more //code.Node sensor inputs and a device output.

CODING IN SPARKVUE

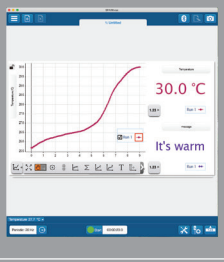


Drag and drop coding blocks to create a functioning program. Then execute it!

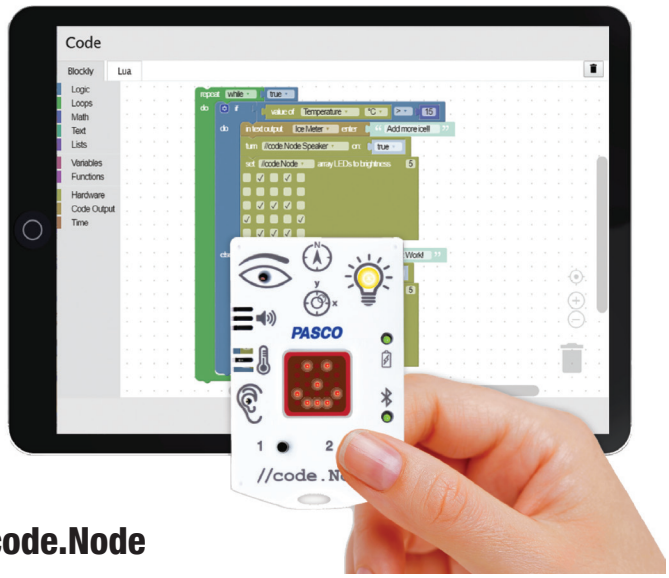
OUTPUT

Sensor data triggers a response in the device's sound & light outputs.

OUTPUT



SPARKvue displays data collected by the sensor input in real time.



//code.Node

PS-3231

The //code.Node is a turnkey coding solution that combines real-world sensor inquiry, Blockly coding, and live data displays to drive computational thinking in STEM learning. It includes six interactive sensors and four device outputs that measure and respond to phenomena using code created in SPARKvue or Capstone software.

Specifications:

Maximum Sample Rate: 100 Hz

Light Level Sensor Range: 600 to 50,000 lx (not calibrated)

Sound Level Sensor Range: 70 to 100 dB (not calibrated)

Magnetic Field Sensor Range: ±50 gauss

Acceleration Sensor Range: ±8 g

Speaker Frequency Range: 10 to 10,000 Hz

Ambient Temperature Sensor: Range: -25°C to 40°C

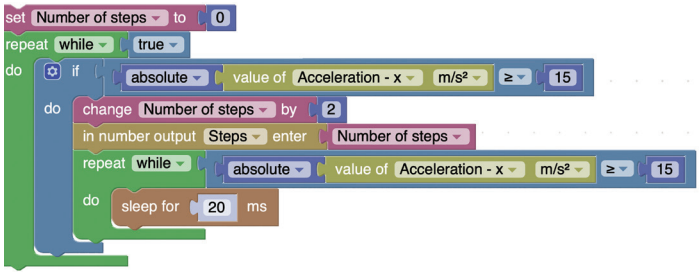
Ambient Temperature Sensor: Resolution: 0.05°C

Ambient Temperature Sensor: Accuracy: ±1°C

Connectivity: USB or Bluetooth 5.2

Logging: No

Battery: Rechargeable LiPo



Block-Based Coding

Blockly simplifies the programming process for new coders. Visual coding blocks connect like puzzle pieces to help students master the basics of programming, without having to worry about their syntax.

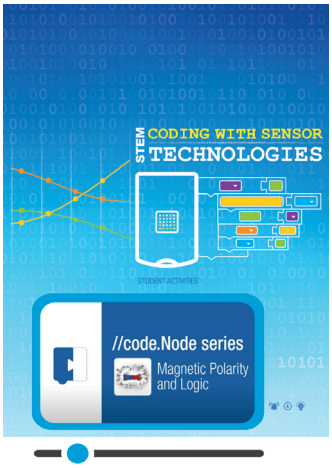
Order Information

//code.Node	PS-3231
//code.Node Holder	PS-3233
//code.Node (Set of 8)	PS-3311

Coding with Sensor Technologies Kit

ST-7800

The Coding with Sensor Technologies Kit introduces students to foundational coding concepts and includes ten hands-on investigations that explore science phenomena using the //code.Node's programmable sensors, lights and sounds.



Activities & Video Lessons

- Magnetic Polarity
- Random Number Cube
- Automatic Night Light
- Light Bulb Efficiency
- Clap On
- What's the Origin?
- Investigating Sound Levels
- Step Counter
- Intruder Alarm
- Digital Thermometer

Build career awareness with activities that make real-world connections to:

- Engineering with real-life sensors
- Designing "smart" home technology
- Programming and developing sensor-based safety features

Help students develop competency in:

- Problem-solving, logical reasoning and critical thinking
- Computational thinking
- Data collection and analysis
- Mathematics
- Technology and programming

Coding with Sensor Technologies Equipment

The Coding with Sensor Technologies Kit includes a //code.Node, two painted bar magnets, a color printed booklet of student activities and a //code.Node Holder with wrist-strap.

Includes:

- //code.Node PS-3231
- //code.Node Holder PS-3233
- Painted Bar Magnet (Pair) SE-7593
- Color-Printed Booklet of Student Activities

Order Information

Coding with Sensor Technologies Kit	ST-7800

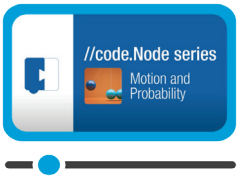
Coding with Vehicle Sensor Technologies Kit

ST-7820

Explore the science and sensors behind today's modern vehicles, while teaching students about physical science as they design, test, measure and code with sensors that mimic real-world vehicle technology.

Activities & Video Lessons

- **Crash Test:** Impact Alert System
- Investigating Odometers
- Engineering Turn Signals
- 3-2-1 Launch!
- **The Need for Speed:** Radar Detectors



Build career awareness with activities that make real-world connections to:

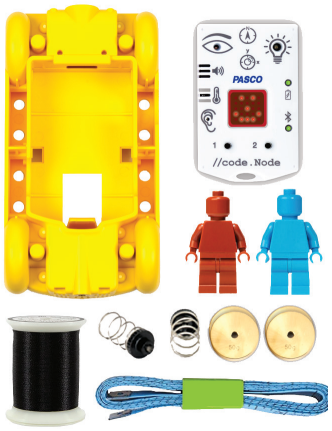
- Automotive engineering
- Real-life vehicle sensors
- Crash test engineering

Help students develop competency in:

- Problem-solving, logic, and critical thinking
- Computational thinking
- Data collection and analysis
- Mathematics
- Technology and programming

Coding with Vehicle Sensor Technologies Equipment

The Coding with Vehicle Sensor Technologies Kit comes classroom-ready with all the equipment, accessories, and software needed to complete the included activities. The complete kit includes a // code.Node; a //code.Node Cart; a color-printed booklet of student activities; two light spring bumpers; six 50-g masses; a 1.5-m roll of measuring tape; a spool of thread; and two block person figurines.



Includes:

- //code.Node PS-3231
- //code.Node Cart PS-3235
- Color-Printed Booklet of Student Activities
- Light Spring Bumpers (Qty. 2)
- 50 g Masses (Qty. 6)
- Soft Measuring Tape, 1.5m
- Spool of Thread
- Block Person Figurines (Qty. 2)

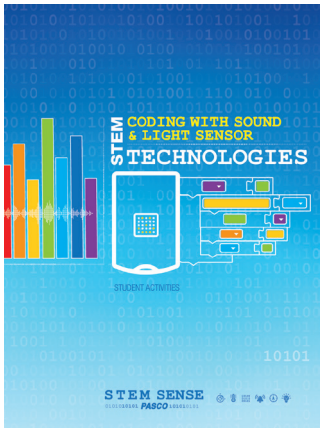
Order Information

Coding with Vehicle Sensor Technologies Kit ST-7820

Coding with Sound and Light Sensor Technologies Kit

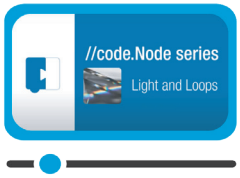
ST-7830

The Coding with Sound and Light Sensor Technologies Kit engages students in the exploration of light and sound with five hands-on coding investigations that use familiar phenomena and real-world sensors to bring concepts to life.



Activities and Video Lessons

- What is a Color Sensor?
- **RGB LED:** How to Program Color
- Engineering Sound Level Meters
- **Detect an Intruder:** Home Alarm Systems
- Investigating Electronic Tuners



Build career awareness with activities that make real-world connections to:

- Audio engineering and light technicians
- Programming and developing sensor-based security features
- Real-world innovations in sound and light technology

Help students develop competency in:

- Problem-solving, logic, and critical thinking
- Computational thinking
- Data collection and analysis
- Mathematics
- Technology and programming

Coding with Sound and Light Sensor Technologies Equipment

The Coding with Sound and Light Sensor Technologies Kit includes everything students need to explore concepts in light and sound through STEM. The complete kit includes: a //code.Node; a //code.Node Holder with wrist-strap; two tuning forks of different frequencies; a small flashlight; a color-printed booklet of student activities; a set of colored paper; and five sheets of aluminum foil.

Includes:

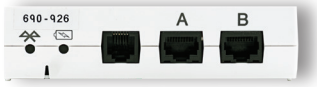
- //code.Node PS-3231
- //code.Node Holder PS-3233
- Color-Printed Booklet of Student Activities
- Small Flashlight
- Tuning Fork, Various Frequency (Qty. 2)
- Colored Paper, Various 4"x4" Sheets (Qty. 35)
- Aluminum Foil Sheet, 4"x4" Sheets (Qty. 5)

Order Information

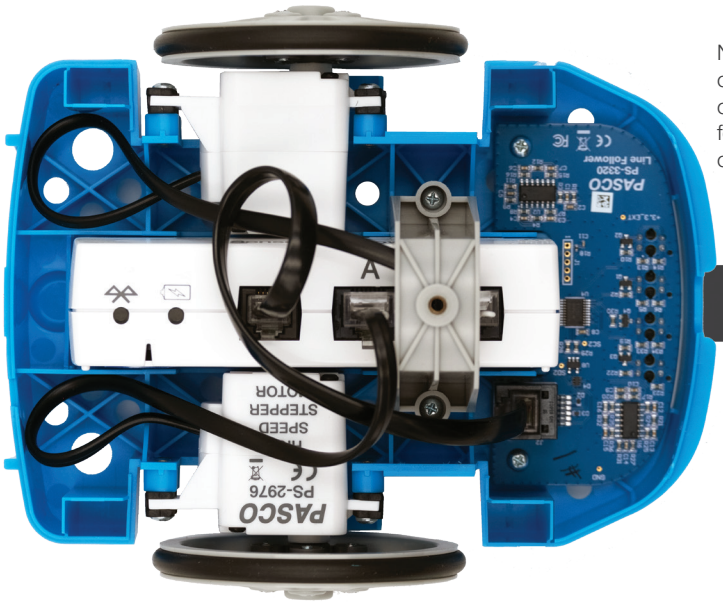
Coding with Sound and Light Sensor Technologies Kit ST-7830

PASCObot
SENSE & CONTROL KIT

When nestled inside the PASCObot, the //control.Node serves as a brain, providing both power to the bot and memory storage for students' code.



Build your bot in minutes with simple components and connector pieces that bring power to its wheels.



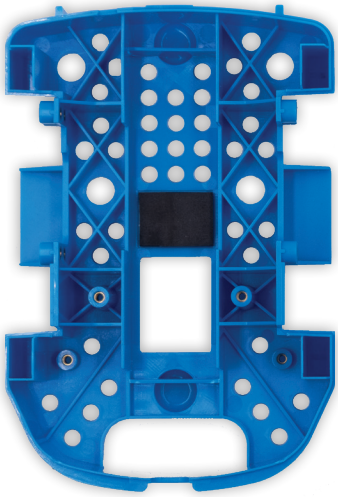
Navigate custom paths, obstacles, and more with code blocks that drive the bot forwards, backwards, or around corners and curves.

Create programs that control how the PASCObot identifies and responds to objects! Pick up a can, stack cups, or avoid objects entirely with the included Range Finder.

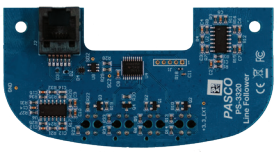
Stream code to the bot in real time or use the rechargeable //control.Node to run programs autonomously!

Designed for ages 11+, the PASCObot Sense & Control Kit includes everything students need to explore STEM through coding and robotics. Whether they're new programmers or hobby hackers, the PASCObot makes it easy to support students of all levels with a variety of scaffolded and open-ended activities.

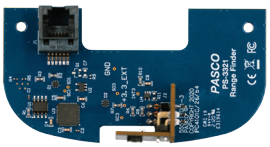
This complete kit includes a PASCObot and //control.Node, as well as all the accessories needed to program how the bot interacts with its environment. From simple movements and spins to object avoidance to complex obstacle courses, there's no limit to what students can create with PASCObot.



The PASCObot's motion is controlled by two Stepper Motors, which connect to the bot's Wheels. Compatible with other STEM Sense products, the Stepper Motors can be controlled individually to move the bot forwards, backwards, and around corners and curves.



The Line Follower enables the PASCObot to detect and respond to custom line paths that students create using the included tape.

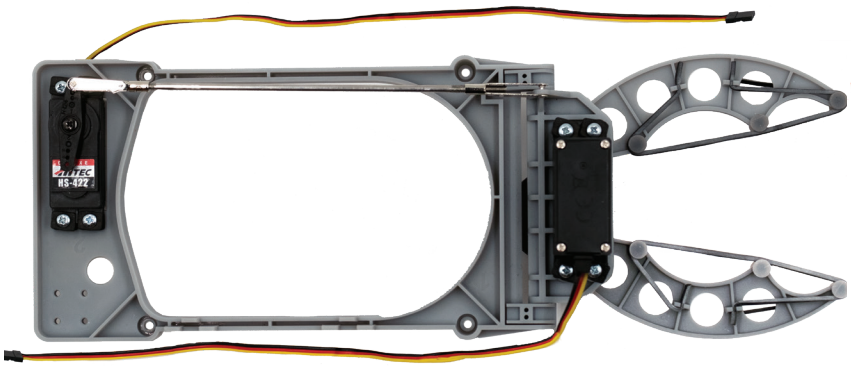


The Range Finder gives the PASCObot sight, allowing it to locate, avoid, and respond to objects based on code.

Wireless and rechargeable, the //control.Node has two ports for stepper motors, two ports for servo motors, and one port for digital sensors.

Design custom obstacle courses using the included cups and tape. Then create code to navigate the bot through the course!

The PASCObot Gripper Accessory opens a new world of opportunity by enabling students to program the bot to move, pick up, or even stack a variety of objects. When used with the included Range Finder, the PASCObot Gripper Accessory allows students to control how the bot identifies and interacts with objects.



Order Information

PASCObot PS-2994

PASCObot Sense & Control Kit ST-7840

The PASCObot Sense & Control Kit comes with the PASCObot (body, wheels, stepper motors and //control.Node) and all of the modules and accessories shown above. See below and right for à la carte ordering.

PASCObot Line Follower Module PS-3320

Order Information

PASCObot Range Finder Module.....PS-3321

PASCObot Gripper Accessory ..... PS-3325.

PASCObot Servo Motor SE-2975

PASCObot Line Follower Tape (black & white).....SE-2953

Colored Plastic Cup Set (5 colors) SE-2952

Greenhouse Sense & Control Kit

ST-2997

Designed for the exploration of biological and ecological concepts, the Greenhouse Sense & Control Kit includes everything students need to design, build, program, and study their very own greenhouse.

Student Activities

The Greenhouse Sense & Control Kit includes five student activities that can be edited to fit your course needs. Each activity focuses on a key concept in biology or environmental science and includes extensions to engineering and design practices.

Build career awareness with activities that make real-world connections to:

- Agricultural monitoring
- Ecological management
- Plant physiology

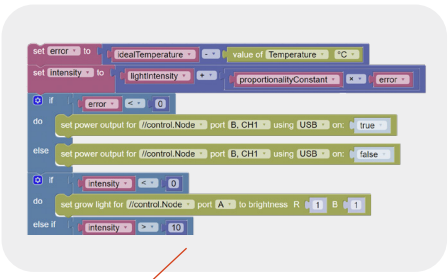
Help students develop competency in:

- Coding
- Problem solving
- Data collection and analysis
- Ecological concepts
- Science and Engineering practices

Student Activities

- Program a Sunny Day for Plants
- Coding a Cooling Breeze
- Program Perfectly Timed Rain
- Optimize Water Movement
- Program a Greenhouse Sense and Control System

Blockly



Program your PASCO Grow Light

Control Port for //control.Node

USB Power

When connected to a //control.Node, the red and blue LEDs can be controlled using Blockly code, available in both SPARKvue and PASCO Capstone.

The PASCO Grow Light (included with ST-2997) connects via USB to help keep classroom terrariums green and growing. Plug the Grow Light into a standard USB port to provide plants with consistent lighting, or connect it to a //control.Node to take full control. When powered by the //control.Node, the PASCO Grow Light becomes fully programmable, enabling students to control the light's intensity, color, and schedule.

Shine a light on biological concepts!

- Study the effects of red and blue light on plant growth.
- Determine the optimum amount of light for a particular plant species.
- Program a light schedule to care for plants over weekends and breaks.

Greenhouse Sense & Control Kit Equipment

This complete kit includes: an EcoChamber (1), PASCO Grow Light (2), Greenhouse Sensor (3) Soil Moisture Probe (4), Humidity/Light/Temperature Probe (5), Power Output Module (6), Fan (7), Water Pump (8), tubing with drip-watering ends (9), and //control.Node (10).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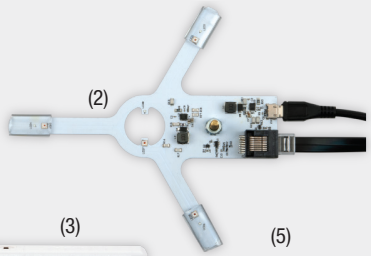
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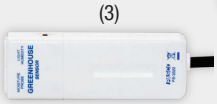
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Order Information

Greenhouse Sense and Control Kit	ST-2997
Greenhouse Sense and Control Kit (without //control.Node)	ST-2998
Available Separately:	
Greenhouse Sensor	PS-3322
PASCO Grow Light	PS-3347

//control.Node

SENSE & CONTROL KIT

PASCO's //control.Node Sense & Control Kit includes a variety of components, from smart coding devices and output circuit boards to wheels, fans, and supplies. This kit enables exploration into all kinds of phenomenon and, as the name suggests, introduces students to coding and sense and control concepts. A set of starter projects—built around the engineering design process— is provided to get students going.

//control.Node Sense & Control Kit

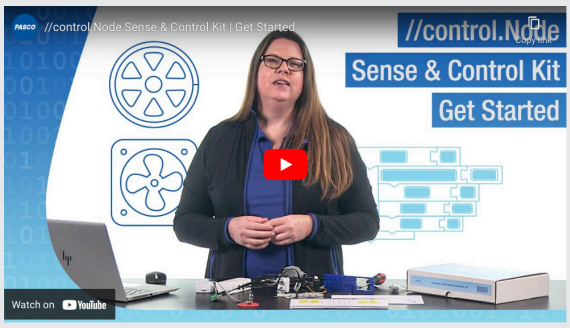
PS-5050

The //control.Node Sense and Control Kit empowers students to create and explore through code. This kit includes a //control.Node and accessories that students can use to turn on lights, run a cooling fan, open doors, launch rubber bands, and much more. The kit also includes materials and instructions for six projects:

- Night Light
- Game with Meter
- Automatic Door Opener
- Thermostat-Controlled Fan
- Light-Activated Winch
- Remote Control Rubber Band Launcher

These projects use elements of the engineering design process:

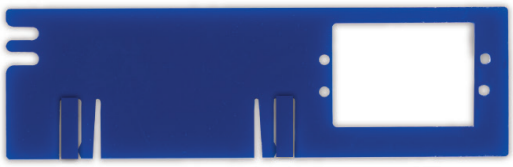
- Define the problem
- Research solutions
- Design a prototype
- Test solution
- Iterative design and improvement



GET STARTED

Learn about the components of PASCO's //control.Node Sense & Control Kit (PS-5050) and how to program them with Blockly code built in to SPARKvue software.

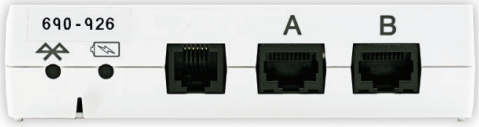
//control.Node Sense & Control Kit



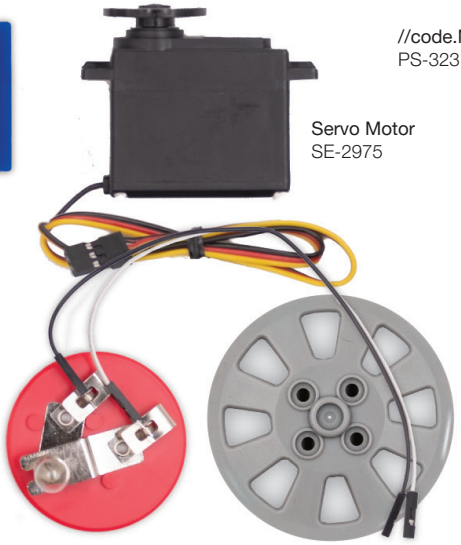
Motor Bracket and Stand

USB Fan
PS-6206

Power Output Module
PS-3324



//control.Node PS-3232
(ships in separate box)



Lightbulb & Stand
with Cable

Servo Motor
SE-2975

Pulley

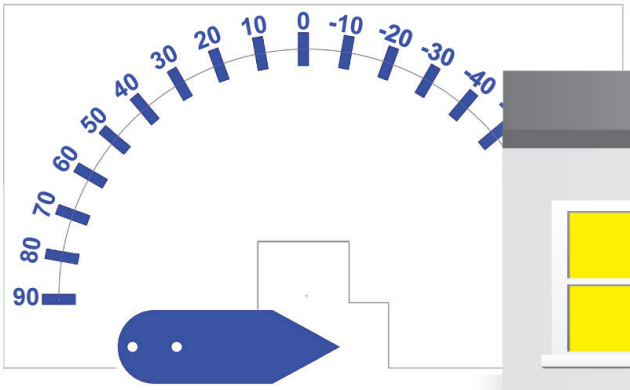
Small Magnet

Jumbo Paper Clips
Qty. 10

//code.Node
PS-3231

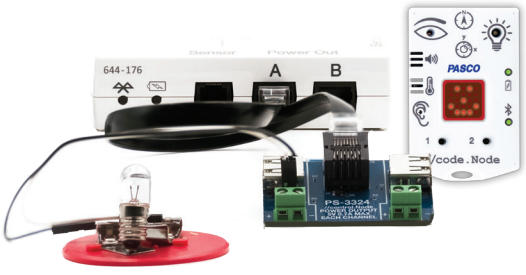
Stepper Motor
PS-2976

Rubber Bands
Qty. 10



House and Meter Paper Templates

Note: Not pictured are 4 bolts and 4 nuts.



EXAMPLE: Night Light Project

Goal: Construct a night light that automatically turns on when the room goes dark and turns off when the room is lit.

Order Information

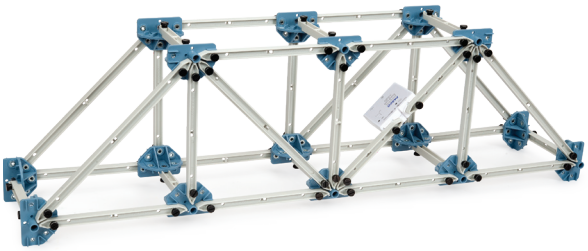
//control.Node Sense and Control Kit..... PS-5050

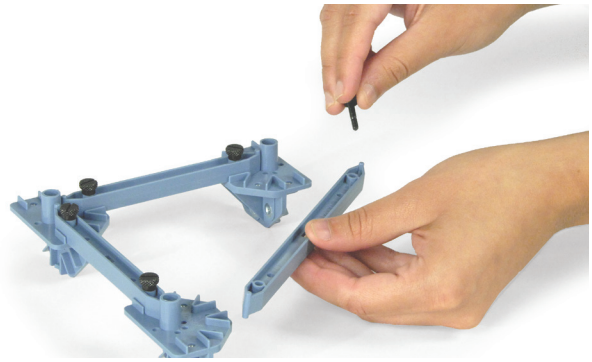
Sense and Control Kit (without //control.Node) PS-5051

This kit is intended for courses that already have a //control.Node. The kit is identical to PS-5050 except it does not include a //control.Node (PS-3232).

STRUCTURES

The PASCO Structures System provides a robust environment for students to foster an understanding of engineering basics. Ultra-realistic I-beams replicate properties of real-world materials, giving students hands-on experience that will transfer to higher education and beyond. The scalable and universal kit components fit together geometrically, allowing students to build basic structures to complex cantilevers.





Building Better Bridges Kit

ME-3581

Now is the perfect time for your students to learn about bridge-building and how bridges really work. This complete STEM kit allows students to learn and apply engineering design concepts. They can use the included I-Beams to build bridges and structures that behave like the real thing! And, with the included Wireless Load Cell, students can measure forces under tension or compression anywhere in their structures.

Concepts:

- Forces in Equilibrium
- Internal Forces
- Moments in Equilibrium
- Strength of Members
- Truss Analysis

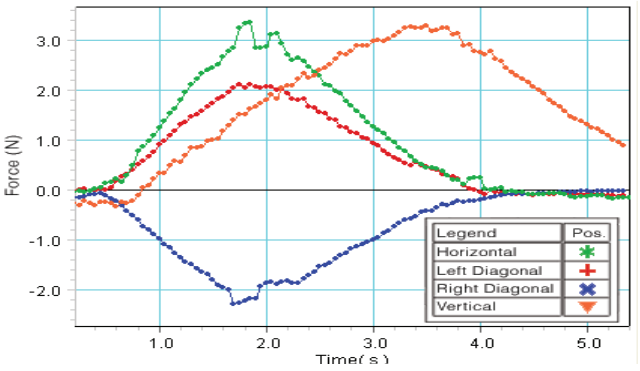
Includes:

- Lab Activities (Qty. 1)
- Wireless Load Cell and Accelerometer (Qty. 1)
- Truss Connector (Qty. 16)
- Truss Screw (Qty. 80)
- Sliding Connector (Qty. 1)
- Mass Hanger (Qty. 1)
- Weight Set (Qty. 1)
- #1 Flexible I-Beam Member (Qty. 6)
- #2 Flexible I-Beam Member (Qty. 2)
- #3 Flexible I-Beam Member (Qty. 10)
- #4 Flexible I-Beam Member (Qty. 18)
- #5 Flexible I-Beam Member (Qty. 8)
- Gratnells® Storage Tray and Foam Liner (Qty. 1)

Building Better Bridges includes everything students need to build, measure, and test a truss bridge—plus a Gratnells® Storage Tray to keep it all organized.

With the PASCO Structures System, students can quickly build, test, and redesign their structures while learning about the engineering process. Construction is easy: Simply fit an I-beam into a Connector, and secure it with thumbscrews.

Wireless Load Cells can be placed anywhere in your structure to make real-time measurements of tension and compression.



PASCO software lets students create live graphs of forces over time, compare measurements from different points, and analyze their results.

Order Information

Building Better Bridges Kit ME-3581

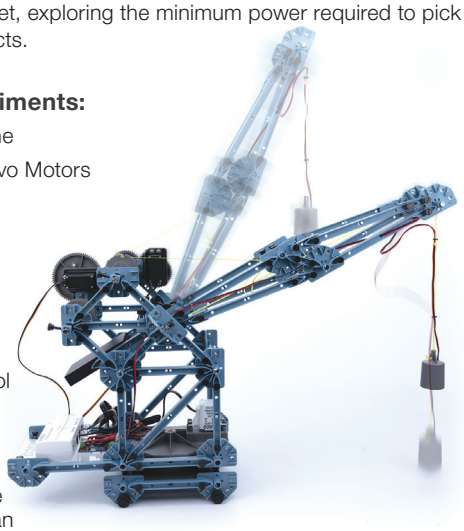
MOTORIZED STRUCTURES

The new Motorized Structures kits are a perfect fusion of the //control.Node's technology and the PASCO Structures System's functionality. Motorized Structures utilize gears, counterweights, electromagnets, and other custom accessories, crafted especially so students can master the fundamentals of statics and dynamics. Students will cultivate their creative problem-solving skills with PASCO software that features Blockly coding, turning live sensor data into variable inputs for their unique programs.

Motorized Crane

ME-7030

The Motorized Crane is a winch mechanism that maneuvers a powerful electromagnet. Students can vary the duty cycle to vary the power supplying the electromagnet, exploring the minimum power required to pick up different weighted objects.



Perform These Experiments:

- Build the Motorized Crane
- Intro to Stepper and Servo Motors
- Effect of Spool Diameter
- Effect of Gear Ratios
- Effect of Duty Cycle

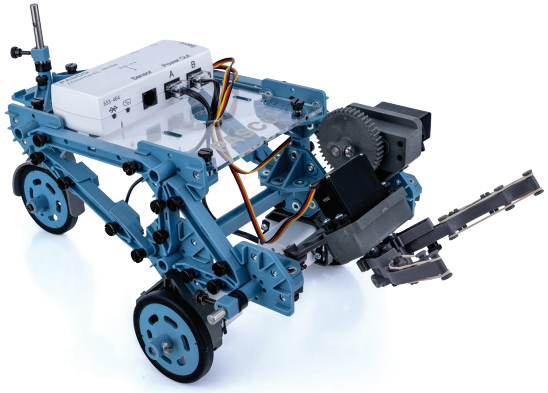
Further Exploration:

- Add a //code.Node as a gyroscope remote control
- Add a Light Sensor to sort colored objects
- Add a Current Sensor to the electromagnet to see the effect of picking up an object

StructureBOT Kit

ME-7029

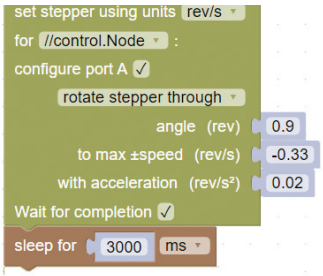
The StructureBOT is a versatile kit that enables students to build several different configurations like front-wheel steering, rear-wheel steering, and with or without the Structures Gripper. Students can add more sensors to expand the functionality of the StructureBOT to follow a line, avoid obstacles, navigate through a maze, turn in circles, pick up objects with its gripper, and create their own new functions.

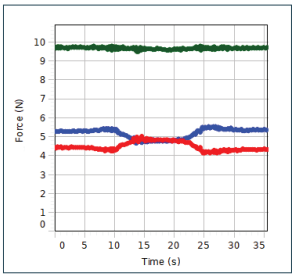


Motorized Drawbridge

ME-7028

Students can build this drawbridge, add the stepper motor and gears, and write Blockly code to raise and lower it. This bridge kit also includes a PASCO Wireless Load Cell/Accelerometer that can be used to measure and analyze the internal tension forces within I-beam sections while the drawbridge moves. Add a //code.Node to act as a gyroscope remote control, or to simulate the flashing lights and siren signals of real drawbridge traffic safety protocol.





Students write Blockly code to control the drawbridge motion. The load on the front bridge support (blue), the load on the back bridge support (red), and the total of the two loads (green) are plotted in real time as the bridge is raised and lowered.

Order Information

Motorized Crane ME-7030

StructureBOT ME-7029

Motorized Drawbridge ME-7028

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PASCObot

Explore STEM through coding and robotics

The PASCObot helps harness students' interest in robotics to drive deeper learning in science and STEM. With scaffolded activities and plenty of room for personalization, the PASCObot opens a new world of opportunity for students to grow, create, and even compete! This kit includes all the materials needed to build, program, and control the PASCObot **(Pages 8-9).**

*Accessories like the **PASCObot Gripper** create additional learning opportunities by enabling students to program the bot to move, pick up, or even stack a variety of objects.*