MINDS-i®

Build whatever you envision in your "mind's eye".

PRODUCTS & CURRICULUMS

DESIGN
BUILD
PROGRAM
EXPLORE

mindsieducation.com

Learn about how MINDS-i is taking STEM learning to new heights – over land and in the air.

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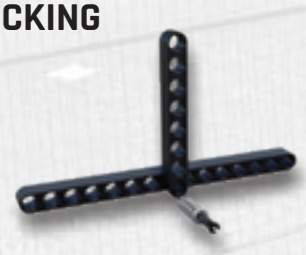
WHY CHOOSE MINDS-i ROBOTICS?

Spark and Sustain Students' Interest in STEM

There's a shortage of students interested in STEM careers. By 2022, there will be 9 million STEM-related jobs in the U.S. but not enough skilled students in the pipeline. MINDS-i Robotics engages students in an energizing STEM learning environment with easy to build, program, and modify robots. Technologically advanced rovers and drones perform impressive real-world tasks that build excitement for STEM careers.

Build whatever you envision in your "mind's eye".

ADVANCED QUICK-LOCKING ERECTOR SYSTEM



Our patented "quick-lock" construction system is superior to friction-snap and erector-based building products. Students can more innovatively build durable robots with the easy to build and easy to modify construction elements.

IMMERSIVE CURRICULUM & LABS

We encourage students to think like engineers and technicians, working collaboratively to test and improve their designs. This project-based learning framework provides the power to excel academically and professionally in our ever-evolving technological world.

LABS & CURRICULUMS **KITS & MODULES**

WORKSHOPS **COMPETITIONS**

CUTTING-EDGE TECHNOLOGIES UNIQUE TO MINDS-i ROBOTICS

Our robots perform complex tasks and provide hands-on experience with advanced technologies. Working with real-world applications excites students about STEM-related career opportunities.

EXCITING WORLD APPLICATIONS

We deliver an impressive learning experience that goes beyond typical classroom environments. Our curriculum takes STEM education to the next level by challenging students with real-world applications using C++ programming technologically advanced open-source robots.

Build whatever you envision in your "mind's eye".

MINDS-i STEM INTEGRATED ROBOTICS

Introduce students to the foundations of robotics with easy to assemble and modify rovers that emphasize real-world applications. Working collaboratively using the Engineering Design Process, students build and program advanced robots to tackle impressive challenges. As they explore mechanical engineering, electrical engineering and programming, students also analyze the robot's physics, mathematical and scientific elements.

» 2 lab options: 4 or 6-wheel drive

» Each lab is one semester (90 hours of curriculum) with seven units, designed for 3-5 students

COURSE DESIGN

Each lab is one semester and designed for 3-5 students. Foundations is the recommended prerequisite to the Drones Lab + Curriculum.

GEAR REDUCER | TACHOMETER | MULTIMETER | TORQUE METER | RC CONTROL | CONTROLLER | CATAPULT

CURRICULUM OUTLINE - 90 HOURS

Unit 1: Introduction to MINDS-i

- 1.1 Introduction to MINDS-i
- 1.2 Student Performance Development Process
- 1.3 What is a Robot?

Unit 2: Design Engineering

- 2.1 Model for Inquiry
- 2.2 The Importance of Data
- 2.3 Parts & Purposes
- 2.4 Simple Machines

Unit 3: Variable of Force & Motion

- 3.1 Force & Motion
- 3.2 Parts & Purposes
- 3.3 Gear Ratios; Speed & Torque
- 3.4 Friction
- 3.5 Inertia

Unit 4: Software Programming; Sensors & Servos

- 4.1 Why Programming?
- 4.2 Parts & Purposes
- 4.3 Testing the Micro-controller
- 4.4 Creating the Breadboard; Servo
- 4.5 Adding to the Breadboard; Esc
- 4.6 Adding to the Breadboard; Radio Transmitter
- 4.7 Adding to the Breadboard; Ultrasound Sensor
- 4.8 Adding to the Breadboard; QTI Sensor
- 4.9 Core Syntax

Unit 5: Autonomous Robotics

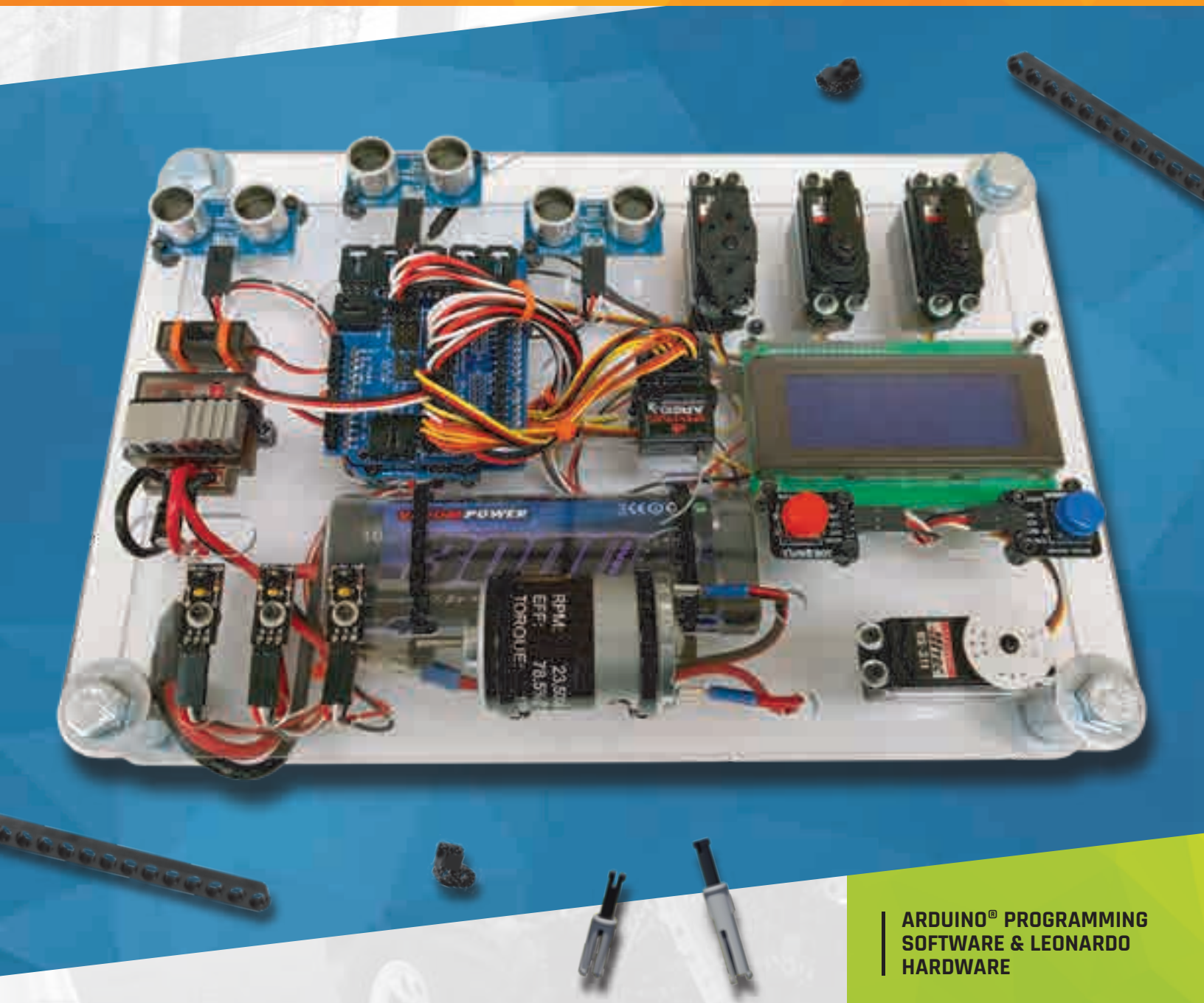
- 5.1 What Makes a Robot Autonomous
- 5.2 Basic Control Structures
- 5.3 Autonomous Obstacle Avoidance
- 5.4 Line Following

Unit 6: Mechanical & Structural Engineering

- 6.1 Levers, Cams & Span
- 6.2 Structural Design
- 6.3 Robot Arm & End of Arm Tool

Unit 7: Culminating Project

- 7.1 Preparing for the Challenge
- 7.2 Cleanup / Organizing



MINDS-i STEM INTEGRATED ROBOTICS

This fully assembled and programmed robotics breadboard accompanies the MINDS-i Foundations Curriculum. Designed to help teach programming, it allows you and your students to physically interact with the sensors on a stationary platform and can be used as a quick and easy method for checking your students wiring and code.

BREADBOARD TECHNOLOGIES

This breadboard includes: ESC: Electronic Speed Controller, PING))) Ultrasound Sensors, Radio Receiver, Servos, LCD Screen: 20 Characters, 4 Lines, QTI Line Following Sensors, Arduino® Microcontroller, 23,000 RPM Motor and Push Buttons: Menu Selection.

BUTTONS | IR LIGHT SENSOR | ULTRASONIC SENSOR | ARDUINO® | SERVOS | RC CONTROL | LCD SCREEN

ARDUINO® PROGRAMMING SOFTWARE & LEONARDO HARDWARE

- 20 Digital I/O Pins
- 7 PWM Channels
- 12 Analog Input Channels
- Serial & I2C Communication Ports
- 32 KB Flash Memory & 16 MHz
- Full Set of Sample Code in Library

This is an abbreviated list of features. Please see the full product flyer for comprehensive details.

MINDS-i STEM INTEGRATED ROBOTICS

Take STEM learning to new heights with cutting-edge, drones and rovers. Students explore programming, electromechanical systems, and aerodynamics with the UAV + UGV Drones Lab.

UAVs: Design, build, and program drones for aerial search and rescues, GPS-guided crop dusting, autonomous deliveries to remote locations, and other compelling industry-related challenges.

UGVs: Build and configure rugged rovers to manually and autonomously navigate challenging outdoor terrain, avoid obstacles, and perform complex tasks.

COURSE DESIGN

Each lab is one semester (90 Hours) and designed for 3-5 students. Foundations is the recommended prerequisite to the Drones Lab + Curriculum.

GPS & COMPASS | ENCODER | DASHBOARD | DRONE MODULE | RC CONTROL | FLIGHT SIMULATOR | GIMBAL KIT

CURRICULUM OUTLINE - 90 HOURS

Unit 1: Introduction to MINDS-i
- 1.1 Introduction to MINDS-i
- 1.2 Student Performance Development Process
- 1.3 What is a Drone?

Unit 2: UGV - Unmanned Ground Vehicles
- 2.1 Unmanned Ground Vehicles
- 2.2 UGV Chassis Build

Unit 3: Electrical Engineering & Energy Transfer
- 3.1 Energy Types & Transfer
- 3.2 Parts & Purposes
- 3.3 Electric Motors
- 3.4 Volts, Amps & Watts
- 3.5 Batteries

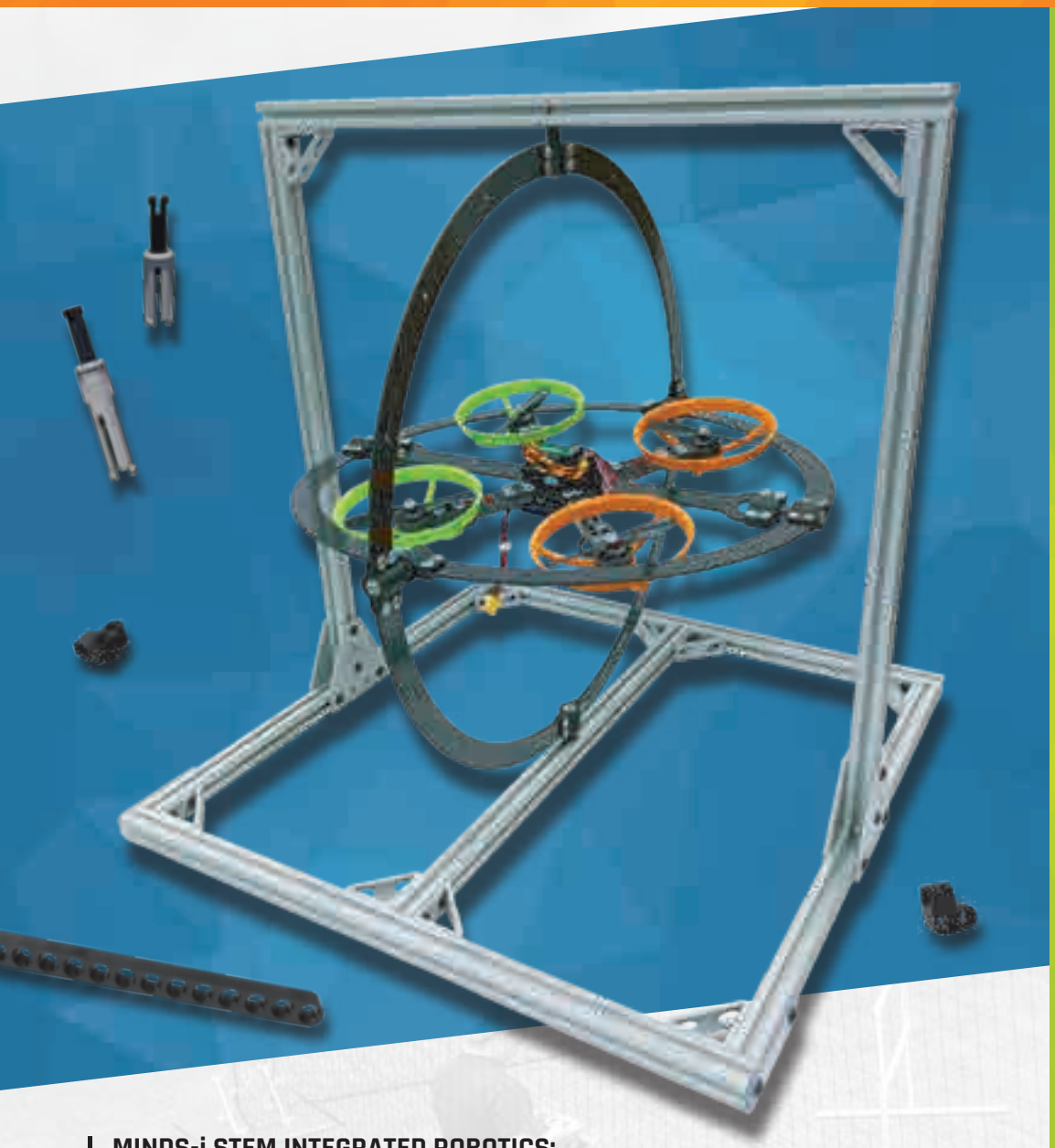
Unit 4: Drone Code & Sensors
- 4.1 Testing the Micro-Controller
- 4.2 Parts & Purposes
- 4.3 Core Syntax Review
- 4.4 Drone Technologies - Part 1
  - 4.4.2 Compass Heading
  - 4.4.3 Gyro & Accelerometer
  - 4.4.4 UGV Drone Build
  - 4.4.5 Power Level Monitoring
- 4.5 Drone Technologies - Part 2
- 4.6 Waves & Information Transfer

Unit 5: Applied Systems Thinking
- 5.1 Systems Thinking
- 5.2 Interrelationship Diagram

Unit 6: Physics of Flight
- 6.1 Physics of Flight
- 6.2 UAV Build

Unit 7: UAV - Unmanned Aerial Vehicles
- 7.1 Unmanned Aerial Vehicles
- 7.2 Flight Dynamics
- 7.3 Simulated Flight
- 7.4 Autopilot & PID Tuning
- 7.5 Manual Flight
- 7.6 FAA Pilot Certification

Unit 8: Culminating Project
- 8.1 Preparing for the Challenge
- 8.2 Cleanup / Organization



MINDS-i STEM INTEGRATED ROBOTICS:

The MINDS-i Drone Gimbal Rig gives you the ability to pilot the MINDS-i UAV in a safe and controlled environment. The preassembled rig allows you to introduce flight controls and best practices to anyone, regardless of skill level or age. With the Gimbal Rig's 3-Axis system, you have the full motion capabilities of the UAV at your fingertips. The MINDS-i Gimbal Rig is an excellent fit in a classroom, trade show or convention.

- **FLYING DRONES:** The programmable UAVs (Unmanned Aerial Vehicles) elicit a "wow" reaction while teaching programming, electrical engineering, mechanical engineering and aerodynamics. Contain the action with the MINDS-i UAV Drone Gimbal Rig.
- **GYRO-ACCELEROMETER:** Stabilize the drone autonomously while also responding to the pilot's commands.
- **REMOTE TELEMETRY:** Send and receive real-time data between the UAV and computer to monitor vital data, including GPS location, orientation, battery voltage and amperage draw.

GPS & COMPASS | TELEMETRY | DASHBOARD | EASY STORAGE | DRONE MODULE | RC CONTROL

UAV CURRICULUM RESOURCE

1. Flight Demo

a. Utilizes the same controls as MINDS-i UAV curriculum kits

b. 3-Axis Gimbal allows the UAV to move as it would during standard flight

c. Students will become familiar with flight controls in a contained environment

d. Perfect for FAA 107 Preparation

2. Features

a. Rugged Aluminum Frame

b. Ball Bearing Pivot Points

c. Carbon Fiber Gimbal section for increased strength to weight

d. Fully loaded UAV with GPS & telemetry

CONNECT TO THE MINDS-i DASHBOARD TO VIEW FLIGHT DATA AND TELEMETRY LIVE

- » Open Source Software
- » Easy to use Graphical Interface
- » Drag and Drop Installation (w/Radio Driver)
- » Save and Load GPS Paths
- » Live Location Tracking
- » Wirelessly Adjust Settings
- » Capable of Navigating to 100 Waypoints
- » Customizable Graphs: Latitude, Longitude, Yaw/Direction, Pitch, Roll, Ground Speed, Voltage, Amperage and Altitude
- » Full Telemetry Logging
- » Inclinometer Gauges
- » Windows 10, OS X & Linux Ready

MINDS-i STEM INTEGRATED ROBOTICS

Take STEM learning to new heights with cutting-edge, programmable drones. The allure of UAVs (Unmanned Aerial Vehicles) attracts a diverse group of students to explore programming, electromechanical systems, and aerodynamics. Students design, build, and program drones for aerial search and rescues, GPS-guided crop dusting, autonomous deliveries to remote locations, and other compelling industry-related challenges.

COURSE DESIGN

Each lab is a half semester (45 Hours) and designed for 3-5 students. Foundations is the recommended prerequisite to the MINDS-i Drone Curriculum.

GPS & COMPASS | TELEMETRY | DASHBOARD | DRONE MODULE | RC CONTROL | FLIGHT SIMULATOR | GIMBAL KIT

CURRICULUM OUTLINE - 45 HOURS

Unit 1: Introduction to MINDS-i

- 1.1 Introduction to MINDS-i
- 1.2 Student Performance Development Process
- 1.3 What is a Drone?

Unit 2: Drone Code & Sensors

- 2.1 Testing the Micro-Controller
- 2.2 Parts & Purposes
- 2.3 Drone Technologies - Part 1
  - 2.3.2 Gyro & Accelerometer
- 2.4 Drone Technologies - Part 2

Unit 3: UAV Flight Principles

- 3.1 Physics of Flight
- 3.2 UAV Build
- 3.3 Flight Dynamics
- 3.4 Autopilot & PID Tuning
- 3.5 Simulated Flight
- 3.6 Manual Flight
- 3.7 FAA Pilot Certification

Unit 4: Applied Systems Thinking

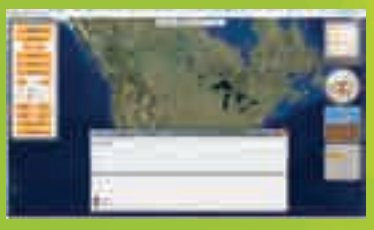
- 4.1 Systems Thinking
- 4.2 Interrelationship Diagram

Unit 5: Culminating Project

- 5.1 Preparing for the Challenge
- 5.2 Cleanup / Organization

MINDS-i DASHBOARD SOFTWARE & MEGA 2560 HARDWARE

- » Open Source Software
- » Easy to use Graphical Interface
- » Drag and Drop Installation
- » Save and Load GPS Paths
- » Live Location Tracking
- » Wirelessly Adjust Settings
- » Customizable Graphs
- » Full Telemetry Logging
- » Inclinometer Gauges



This is an abbreviated list of features. Please see the full product flyer for comprehensive details.

MINDS-i COMPETITION | UAV Competition Kit

CPK-UAM2-001

MINDS-i STEM INTEGRATED ROBOTICS

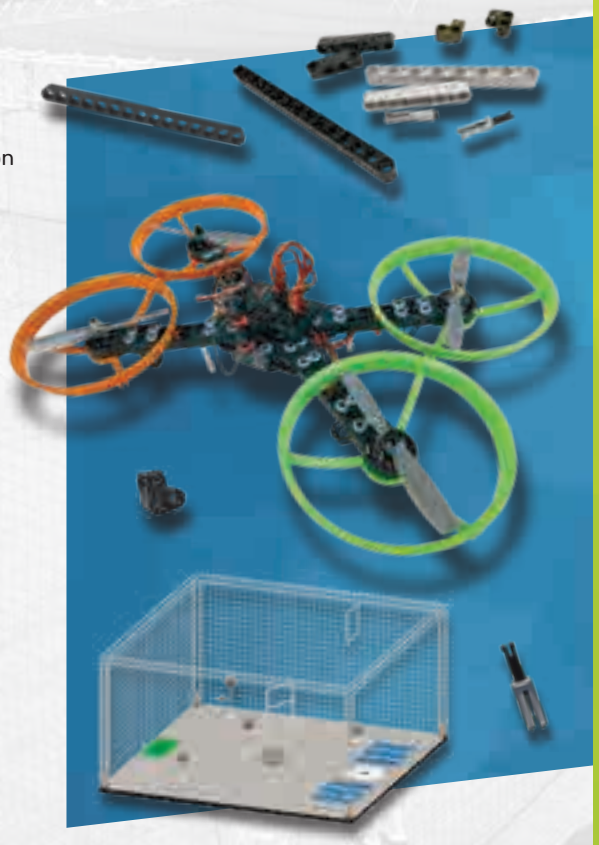
Immerse your students in STEM with the thrill of UAV (Unmanned Aerial Vehicle) competitions. The kit introduces students to drone building and programming, with a focus on classroom, community, statewide and national competitions. It includes a UAV frame, replacement parts, and a full library of sample programs to quickly get started.

MINDS-i COMPETITIONS

MINDS-i competitions merge classroom learning with real world experience. Students learn the practical skills necessary to pilot a UAV and the knowledge of how it operates on all levels.

SAFETY DUCT | POWER MODULE | DRONE MODULE

RC CONTROL | BRUSHLESS MOTORS | SPARE PARTS



UAV LEARNING WITH MINDS-i

1. Quick entry into drone building and programming

a. Calibration - Set up internal sensors including: Accelerometer, Gyro, Compass, Barometer

b. Included safety features allow safe flight, indoors and out

c. Safety Ducts - Made from impact resistant materials

2. Instructions to build a total of 5 variations

3. The simple design allows the end user to customize the frames, to best suit the challenge or task

4. Able to be upgraded to function with GPS and Telemetry

This is an abbreviated list of features. Please see the full product flyer for comprehensive details.

MINDS-i COMPETITION | Drone Cage System

CPK-DRCG-001-002-003

MINDS-i STEM INTEGRATED ROBOTICS

Keep the action contained, and easily host any indoor or outdoor drone competition with the Drone Cage System. The durable modular design is easy to assemble, transport, store, and re-use. With a variety of sizes, you can accommodate any classroom, gym, or convention center, and they easily combine for future expansion.

DRONE CAGE SIZES

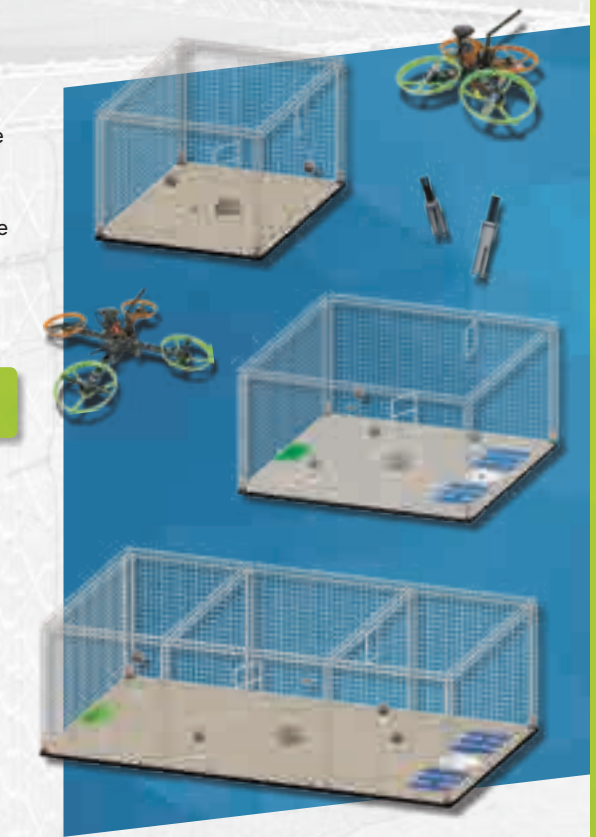
SMALL CAGE (20' X 28' X 15')

MEDIUM CAGE (30' X 30' X 15')

LARGE CAGE (28' X 49' X 15')

EASY PACK | UNPACK | EXPAND

QUICK CONSTRUCT | QUICK NETTING | DRONE CAGE



FEATURES

1. Construction

a. Allows for future expansion

2. Transportable

a. Packs into easy to ship rolling cases for storage and transportation

3. Assembly

a. Can be assembled without the need of lifting equipment

4. Safety

a. Host flying events indoors while keeping the action contained

5. Accessories

a. Erector system, netting, base plates, tools and hardware

b. Obstacles and gates are for reference only

This is an abbreviated list of features. Please see the full product flyer for comprehensive details.

MINDS-i ENGINEERING | Construction System: Catapult Lab

MCK-CKWM-001

MINDS-i STEM INTEGRATED ROBOTICS

The Catapult Lab is a great entry point to the MINDS-i system. The exercises focus on the build process, data collection and the PDSA cycle (Plan, Do, Study, Act) for design engineering, product troubleshooting & problem solving.

DESIGN ENGINEERING

Learn the basics of construction and design while expanding your creativity with the MINDS-i Robotics platform.

LAB DESIGN

Each lab is designed for 2-3 students and includes 10 curriculum hours of building and data collection.

CONSTRUCTION PIECES | DESIGN ENGINEERING

EXPERIMENTATION | ANALYSIS & COMPARISON | OPTIMIZATION

CURRICULUM OUTLINE - 10 HOURS

Unit 1: Design Engineering

- 1.1 Model for Inquiry
- 1.2 The Importance of Data
- 1.3 Parts & Purposes
- 1.4 Simple Machines

THE BUILD PROCESS

- » Utilizes the PDSA cycle
- » Allows rapid building, improvements and testing, perfect for the classroom setting
- » The target mat is designed to physically represent a histogram and allows students to visualize the data
- » Zones of the mat represent a specification with its corresponding tolerances

This is an abbreviated list of features. Please see the full product flyer for comprehensive details.

ARDUINO® ROBOT KIT | Robotics System Starter Kit

PTT-ARD2-001

MINDS-i STEM INTEGRATED ROBOTICS

Sample the MINDS-i Robotics system and introduce students to the basics of programming, robotics, and engineering. Students construct two robots and experiment with various sensors, actuators, and mechanical elements to perform multiple autonomous tasks. The set includes easy to use visual instructions for building and programming.

KIT DESIGN

This kit is designed for 2-3 students and requires about 3 hours to build and program each robot style. The Arduino® Robot Kit does not include a curriculum. See the MINDS-i Foundations Lab and Drones Lab for the curriculum.

BUTTONS | IR LIGHT SENSOR | QUICK LOCKS | ARDUINO®

ULTRASONIC SENSOR | SERVOS | RECHARGEABLE BATTERY

2-IN-1 ARDUINO® ROBOT KIT

Quick entry into programming with sample programs

a. Calibration: Get a reading from individual sensors or control servos and motors

b. Application: Utilize one sensor and one servo or motor to perform a simple task

Programming Tasks

a. The supplied chassis designs allow the instructor and students to focus on the programming tasks

Arduino® User Guide

a. We provide a step by step walk through the sample code, including descriptions and notes

This is an abbreviated list of features. Please see the full product flyer for comprehensive details.

MINDS-i

ADVANCED QUICK-LOCKING ERECTOR SYSTEM

Our patented “quick-lock” construction system is superior to friction-snap and erector-based building products. Students can more innovatively build durable robots with the easy to build and easy to modify construction elements.

DURABLE

Withstands abuse in extreme conditions

FLEXIBLE

Easy to design and construct infinite possibilities

MODIFIABLE

Modular and interchangeable parts foster creativity

VERSATILE

Simple for beginners and advanced for more experienced students

Build whatever you envision in your “mind’s eye”.

MINDS-i

Build whatever you envision in your "mind's eye".

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