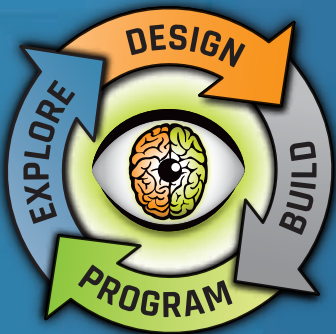




Build whatever
you envision in
your “mind’s eye”.

PRODUCTS & CURRICULUMS 2023-2024



mindsieducation.com

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



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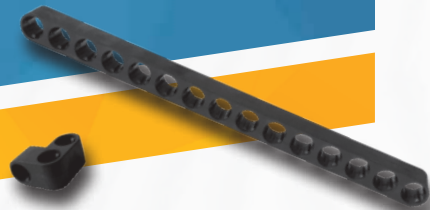
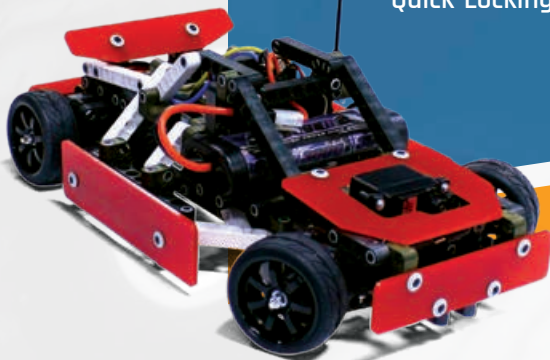
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WHY CHOOSE MINDS-i ROBOTICS?

Spark and Sustain Students' Interest in STEM

There's a shortage of students interested in STEM careers. By 2025, there will be 10.6 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

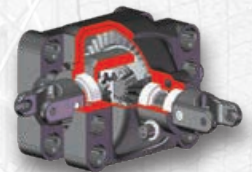
CUTTING-EDGE TECHNOLOGIES UNIQUE TO MINDS-i ROBOTICS

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 LAB

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.



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.

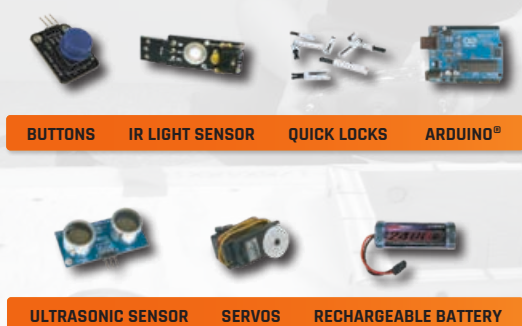
2 in 1 Arduino® Robot Kit

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.



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 STEM INTEGRATED ELECTRIC CAR LAB

This fast and sleek 1/10th scale electric car comes with all the electronics and hardware needed to assemble the kit, and includes easy to use visual instructions. This kit is also compatible with most hobby standard DC motors, gears, radio transmitters, servos, bodies, wheels, tires and more.

COURSE DESIGN

Each lab is one half semester (45 Hours) with 4 units and designed for 1-2 students.



MULTIMETER



ESC



SERVO



23,500 RPM MOTOR



RC CONTROLLER

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 an Electric Car?

Unit 2: Variables of Force & Motion

- 2.1 Force & Motion
- 2.2 Parts & Purposes
- 2.3 Gear Ratios; Speed & Torque
- 2.4 Inertia

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: Culminating Project

- 4.1 Preparing for the Challenge
- 4.2 Cleanup / Organizing

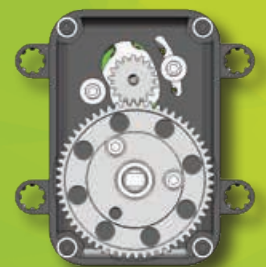
STEM INTEGRATED ROBOTICS FOUNDATIONS

This curriculum covers a multitude of engineering concepts including

- » Mechanical Systems
- » Electrical and Electronic Systems
- » Hands on Activities and Capstone Projects in each Semester

MOTOR CASE GEARS

- » Includes Metal Gears
- » 17 Tooth 32 Pitch Pinion Gear
- » 58 Tooth 32 Pitch Spur Gear
- » Adjustable Motor Mount Accommodates Many Additional Gear Ratios
- » Aluminum Main Shaft with Dual Ball Bearing Mounting





| 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

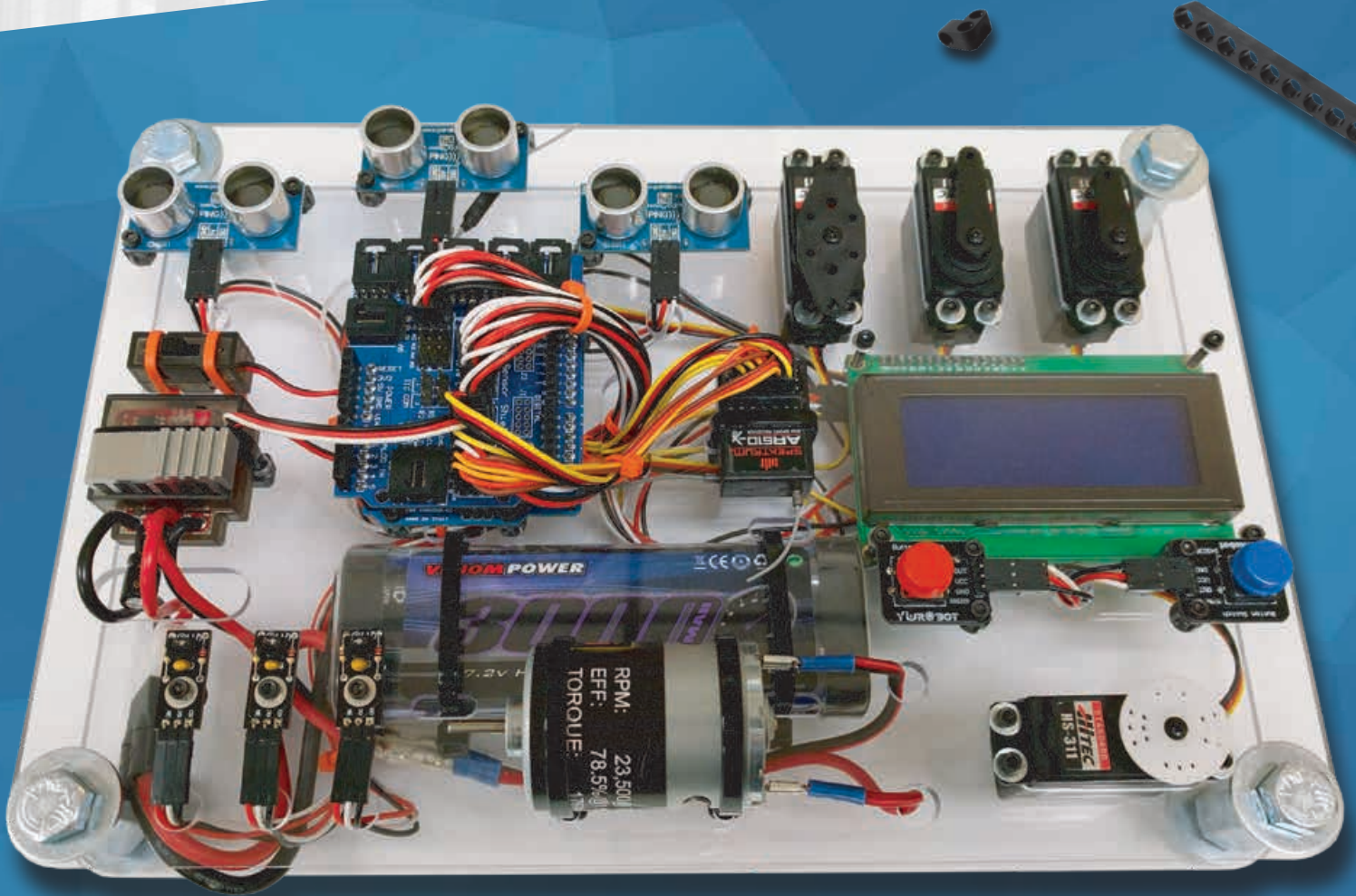
- 5.1 What Makes a Robot Autonomous
- 5.2 Basic Control Structures
- 5.3 Autonomous Obstacle Avoidance
- 5.4 Line Following

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.





AUTONOMOUS DRIVE PATH

MINDS-i STEM INTEGRATED ROBOTICS: AUTONOMOUS SELF-DRIVING MARS ROVER

Take STEM learning to new heights with this cutting edge GPS-IMU powered rover. Students explore programming, electromechanical systems, and autonomous navigation. Students design, build, and program the rover for ground-based missions, environmental exploration, autonomous obstacle avoidance, and other compelling space related challenges.

COURSE DESIGN

This lab is a half semester (45 Hours) and designed for 2-4 students.



GPS & COMPASS



ENCODER



DASHBOARD



DRONE MODULE



RC CONTROL

CURRICULUM OUTLINE - 45 HOURS

Unit 1: Introduction to Autonomous Vehicles

1. Student Performance
2. What is an Autonomous Vehicle

Unit 2: Mars Rover Autonomous Vehicles

1. Space Exploration
2. Mars Exploration
3. Parts & Purposes
4. Mars Rover Chassis Build

Unit 3: Autonomous Vehicle Technologies

1. Testing the Micro-Controller
2. Parts & Purposes
3. Core Syntax Overview
4. Surface Mapping of Mars
5. Martian Autonomous Navigation
 - 5.1 Earth Based GPS Navigation
6. IMU Heading
7. Autonomous Vehicle Build
8. Power Level Monitoring
9. Communications

Unit 4: Electrical Engineering & Energy Transfer

1. Energy Types & Transfer
2. Electric Motors
3. Volts, Amps & Watts
4. Batteries

Unit 5: Applied Systems Thinking

1. Earth Based Autonomous Navigation
2. Inputs, Outputs and Constraints
3. Interrelationship Diagrams

Unit 6: Culminating Project

1. Search for Life
2. Obstacle Avoidance
3. Autonomous Navigation

INCLUDES A CAMERA FOR FIRST-PERSON VIEW





AUTONOMOUS SWATH PATH

| MINDS-i STEM INTEGRATED ROBOTICS: AUTONOMOUS SELF-DRIVING FARMING

Take STEM learning to new heights with this cutting edge GPS-IMU powered tractor. Students explore programming, electromechanical systems, and autonomous navigation. Students design, build, and program the tractor for ground-based crop evaluation, spraying, spreading, crop monitoring, and other compelling farming related challenges.

| COURSE DESIGN

This lab is a half semester (45 Hours) and designed for 2-4 students.

CURRICULUM OUTLINE - 45 HOURS

Unit 1: Introduction to Autonomous Vehicles

1. Student Performance
2. What is an Autonomous Vehicle

Unit 2: Autonomous Self-Driving Tractor

1. Self-Driving Tractors; Levels of Autonomy
2. Self-Driving Tractors; Current and Future Use Cases

Unit 3: Autonomous Tractor Technologies

1. Self-Driving Tractors; Localization
 - a. GPS Navigation
 - b. Inertial Measurement Unit (Gyro, Accelerometer, Compass)
 - c. Encoder (Cruise Control)
 - d. Localization (Cross-Track Error)
2. Self-Driving Tractors; Communication
 - a. Control Systems
 - b. Object Detection & Avoidance

Unit 4: Electrical Engineering & Energy Transfer

1. Energy Types & Transfer
2. Electric Motors
 - a. How They Work & Benefits
3. Batteries
 - a. Usage, Maintenance, Technologies

Unit 5: Applied Systems Thinking

1. Inputs, Outputs and Constraints
2. Interrelationship Diagrams

Unit 6: Culminating Projects; Automated Farming

1. Ground Prep
2. Planting
3. Fertilizing
4. Watering



GPS & COMPASS



ENCODER



DASHBOARD



DRONE MODULE



RC CONTROL



| 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
- » Inclinator Gauges



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



| MINDS-i STEM INTEGRATED ROBOTICS FAA 107 PREPARATORY COURSE

The MINDS-i FAA 107 Preparatory Course is designed to get students up to speed with the required materials for taking the 107 Certification. Prepare your students for the future of UAV's (Unmanned Aerial Vehicles) in the workplace, including industries such as photography, inspection, search and rescue, and farming.

| 107 CERTIFICATION

The 107 Certification allows you to use a UAV for business purposes. This could include delivering goods or providing services, etc. Open a world of possibilities where the sky is the limit.



SAFETY DUCT

POWER MODULE

DRONE MODULE

RC CONTROL

BRUSHLESS MOTORS

FAA 107 PREPARATORY COURSE

1. Applicable Regulations

2. Airspace Classifications, Operating Requirements & Flight Restrictions

- a. Airspace: Controlled / Uncontrolled / Special Use / Other
- b. Designations of Airspace: A-G
- c. Air Traffic Control
- d. VFR & NOTAMS
- e. Lots of MAPS & MAPS Later on Test

3. Weather

- a. Aviation Weather Sources
- b. Effect of Weather on Small UAVs

4. Small Unmanned Aircraft Loading

- a. Weight, Load Factors, Balance & Stability

5. Emergency Procedures

- a. Inflight Emergency

6. Crew Resource Management

7. Radio Communication Procedures

- a. Understanding Proper Radio Procedures
- b. Traffic Advisory Practices at Airports Without Towers

8. Determining the Performance of Small UAVS

- a. Effect of Temperature on Density
- b. Effect of Humidity on Density

9. Physiological Factors Affecting Pilots (Drugs and Alcohol)

- a. Phys / Medical Factors Affecting Pilots
- b. Vision & Flight

10. Aeronautical Decision Making & Judgment

- a. History of ADM
- b. Risk Management, Hazard & Risk, & Human Factors
- c. Crew Resource Management, Decision Making, & Situational Awareness

11. Airport Operations

- a. Types of Airports
- b. Sources of Airport Data
- c. Latitude and Longitude

12. Maintenance & Preflight Inspection Procedure



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

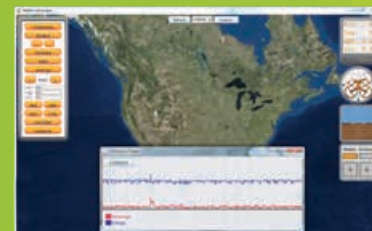
- Utilizes the same controls as MINDS-i UAV curriculum kits
- 3-Axis Gimbal allows the UAV to move as it would during standard flight
- Students will become familiar with flight controls in a contained environment
- Perfect for FAA 107 Preparatory Course

2. Features

- Rugged Aluminum Frame
- Ball Bearing Pivot Points
- Carbon Fiber Gimbal section for increased strength to weight
- 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
- » Inclinator Gauges
- » Windows 10, OS X & Linux Ready





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.

ARDUINO® PROGRAMMING SOFTWARE & MEGA 2560 HARDWARE

- » 8 Radio Input Channels
- » 8 Motor Output Channels
- » 9 Analog Input Channels (with ADC)
- » Serial, SPI & I2C Communication Ports
- » 256 KB Flash Memory & 16 MHz
- » Full Set of Sample Code in Library
- » Windows 10, OS X & Linux Ready
- » Analog Ports can be used to operate Servos, Motors & Sensors
- » 3 Axis Accelerometer
- » 3 Axis Gyro
- » 3 Axis Compass
- » Barometer



| PVC FIELD ELEMENTS

The included field elements are designed to replicate several tasks that UAVs face in the industry. The main focus of these tasks include;

Precision Maneuvering: Fly to an object that is at least six feet tall. The course includes multiple landing pads, each with a different difficulty level and a small target. Flight skills are proven based on the pilot's ability to land the drone on less accessible landing pads, on smaller landing pads, and being centered on the landing pads.

Remote Identification: Find hidden objects. These objects can be under, between, or on top of some structure or object. The object has an indicator, such as a numbered or colored sticker, that the drone has to be able to photograph and relay to the drone operator. This indicator corresponds to a landing pad that the operator must then navigate the drone to and land on.

Manual Manipulation: Find an object mixed in with similar objects. The drone will need to inspect and locate the object and knock it over.

| SKILLSUSA®

Use these field elements to prepare for the SkillsUSA® Commercial Drones Competition.



| FEATURES

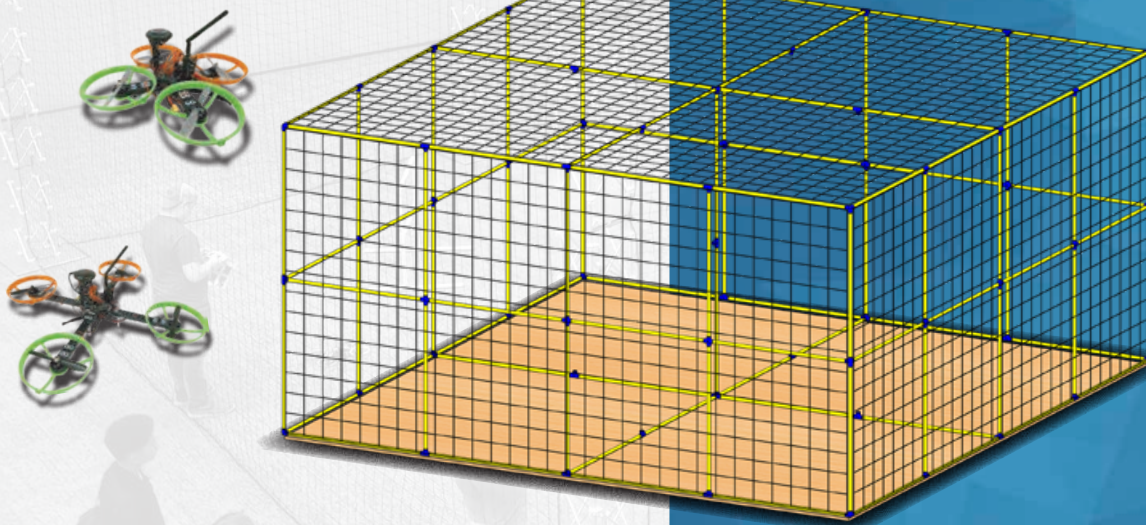
1. Light Weight
2. Easy to Assemble
3. Can be Reconfigured Year to Year

INCLUDES PARTS TO BUILD 1 OF EACH OF THE 3 TASK ELEMENTS AND THE 3 LANDING PADS

- a. Raised Platforms (Quantity 1)
- b. Inspection Tower (Quantity 1)
- c. Obstacle Field (Quantity 1)
- d. Landing Pads - Various Heights (Quantity 3)

| PVC DRONE CAGE [20' X 20' X 10']

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.



| FEATURES

1. Construction
 - a. Allows for future expansion
2. Transportable
 - a. Disassembles easily for storage or transport
3. Assembly
 - a. Can be assembled without the need of lifting equipment
4. Safety
 - a. Host flying events indoors and out while keeping the action contained
5. Accessories
 - a. PVC, Netting and Hardware

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



DURABLE

Withstands abuse in extreme conditions

FLEXIBLE

Easy to design and construct infinite possibilities

MODIFIABLE

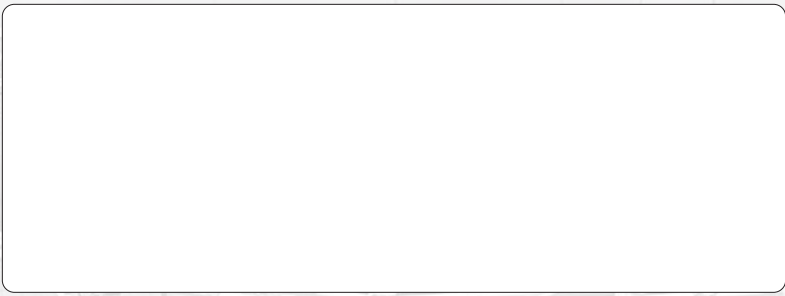
Modular and interchangeable parts foster creativity

VERSATILE

Simple for beginners and advanced for more experienced students



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



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

FOR MORE INFORMATION:

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mindsieducation.com

