

FOUNDATIONS TO

ROBOTICS | INTRODUCTION TO STEM ROBOTICS

MINDS-i STEM INTEGRATED ROBOTICS: FOUNDATIONS LAB – 6x6

The Foundations Lab 6x6 is an introduction into the world of STEM and Robotics. It is designed as an interactive approach to applied science, technology, engineering and math. In this course students will become familiar with the basics of robotics and programming in a team based environment.

STEM as a System

MINDS-i is rocking the Robotics Education world with a high-technology platform that is simple to use, extraordinarily durable, infinitely modifiable, and will prepare students with the skills they need to excel in the 21st century.

Continuous Learning and Improvement

We inspire a rigorous college and career relevant experience through STEM Robotics in the everyday classroom in a format that can impact each and every student.

Course Design

Each lab is one semester, designed for three to five students. Foundations is the prerequisite to the Drones Lab + Curriculum.



Gear Reducer



Tachometer



Multimeter



Torque meter



RC Control



Storage Bins



Catapult

Find Your Sales Representative at
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MCK-FDLB-6X6

Curriculum Unit Outline

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: Continuous Learning & Improvement

- 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

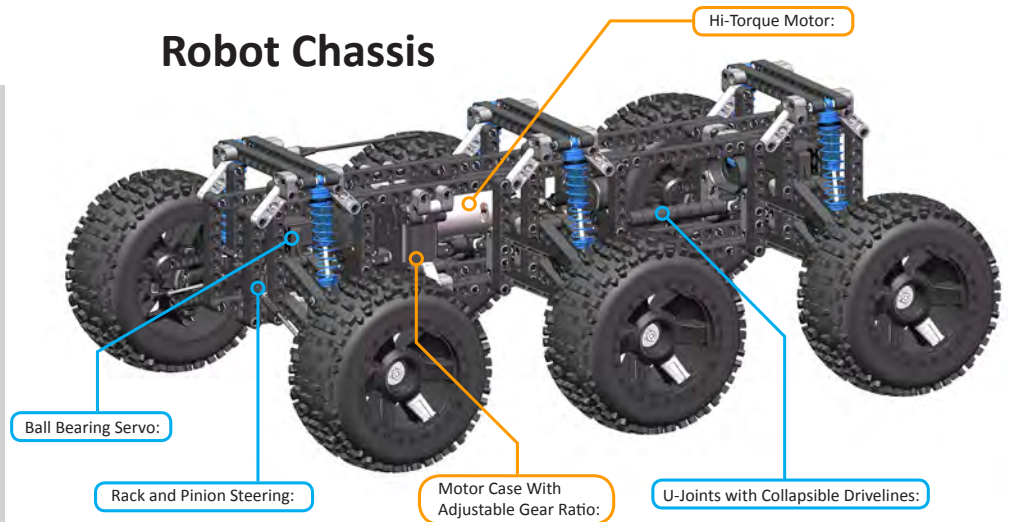
Unit 7: Culminating Project

- 7.1 Preparing for the Challenge
- 7.2 Cleanup / Organizing

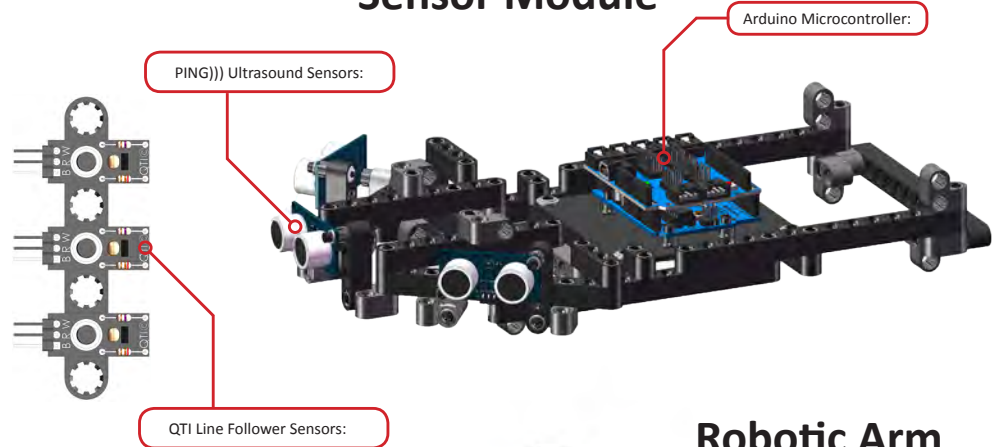
STEM Integrated Robotics Foundations covers a multitude of engineering concepts including

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

Robot Chassis

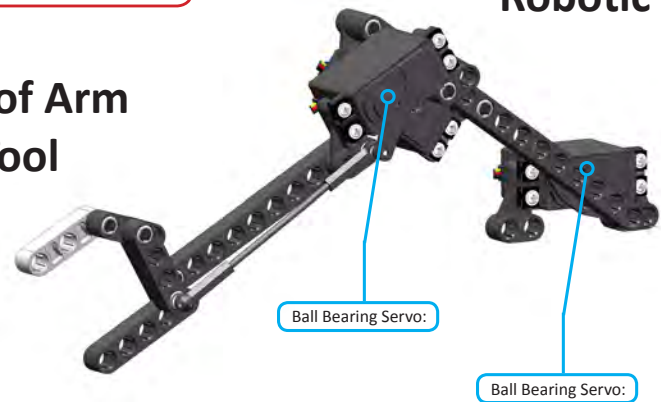


Sensor Module



Robotic Arm

End of Arm Tool



Arduino Programming Software & Leonardo Hardware

- 20 digital I/O pins
- 7 PWM channels
- 12 analog Input channels (with ADC)
- Serial & I2C communication ports
- 32 KB flash memory & 16 MHz
- Full set of sample code in library
- Windows 10, OS X & Linux Ready
- Digital ports can operate servos, motors and sensors

```
PingSensor | Arduino 1.6.7
File Edit Sketch Tools Help
PingSensor
15 Servo drive, steer;
16
17 void setup() {
18 //set a pin for the ESC/steering servo to use
19 drive.attach(4);
20 steer.attach(5);
21
22 //set the initial throttle/direction for the ESC/servo
23 drive.write(90);
24 steer.write(90);
25
26 //delay 2 seconds for arming
27 delay(2000);
28
29 //turn the wheel
30 steer.write(120);
```