FOUNDATIONS TO
ROBOTICS | INTRODUCTION TO STEM ROBOTICS

MINDS-i STEM INTEGRATED ROBOTICS: **FOUNDATIONS LAB – 4x4**

The Foundations Lab 4x4 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 (**90 Hour**), designed for three to five students. Foundations is the recommended prerequisite to the Drones Lab + Curriculum.
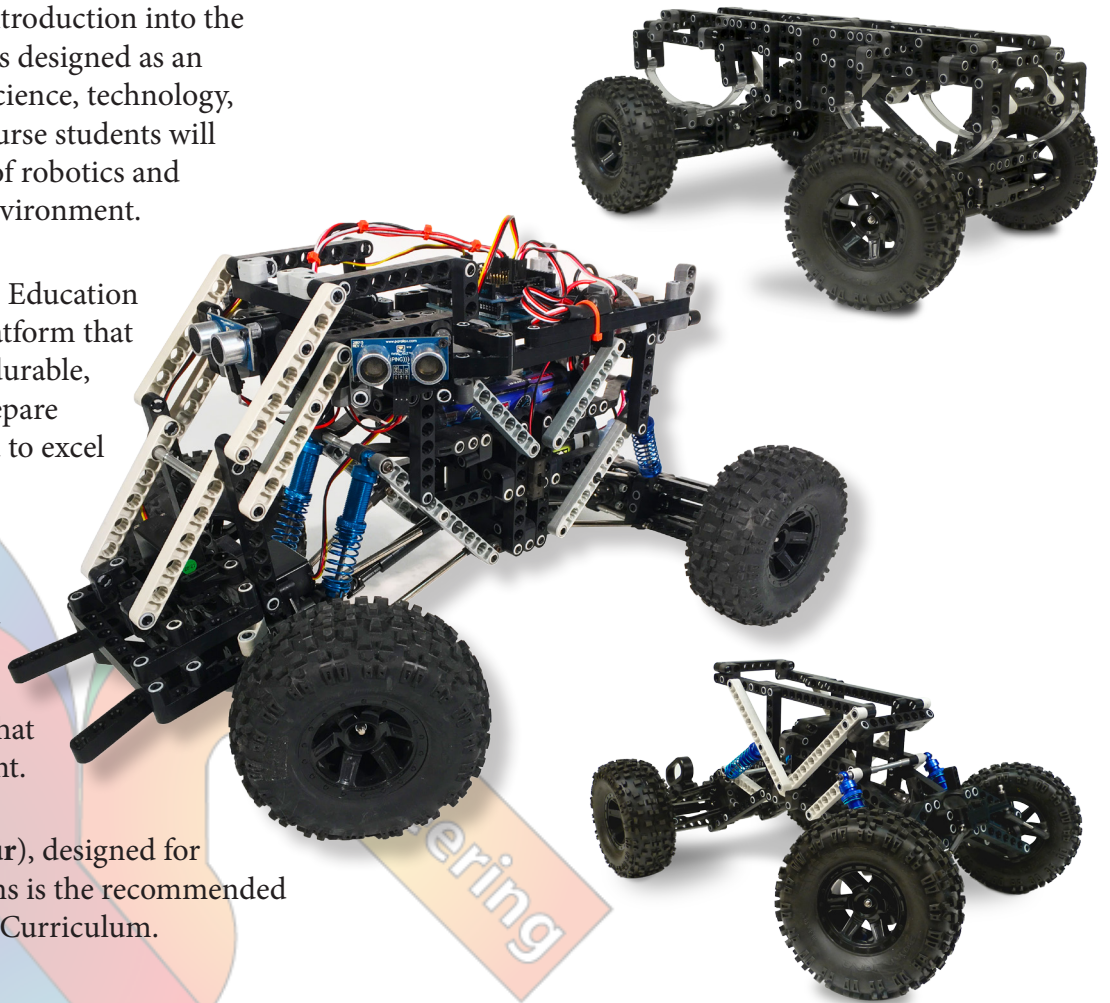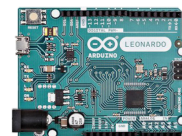
Gear Reducer	Tachometer	Multimeter	Torque meter	RC Control	Controller	Catapult

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MCK-FDLB-4X4

Curriculum Outline - 90 Hour

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

Hi-Torque Motor:

Motor Case With Adjustable Gear Ratio:

Working Differentials: Adjustable Input Angle

U-Joints with Collapsible Drivelines:

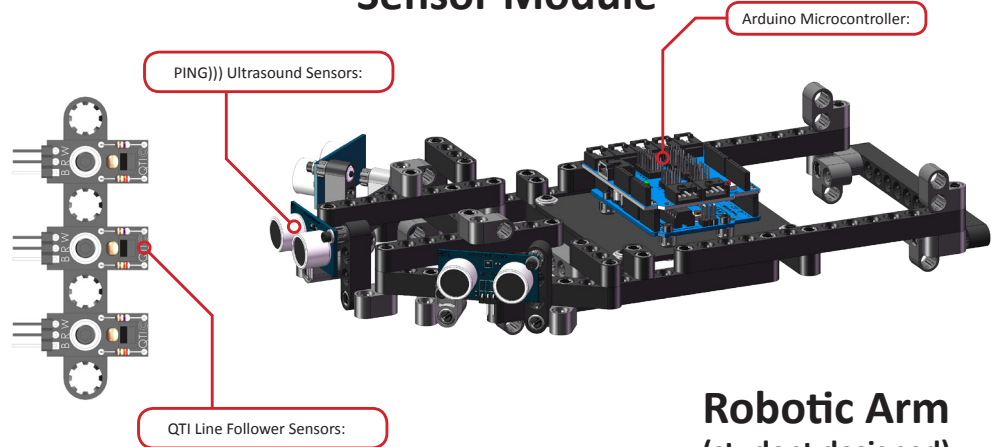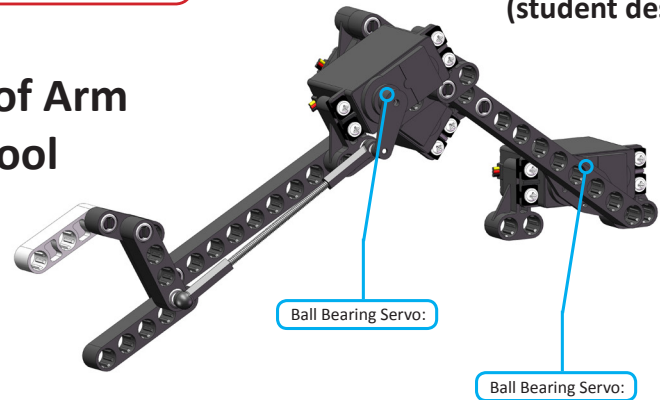Ball Bearing Servo:

Rack and Pinion Steering:

Sensor Module

Arduino Microcontroller:

PING))) Ultrasound Sensors:

QTI Line Follower Sensors:
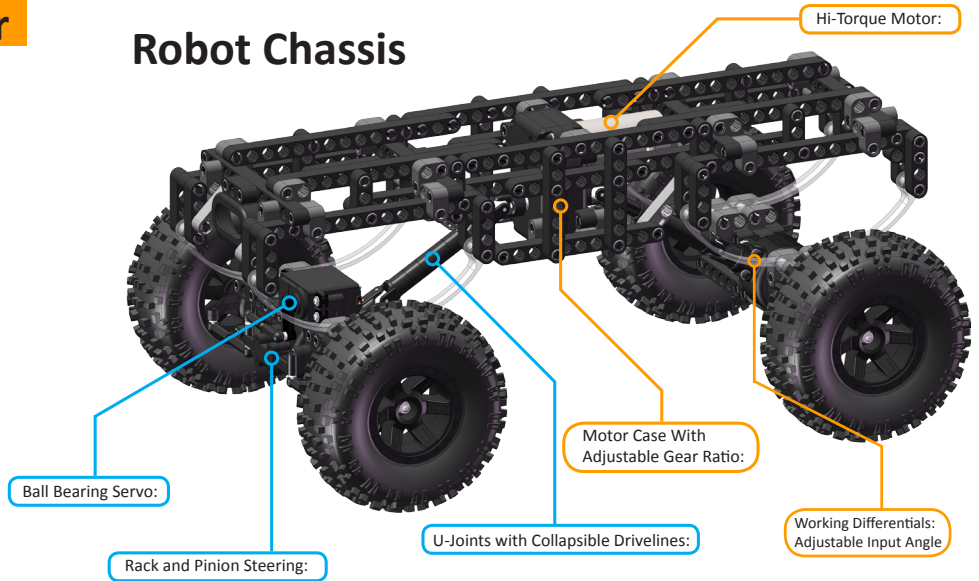
Robotic Arm
(student designed)

End of Arm Tool

Ball Bearing Servo:

Ball Bearing Servo:

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);
```