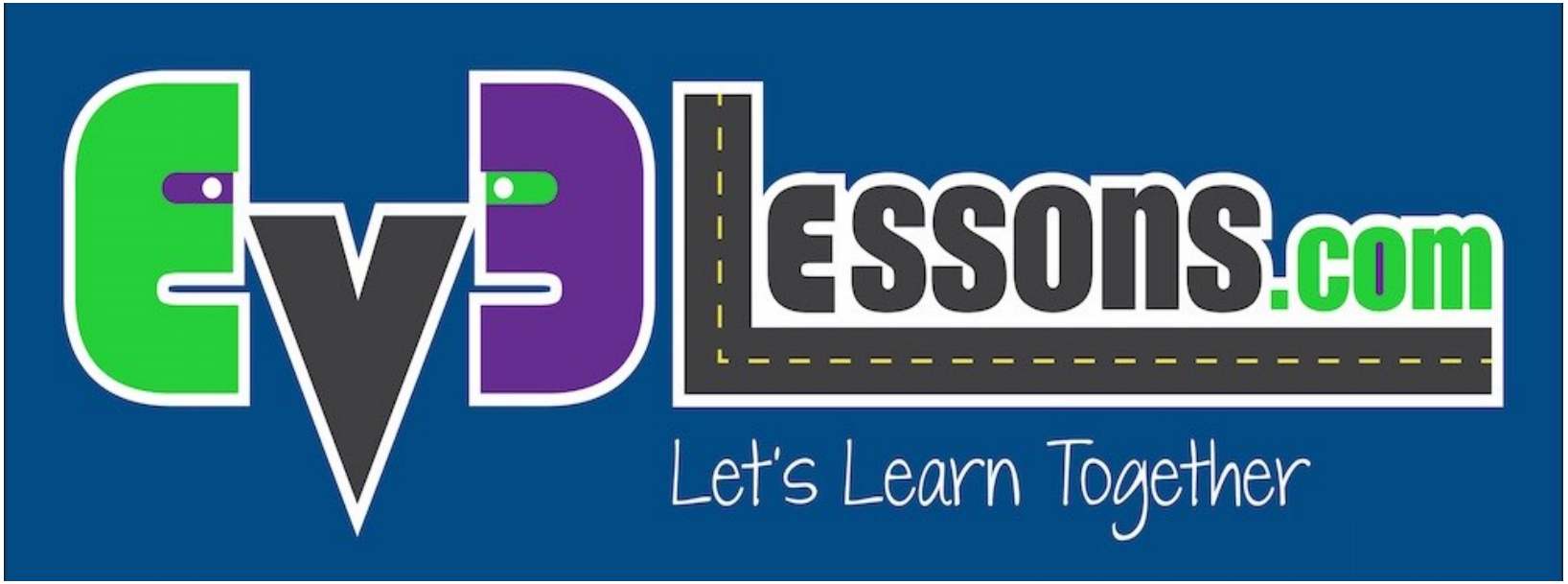


How to Use EV3Lessons

By Sanjay and Arvind Seshan

BEGINNER PROGRAMMING LESSON

SITE OVERVIEW

- **EV3Lessons.com provides the building blocks for successfully learning to program the LEGO MINDSTORMS EV3**
- **We also provide extensive resources for robotics teams such as planning tools, Quick Guides, Coach's Corner and Team Building Activities**
- **Anyone is welcome to use and modify these lessons for educational (non-profit) purposes**
  - However, you must give credit to EV3Lessons for the materials and provide a link back to us if you post materials online
  - If you use EV3Lessons materials in any robotics competition (e.g. FIRST, WRO), you must cite your sources in your contest materials.
  - If you make extensive use of our materials, please consider making a donation to the site to support our work

LESSON DESCRIPTION

http://ev3lessons.com/lessons.html

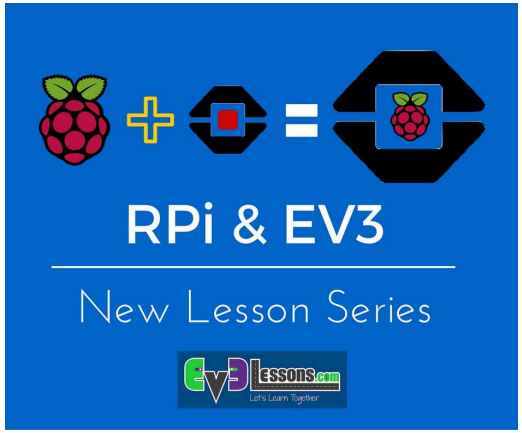
- **Beginner:** These lessons will teach you to move and turn the robot, use the sensors, and use loops and switches.
- **Intermediate:** These lessons introduce more advanced programming techniques such as My Blocks, variables, parallel beams, calibration and math/logic blocks.
- **Advanced:** These lessons assume that you are comfortable using all the blocks in the EV3 environment. The advanced lessons teach you to more sophisticated programs such as menu systems, proportional line followers, squaring on lines and stall detection techniques.
- **Beyond:** These lessons are for students who have completed all our other lessons and interested in learning about third-party sensors and using the EV3 with other platforms such as the Raspberry Pi.
- Beginner Lessons are designed to be done in order. Intermediate and Advanced Lessons may be done out of order. Lessons usually mention specific pre-requisites when needed.
- If you print the lessons out, make sure to return to the site often to check the date on the bottom of the page to make sure you have the latest version of the lesson.
- To be notified of updates, sign up for our mailing list on the Contacts page.

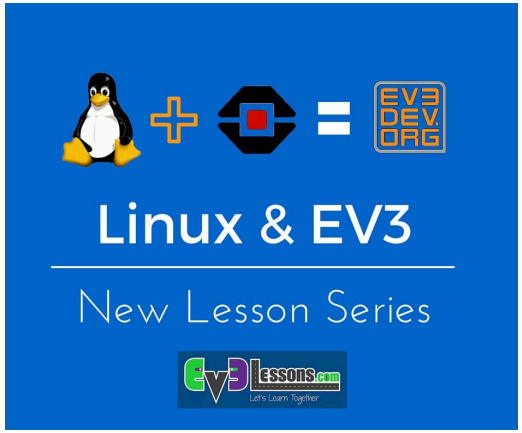
CORE PROGRAMMING LESSONS

Beginner	Intermediate	Advanced
		
• How to Use the EV3Lessons • Build a Base Robot • Introduction to Brick/Software • Moving Straight • Port View • Pseudocode • Basic Turning • Displaying Text and Graphics • Custom Images & Sounds • Intro to Touch Sensor • Intro to Color Sensor • Loops • Switches • Importing Additional LEGO Blocks • Sound Block • Intro to Sound Sensor • Intro to Ultrasonic Sensor • Basic Line Follower • Moving an Object • Final Challenge	• Basic Ultrasonic Wall Follower • Brick Buttons as Sensors • Data Wires • My Blocks with Inputs and Outputs • Moving with My Blocks • Turning with My Blocks • Color Line Follower with My Blocks • Infrared Sensor • Debugging Techniques • Move Blocks • Reliability Techniques • Color Sensor Calibration • Variables • Logic Operations and Decision Making • Intro to Parallel Beams	• Parallel Beams Synchronization • Arrays • Intro to Proportional Control • Proportional Line Follower • Proportional 2 Color Line Follower • Proportional Ultrasonic Wall • Proportional Control with the Sound Sensor • Follower • Ramping Up • Intro to Gyro Sensor • Gyro Sensor Turns • Gyro Move Straight and Wall Follow • Squaring on Lines • Stall Detection • Menu System • Data Logging • Bluetooth • Random Block

BONUS LESSONS

Beyond
• Importing Third-Party Blocks • PixyCam for MINDSTORMS: Introduction • PixyCam for MINDSTORMS: Color Identifier • PixyCam for MINDSTORMS: Using Color Codes • Mindsensors PSP-Nx Controller: Introduction • Mindsensors PSP-Nx Controller: Simon Game • EV3 Raspberry Pi Communicator • Controlling Lights with an EV3 • Introduction to ev3dev • Raspberry Pi and ev3dev Communicator • Controlling Lights using ev3dev and Raspberry Pi • NXT Light Sensors in EV3





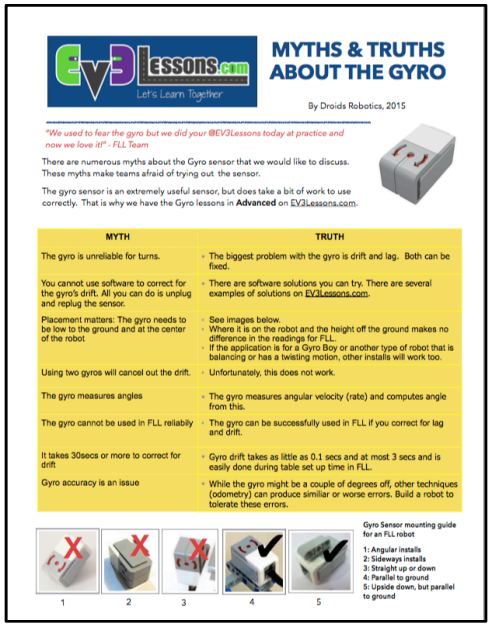
LESSON STRUCTURE

1. Each lesson starts with a list of objectives and ends with a challenge
2. In most lessons, we provide hints in the form of Pseudocode. Students who need a hint should look at the Pseudocode.
3. We provide a challenge solution as well, but want students to complete the challenge on their own before checking the solution
4. A discussion guide is included after the challenge that will help understand the main objectives
5. Some lessons have companion worksheets for students. More will be added over time.

QUICK GUIDES

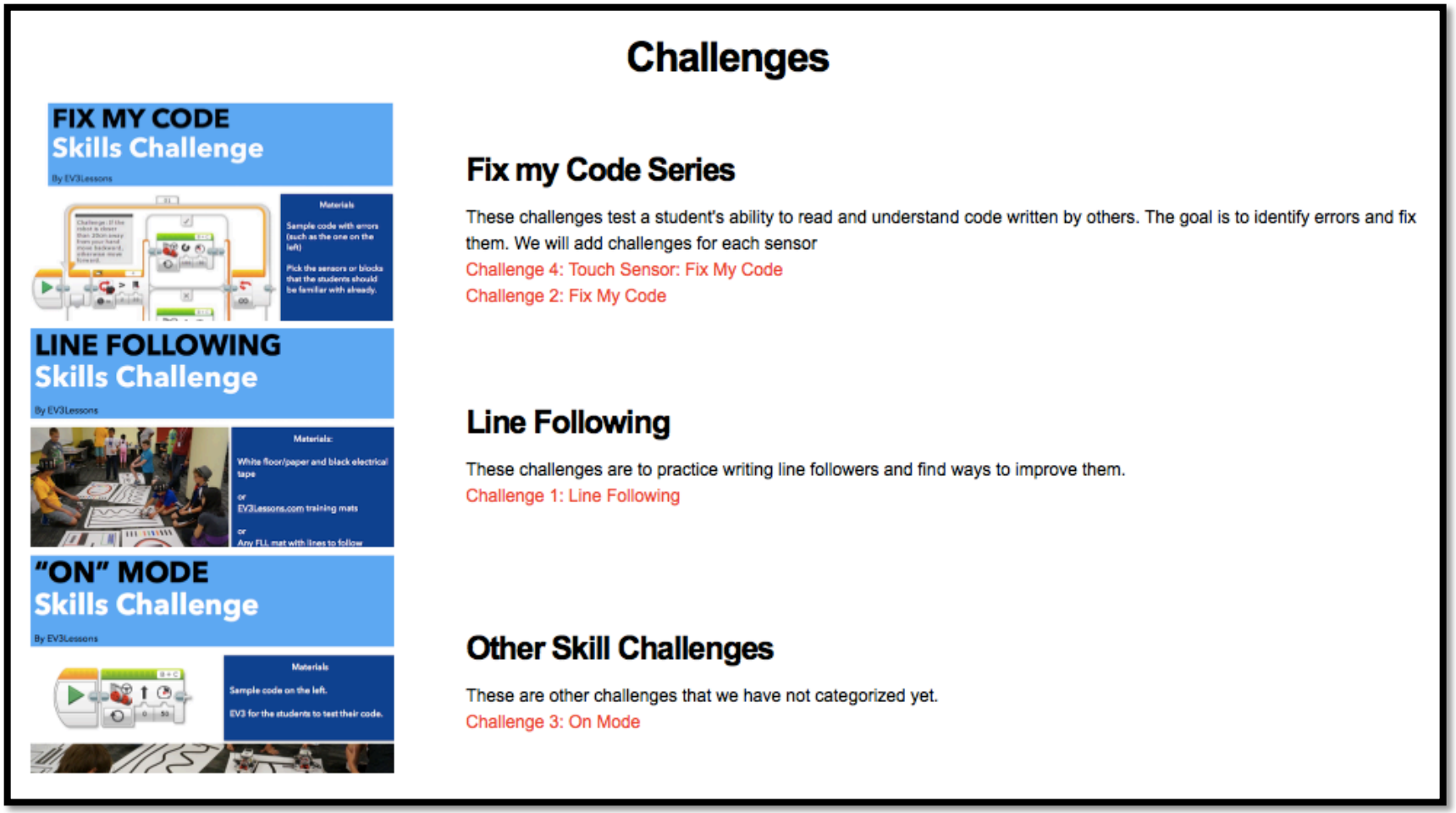
Hardware	Programming	Documentation & Strategy
• Cable Management 1 • Cable Management 2 • FLL Robot Build Guide • Shielding Techniques • Using Gears with the EV3 • Passive Attachments • Carabiner LEGO Digital Designer File • One Way Gate LEGO Digital Designer File	• One Minute Line Follower • Using Sensors: Move Until • Improving Robot Reliability • Color Sensor: Shielding and Calibration • My Blocks • Myths & Truths About the Gyro • Truth About Turns: Pivot Turns	• Using Comments to Improve Code • Engineering Notebook • LEGO CAD & Robot Build Instructions • Robot Game Strategy • Mission Planning Worksheet • Learning FLL Runs

EV3 Platform	Misc.
• Edu vs. Home Edition Software • EV3 and NXT Compatibility • Updating Software/Firmware Home Edition • Updating Software/Firmware Edu Edition	• LEGO Organization Systems • Roles and Responsibilities • Tournament Checklist • Ten Off-Season Ideas • FLL: Getting Started Guide



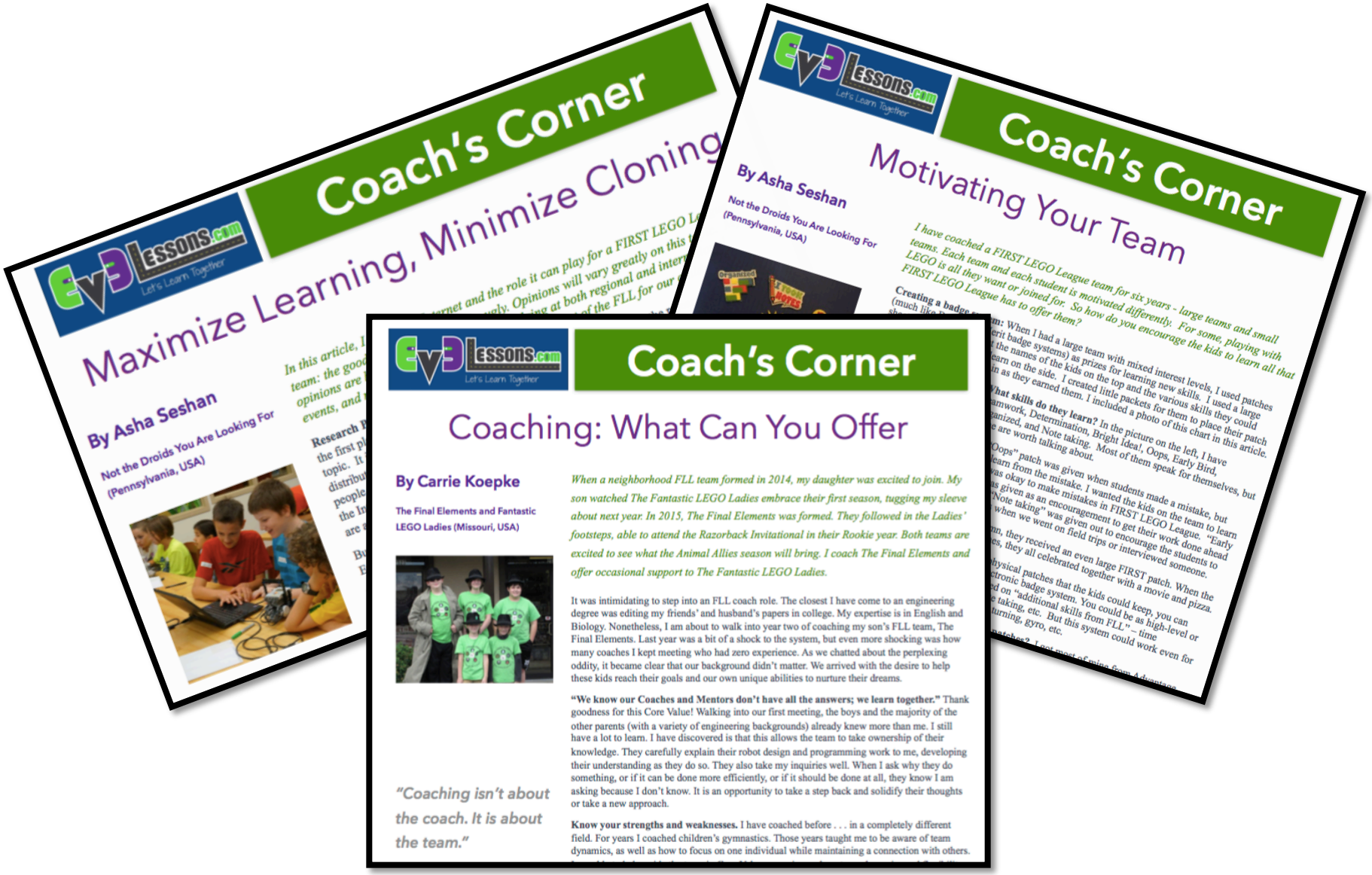
http://ev3lessons.com/guides.html

SKILLS CHALLENGES

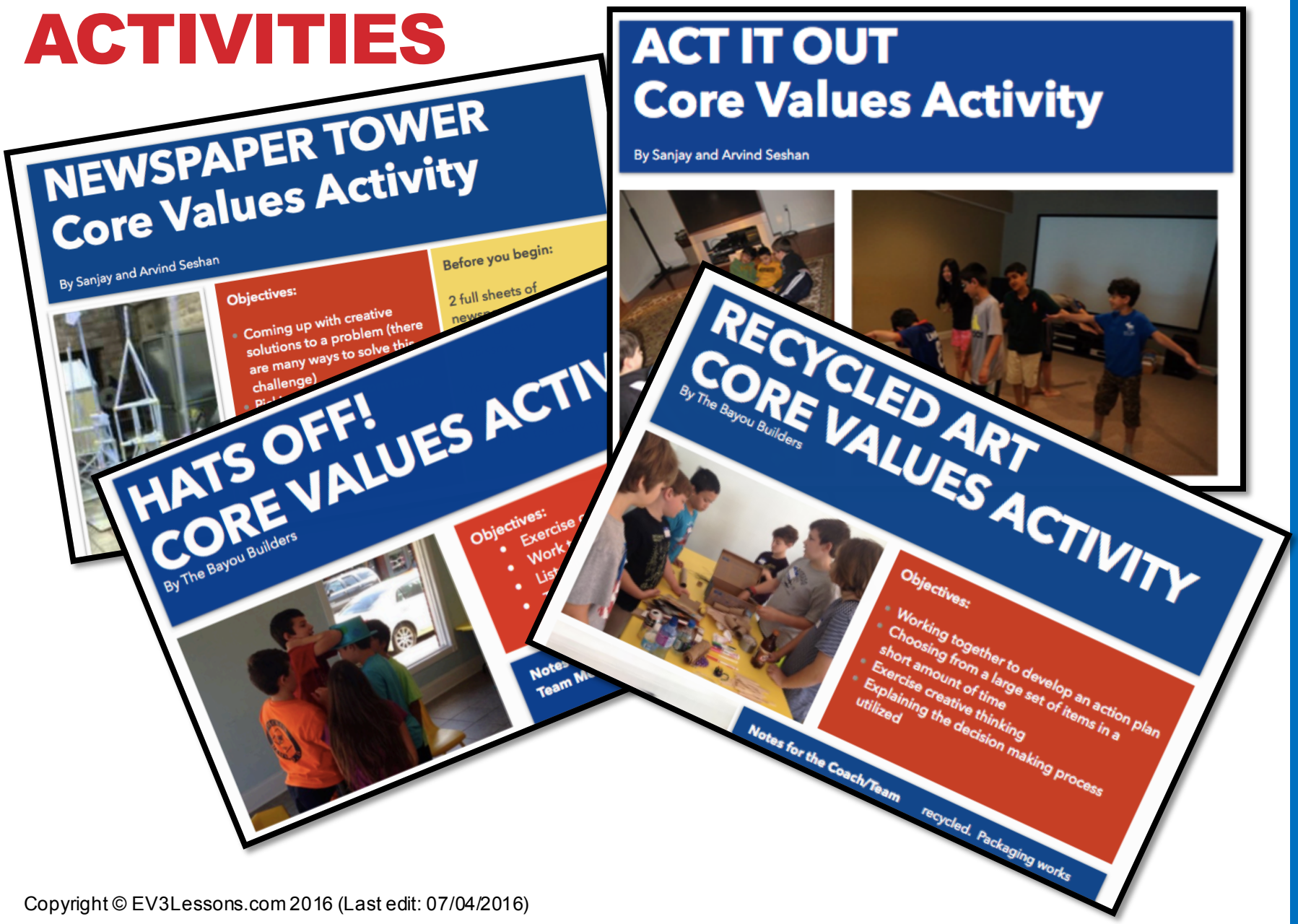


http://ev3lessons.com/challenges.html

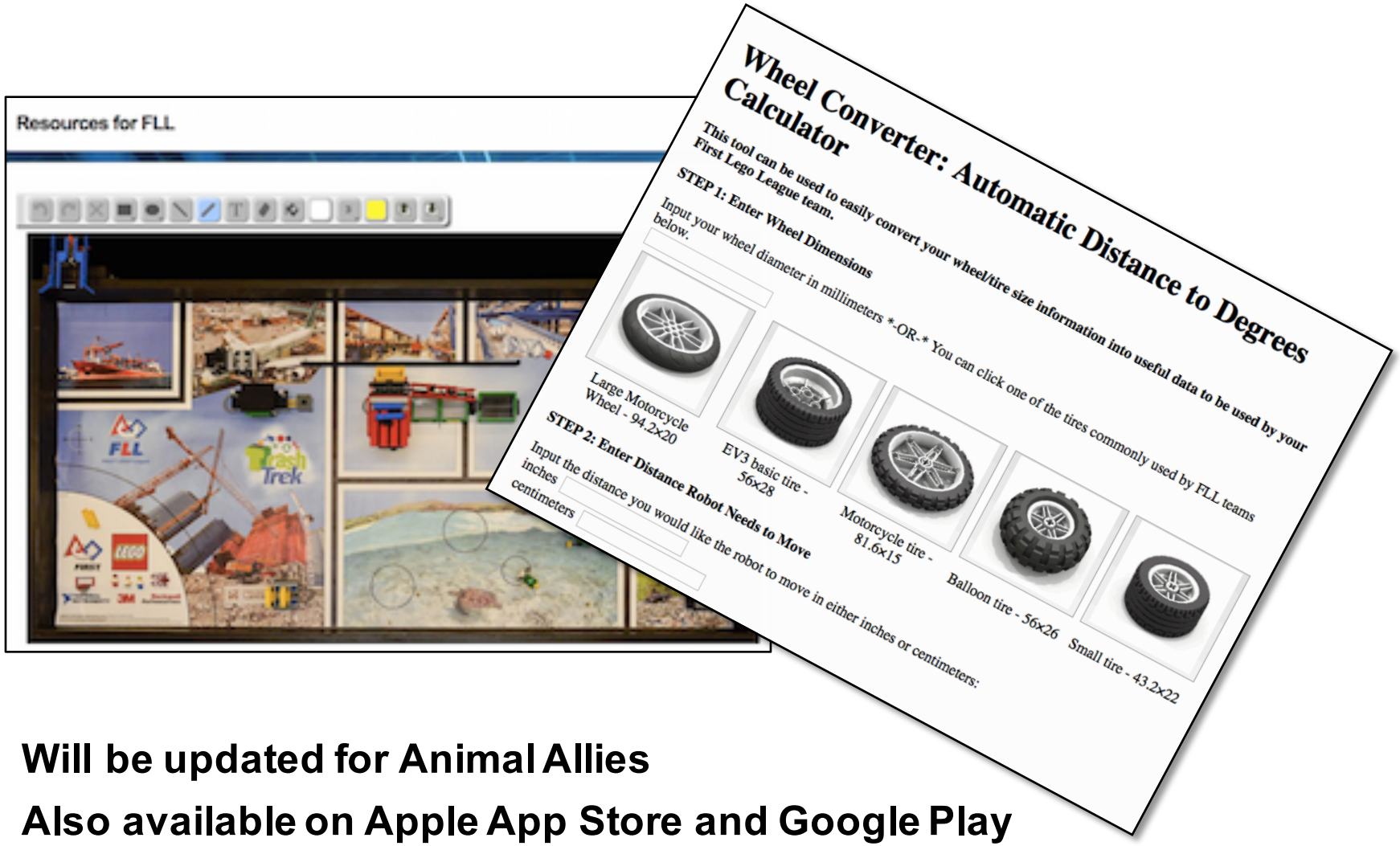
RESOURCES: COACH'S CORNER



RESOURCES: CORE VALUES ACTIVITIES



RESOURCES: PLANNING & SCORING TOOLS



Will be updated for Animal Allies

Also available on Apple App Store and Google Play

CREDITS

Author: Sanjay and Arvind Seshan

More lessons are available at www.ev3lessons.com