Robot Games
What does video game design have to do with control of robots?

Target Grade Levels: 10-12
Subject Areas: Coding/Computer Programming
Time Required: 10-12, 80 minutes class periods

Lesson Objectives:
1. Understand & apply the design process.
2. Write, analyze, & test programs.
3. Improve public presenting & speaking skills.
4. Understand workplace ethics.
5. Understand issues of intellectual property.

Lesson Summary
Students explore the connection between programming in the video game design environment to programming for robotic control.

Through the use of the Board of Education (BOE) Shield Bot and Arduino microcontroller, student will learn the Arduino programming language to complete various tasks and challenges with their robot. Applying the logic to programming that they learned in video game design they will compete in a design challenge, attempting to complete the task as efficiently as possible.

Students will also study several game theory to robot control studies to gain additional insight into the link between the virtual and physical world of programming, and how it relates to everyday situations in our modern (and future) civilization.

Materials Required:
- Parallax BOE Shied Bot
- USB cable
- Computer
- Internet
- Arduino Programming Software
- www.learn.parallax.com
- www.arduino.cc

Partner
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Activities

**Board of Education (BOE) Shield-Bot**

Students will complete the Parallax robot building and programming activities. Students will complete the projects in chapter challenges. Each chapter of the Parallax Shield Bot learning tutorial contains hardware and programming activities. Each chapter contains at the end a summary and challenge section. All students are expected and encouraged to review the summary, answer the questions, and complete the projects. Students will provide video evidence of programming and testing. All programs must be saved in a dedicated folder for review by the instructor and for future reference. Students will be able to troubleshoot and seek advice from partner and/or lab assistants during the course of the lesson via in-person and video conferencing opportunities.

**Design Challenge**

Students will compete in a challenge incorporating the BOE Shield-Bot and video game design theory in a group design problem. The results of the challenge will be documented via video and explained by recorded presentation. The competition will then be judged by a partner at Iowa State University for efficiency, creativity, and communication.

**Differentiation**

Students complete predictable and open ended activities that are self-paced. Students are encouraged to redo the activities to reinforce concepts.

Students work with peers to complete activities.

Students may receive assistance from peers and/or instructor.

Students that master concepts may work ahead on new material.

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**Teaching Tips or Concepts**

1. Focus on the logic of game or robot control.
2. Emphasize commenting in the program!
3. Some prerequisite work in coding/programming will be needed by the instructor to help troubleshoot. A good place to practice for teachers and students is [https://processing.org/](https://processing.org/). Arduino claims that practicing in processing works similar to the Arduino language.