# Unit 4: Physical Computing

Content Area: **Business**
Course(s):
Time Period: **Semester 1 & 2**
Length: **3 weeks**
Status: **Published**

## Standards

| | |
|---|---|
| | A computing system involves interaction among the user, hardware, application software, and system software. |
| 8.1.12.CS.2 | Model interactions between application software, system software, and hardware. |
| 8.1.12.CS.3 | Compare the functions of application software, system software, and hardware. |
| AP | Algorithms & Programming |
| | Individuals evaluate and select algorithms based on performance, reusability, and ease of implementation. |
| 8.1.12.AP.1 | Design algorithms to solve computational problems using a combination of original and existing algorithms. |
| 8.1.12.AP.3 | Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice. |
| | Complex programs are designed as systems of interacting modules, each with a specific role, coordinating for a common overall purpose. Modules allow for better management of complex tasks. |
| 8.1.12.AP.5 | Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. |

## Essential Questions

### Chapter 1: Inputs and Outputs

- What inputs and outputs are available on a physical device?
- What inputs and outputs are available on an app?
- How can we create apps that use a physical device to control a digital app?

### Chapter 2: Building Physical Prototypes

- How can a physical device use sensors to react to a physical environment?
- How can simple hardware be used to develop innovative new products?

## Enduring Understandings

- Design and build a physical computing device that integrates physical inputs and outputs with digital apps.

- Create app prototypes that use a physical device to solve real-world problems
- Use physical computing to solve problems in fun and innovative ways

## Knowledge and Skills

- Students use Code.org's App Lab environment, in conjunction with the Adafruit Circuit Playground, to explore the relationship between hardware and software.
- Throughout the unit, students develop prototypes that mirror existing innovative computing platforms, before ultimately designing and prototyping one of their own.

## Transfer Goals

- Students explore the role of physical devices in computing.
- Using App Lab and Adafruit's Circuit Playground, students develop programs that utilize the same hardware inputs and outputs that you see in the smart devices, looking at how a simple rough prototype can lead to a finished product.
- Students explore how physical devices can be used to react to the world around them using a "maker" mindset to create prototypes with everyday materials.

## Resources

- Web Lab - Programming Environment
- Code.org Videos
- Code.org Demonstration Apps
- Code.org Activity Guide