

# Electronics

## Overview of Physical Computing

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# Preparation

## Preparation

- Do you have a smartphone or tablet?

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If so, in what ways can it get information *from* the user or the environment?

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If so, in what ways can it get information *from* the user or the environment?

In what ways can it provide information *to* the user or the environment?

- Do you have an electronic device that you wear?

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- Do you have a smartphone or tablet?

If so, in what ways can it get information *from* the user or the environment?

In what ways can it provide information *to* the user or the environment?

- Do you have an electronic device that you wear?

If so, in what ways does it interact with you?

Preparation

**Learning Objectives**

Two Worlds

Getting information between worlds

Comparing worlds

Review

# Learning Objectives



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- *state properties of* **analog** and **digital** quantities

# Learning Objectives

By the end of this lesson, you should be able to:

- *identify* what sets **physical computing** apart from ordinary computing
- *state properties of* **analog** and **digital** quantities
- *define* the terms **sensor** and **actuator**

Preparation

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## Two types of questions

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What is the third letter  
of the alphabet?

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Should I wear a coat  
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Do I need to get  
gasoline in my car on  
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## Two types of questions

What is the third letter  
of the alphabet?

What is the square root  
of 16?

What is the area of a  
rectangle 4 inches by 3  
inches?

Should I wear a coat  
today?

Do I need to get  
gasoline in my car on  
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## Two types of questions

What is the third letter  
of the alphabet?

What is the square root  
of 16?

What is the area of a  
rectangle 4 inches by 3  
inches?

Should I wear a coat  
today?

Do I need to get  
gasoline in my car on  
my way home?

Which direction is  
north?

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# Physical computing

## Physical computing

*Physical* computing involves interaction with the world outside the computer.

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## Further examples

## Further examples

Physical computing systems are all around us. Many we are not even aware of.







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Two Worlds

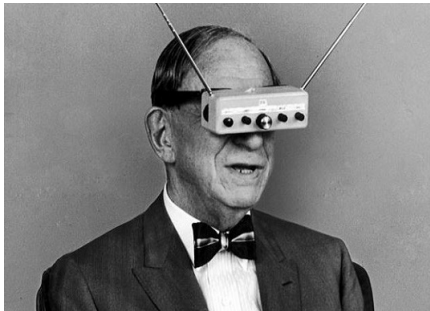
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# Getting information between worlds

# Getting information between worlds

- Sensors

## Getting information between worlds

- Sensors  
get information *from* the user or the environment

## Getting information between worlds

- Sensors  
get information *from* the user or the environment
- Actuators



## Getting information between worlds

- Sensors  
get information *from* the user or the environment
- Actuators  
provide information *to* the user or produce action in the environment

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*Inside the computer, electrical signals represent all of the real world quantities.*

# Comparing worlds

## Comparing worlds

The world *outside* the computer is primarily **analog**.

## Comparing worlds

The world *outside* the computer is primarily **analog**.  
The world *inside* the computer is primarily **digital**.

# Analog versus digital worlds

# Analog versus digital worlds

Analog

# Analog versus digital worlds

Analog

Digital



# Analog versus digital worlds

Analog  
continuous

Digital

# Analog versus digital worlds

Analog  
continuous

Digital  
discrete

## Analog versus digital worlds

Analog  
continuous  
many different  
quantities (sound, light,  
temperature, etc.)

Digital  
discrete

## Analog versus digital worlds

Analog  
continuous  
many different  
quantities (sound, light,  
temperature, etc.)

Digital  
discrete  
numbers, represented  
by electrical signals

# Review

## Review

- What sets *physical computing* apart from ordinary computing?

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- What sets *physical computing* apart from ordinary computing?
- What is different about the *analog* and *digital* worlds?

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- What is different about the *analog* and *digital* worlds?
- What is a *sensor*?



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## Review

- What sets *physical computing* apart from ordinary computing?
- What is different about the *analog* and *digital* worlds?
- What is a *sensor*?
- What is an *actuator*?