

Electronics Overview

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Preparation

Learning Objectives

Two Worlds

Getting information between worlds

Comparing worlds

Review

Preparation

Preparation

- Do you have a smartphone or tablet?

Preparation

- Do you have a smartphone or tablet?

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?

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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?

Preparation

- 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?

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

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- *identify* what sets **physical computing** apart from ordinary computing

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- *identify* what sets **physical computing** apart from ordinary computing
- *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**

Two types of questions

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What is the third letter
of the alphabet?

Two types of questions

What is the third letter
of the alphabet?

Should I wear a coat
today?

Two types of questions

What is the third letter
of the alphabet?
What is the square root
of 16?

Should I wear a coat
today?

Two types of questions

What is the third letter
of the alphabet?
What is the square root
of 16?

Should I wear a coat
today?
Do I need to get
gasoline in my car on
my way home?

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?

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?

Physical computing

Physical computing

Physical computing involves interaction with the world outside the computer.

Physical computing devices (discussion)

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List the ways a smartphone or tablet can get information *from* the user or the environment.

Physical computing devices (discussion)

List the ways a smartphone or tablet can get information *from* the user or the environment.

List the ways it can provide information *to* the user or the environment.

Physical computing devices (discussion)

List the ways a smartphone or tablet can get information *from* the user or the environment.

List the ways it can provide information *to* the user or the environment.

How about any other electronic device that you wear;

Physical computing devices (discussion)

List the ways a smartphone or tablet can get information *from* the user or the environment.

List the ways it can provide information *to* the user or the environment.

How about any other electronic device that you wear; list the ways it can interact with you.

Further examples

Further examples

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







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Two Worlds

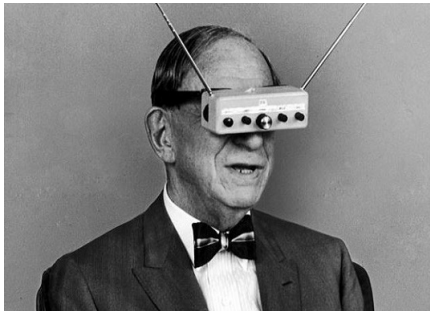
Getting information between worlds

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Further examples



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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

Getting information between worlds

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

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 is different about the *analog* and *digital* worlds?

Review

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

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- 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*?

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*?