



# INTRODUCTION TO PHYSICAL COMPUTING

Combining hardware and software to create interactive systems that can sense and respond to the physical world.

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# OBJECTIVES:

- To provide a clear definition and understanding of what Physical Computing is and its significance in modern technology.
- To emphasize that Physical Computing is an interdisciplinary field by showcasing real-world examples of collaborations between computer scientists, engineers, and artists.
- To explain how Physical Computing enables systems to sense changes in the physical environment and respond accordingly, with practical examples.
- To illustrate the crucial role of microcontrollers like Raspberry Pi in Physical Computing through practical projects.

# OBJECTIVES CONT..

- To present a variety of applications, ranging from wearable technology to smart home systems, to showcase the versatility of Physical Computing.
- Promote Accessibility: To highlight the increased accessibility of Physical Computing tools and platforms, making it available to a broader audience, including hobbyists and students.
- Inspire Innovation: To inspire the audience by showing how Physical Computing is pushing the boundaries of technology and encouraging creative problem-solving.
- Encourage Learning: To encourage individuals, especially students, to explore Physical Computing as a means to learn about electronics, programming, and innovative thinking.

# Definition

Physical Computing is an **interdisciplinary** field that combines **hardware** and **software** to create interactive systems that can **sense and respond** to the physical world. It involves the use of **sensors, actuators,** and **microcontrollers** to build devices that can sense and manipulate their environment.

With the increasing availability of low-cost microcontrollers and sensors, physical computing has become more **accessible** to a wider range of people, including artists, designers, hobbyists, and students. Physical computing can be used to create a wide range of interactive systems, from simple electronic toys to complex installations that respond to human behavior. It is an exciting and rapidly evolving field that is pushing the boundaries of what is possible with technology.

# Definition cont:

- **Definition:** the combination of **hardware** and **software** to create interactive systems that can sense and respond to the physical world.
- Hardware is the physical, tangible part of a computer system. (Like the computer's central processing unit (CPU), memory (RAM), hard drive, motherboard, graphics card, monitor, keyboard, and mouse, among others).
- Software is the intangible set of instructions and programs that enable the hardware to perform specific tasks and operations. (It includes operating systems (e.g., Windows, macOS, Linux), applications (e.g., word processors, web browsers, games), and programming code).

- **Examples of devices that can sense and manipulate their environment:** electronic toys, wearable technology, interactive art installations, robotics.



Here are some key points to note about Physical Computing:

# 1. Interdisciplinary

- Physical Computing is an interdisciplinary field that combines knowledge and skills from fields such as computer science, electronics, and engineering to create interactive systems.

**Example:** A team of computer scientists, electronic engineers, and artists collaborate to create an interactive light installation that changes color in response to music.



## 2. Sensing and Responding

- Physical Computing involves the use of sensors to detect changes in the physical environment and the use of actuators to respond to those changes.
- This allows for the creation of interactive systems that can react to human behavior or environmental changes.



- **Example:** A wearable device that senses the wearer's body temperature and adjusts the temperature of the surrounding environment to maintain a comfortable temperature.

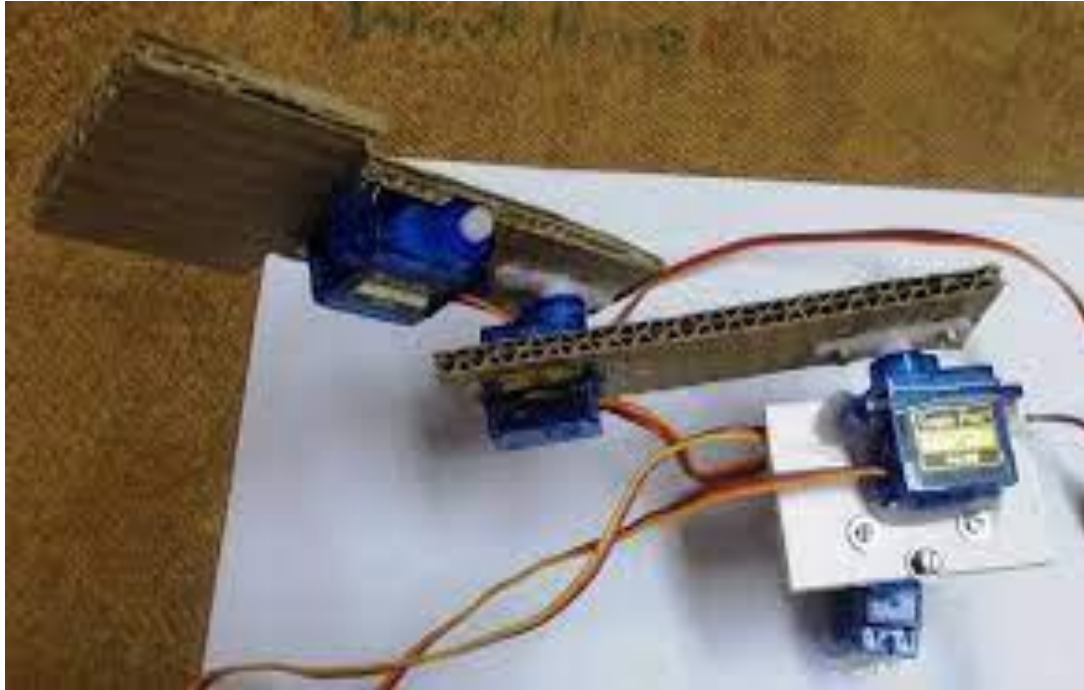


## 3. Microcontrollers

- Physical Computing relies heavily on microcontrollers, which are small computers that can be programmed to control sensors and actuators.
- Some popular microcontrollers used in Physical Computing include Arduino and Raspberry Pi.



- **Examples:** A student uses an Arduino microcontroller to create a robotic arm that can pick up objects and move them around.



## 4. Applications

- Physical Computing has a wide range of applications, from creating interactive art installations to developing wearable technology and robotics.
- It can also be used in education to teach students about electronics and programming.



- **Example:** A company develops a smart home system that can sense the presence of people in a room and adjust the lighting and temperature accordingly.

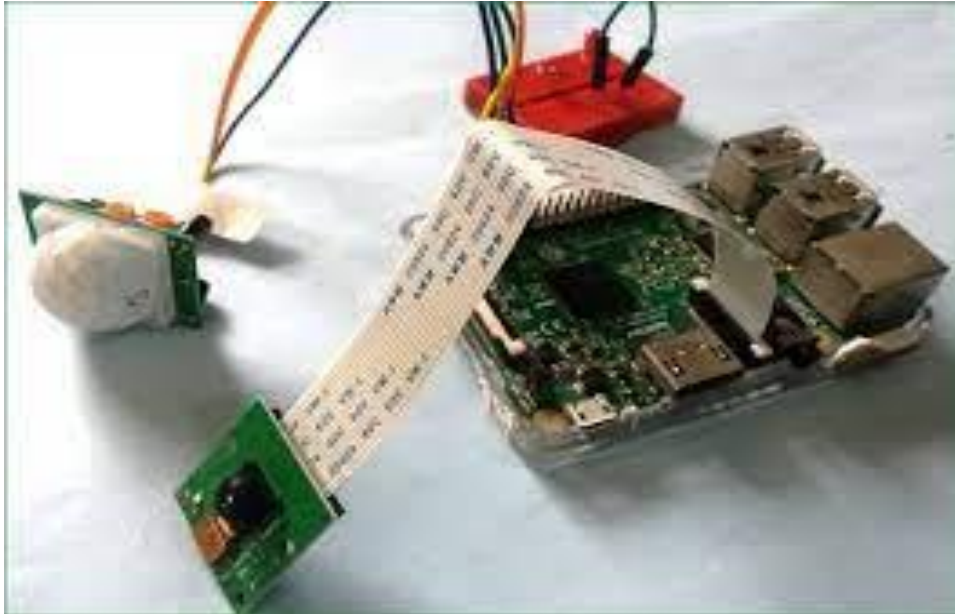


## 5. Accessibility

- With the increasing availability of low-cost microcontrollers and sensors, Physical Computing has become more accessible to a wider range of people, including artists, designers, hobbyists, and students.



- **Example:** A hobbyist uses a Raspberry Pi microcontroller to create a DIY security system that sends an alert to their phone when someone enters their home.



# Conclusion

- Physical Computing is an exciting field that is pushing the boundaries of what is possible with technology.
- It has the potential to create innovative solutions to real-world problems.



# The End

Thank you! Zikomo! Twalumba! Twatasha! Litumezi!  
Ndatenda! Asante! Ngiyabonga! Gracias! Grazie! Спасибо!  
谢谢! merci!

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