WEAR TEC

ENGINEERING DESIGN NOTEBOOK
BOOK 4 | DESIGN CHALLENGES

NAME:

UNIVERSITY OF Nebraska Omaha

N EXTENSION

sparkfun ELECTRONICS

N IANR

UNIVERSITY OF Nebraska Lincoln

NSF
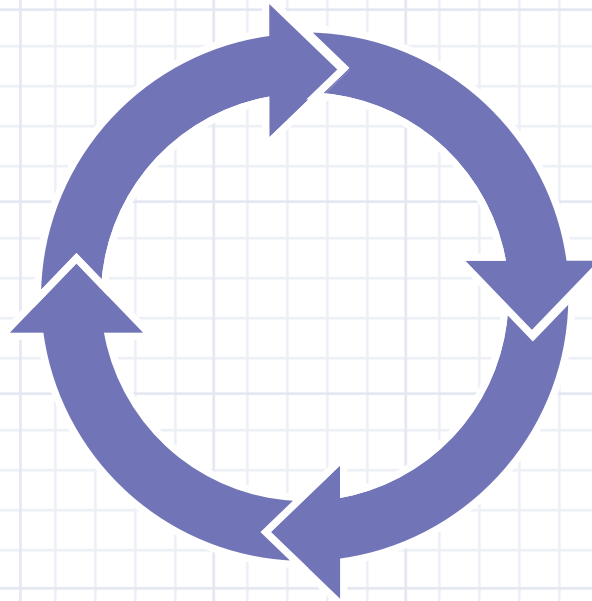
VOCABULARY

Input - is a constant predefined in the Arduino language; pins configured as input are
useful for reading a sensor

Output is a constant predefined in the Arduino language; pins configured as output
can provide a substantial amount of current to circuits; they can provide current or
absorb current curly braces {} -

PinMode - Configures the specified pin to behave either as an INPUT or an OUTPUT

Serial - is used for communication between the Arduino board and the computer
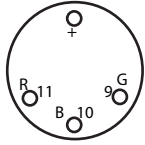
Switch case - A control structure that compares the value of a variable to the values specified in case statements

Switch statement - Switch allows the programmer to choose between several discrete options.
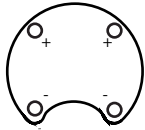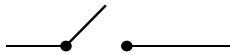Variable - A container value that can be changed
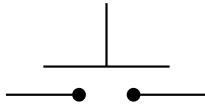
EXAMPLES

Tri-color LED:

Battery Holder:

Switch:

Button:

LED:
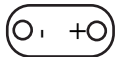
Lily Tiny:
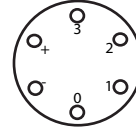
Light Sensor:
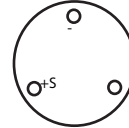
Temp Sensor:
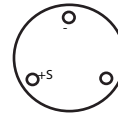
Lilypad Simple Board:
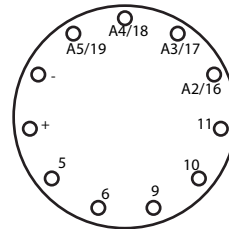
ENGINEERING DESIGN PROCESS KEY

Ask | **What is the problem? What have others done?**

Brainstorm | **What are some solutions? Draw your ideas**

Compare | **What are the pros and cons of each idea?**

Choose | **Which idea do you think is best?**

Create | **Build my design. What works well? What needs to be improved?**

Communicate | **How will you share your solution with others?**

ENGINEERING DESIGN PROCESS

Engineering Design Process (EDP) Overview

The engineering design process is a series of steps that engineers follow to come up with a solution to a problem. Many times the solution involves designing a product that meets certain criteria and/or accomplishes a certain task. This process is different from the steps of the scientific method. While scientists study how nature works, engineers create new things, such as products, websites, environments, and experiences. 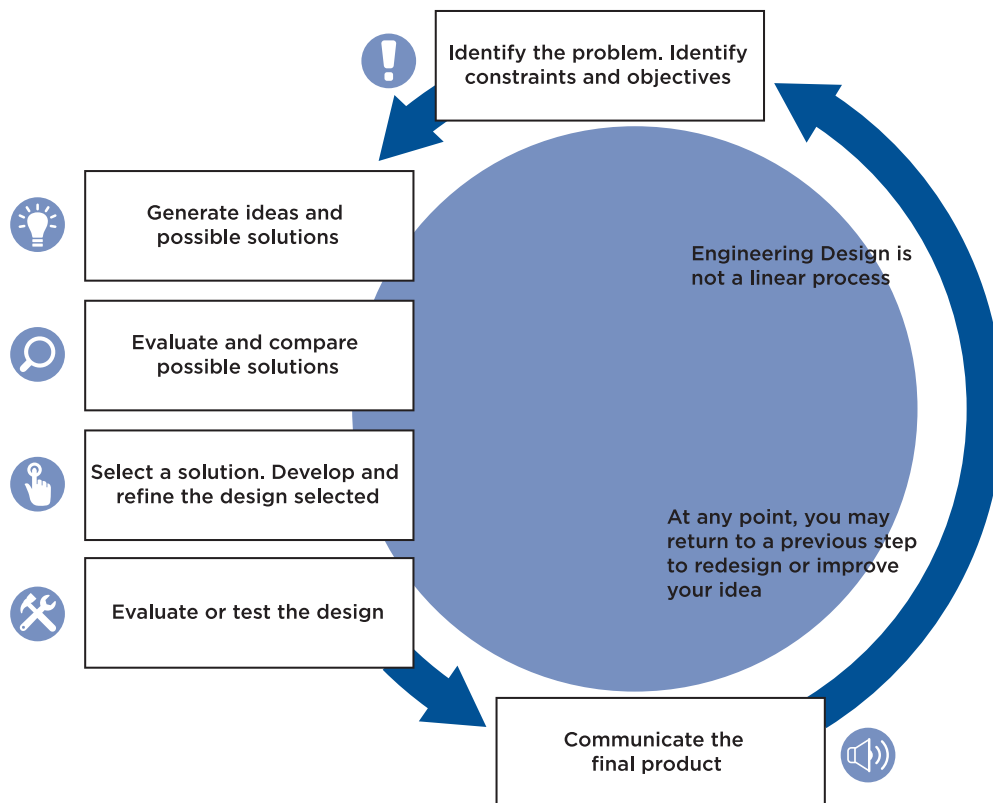Because engineers and scientists have different objectives, they follow different processes in their work. Scientists perform experiments using the scientific method; whereas, engineers follow the creativity-based engineering design process.

It's important to note that the EDP is flexible. There are as many variations of the model as there are engineers. With WearTec, students work through all six steps, but in real life, engineers often work on just one or two steps, then pass their work to another team.

Note that the EDP is non-linear. At any point, you may return to a previous step to redesign or improve your idea. The EDP is reliant on the iterative process. For example, after you improve your design once, you may want to begin all over again to refine your technology. You can use the EDP again and again!

In the WearTec curriculum you will notice symbols to represent a step. These symbols are intended to help you identify the steps of the EDP and bring about the thinking associated with that step.   The symbols can be used for short-hand inclusion in the engineering journal.

Identify the problem. Identify constraints and objectives

Generate ideas and possible solutions

Evaluate and compare possible solutions

Select a solution. Develop and refine the design selected

Evaluate or test the design

Engineering Design is not a linear process

At any point, you may return to a previous step to redesign or improve your idea

Communicate the final product

STUDENT INSTRUCTIONS

Engineers spend time writing and drawing daily in order to document their ideas and their work. This Engineering Design Notebook will provide you with a similar experience.

Write in this notebook daily to keep a record of your progress and next steps on WearTec projects. You, as the WearTec engineer in charge of your project, will make decisions regarding the writing and drawing that goes into this notebook.

This page describes how engineers complete each page of their engineering notebooks using both words and images.

Along the top:

- Write today's date
- Write your name on each page used
- Indicate the WearTec Book number (1, 2, 3, or 4)
- Indicate the WearTec Project name
- Indicate the number of this page, out of the total number of pages used this day.

  For example, page one of three used this day would look like this: 1/3

6/5/16	Tony Stark	1	Bow	1/3
Date	Name	Book	Project	Page

Circle each step of the Engineering Design Process that is used.

Indicate the step(s) of the design process you are working on today by circling the appropriate icon(s). See page 4 for an explanation of each step of the Engineering Design Process.

What did I do and/or learn today? (Use vocabulary & images from the inside cover)

Write and draw to document your work and your thinking about your work. Label your drawings with words to provide more information when possible. Turn to either inside cover of this notebook for a list of words and their meanings that might be used when writing and labeling your images.

6/5/16	Tony Stark	1	Bow	2/3
Date	Name	Book	Project	Page

My plan for next time

Write a sentence or two that will remind you where you left off today, and where you will begin next time you work on your project.

Draw a simple circuit below.

Draw a circuit after completing the final project.

Circle each step of the Engineering Design Process that is used.

What did I do and/or learn today? (Use vocabulary & images from the inside cover)

Date

Name

Book

Project

Page

My plan for next time: