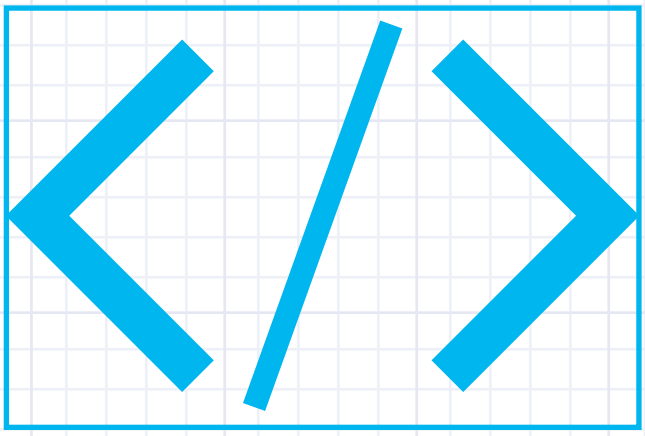
4H3035

ENGINEERING DESIGN NOTEBOOK

BOOK 3 | PROGRAMMING



NAME:

University of Nebraska Omaha
Nebraska 4-H Extension
sparkfun ELECTRONICS
IANR
University of Nebraska Lincoln

VOCABULARY

Programming – writing programs for a computer that tells it what to do

Integer – a whole number that is used in programming

Variable – stores specific values in a computer program

Conditional statement – if-then statement in programming that if one thing happens then the other must happen in the program as well (example: if the light level drops below 622, then the white LED lights up)

Sensor – a component that measures something like temperature or light and records it

Input – a device where energy or information enters a system (the device takes in information)

Output – a place where power or information leaves a system (something is put out of the system in the form of light or sound for example)

RGB – stands for red, green and blue colors of an LED, this component is also called a tri-colored LED

Comment – an explanation of the code you wrote in your computer program that tells you what the code will do

Code – a set of instructions written for a computer to tell it what you want it to do

Millisecond – one thousandth of a second

Delay - pauses the program for the amount of time (in milliseconds)

Pin - a physical connection (lead) to a port of a microprocessor

High/Low - constants are predefined expressions in the Arduino language used in:
reading and writing to a digital pin

Variable - a container value that can be changed

Pinmode - configures the specified pin to behave either as an INPUT or an OUTPUT.

Void set-up - a function that tells the Lilypad what the pins are and how they might behave

Serial - is used for communication between the Arduino board and the computer

EXAMPLES

Variables:

```
void setup()

void loop ()

function()

pinMode(variable, OUTPUT);

digitalWrite(variable, HIGH);

delay(1000);
```

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

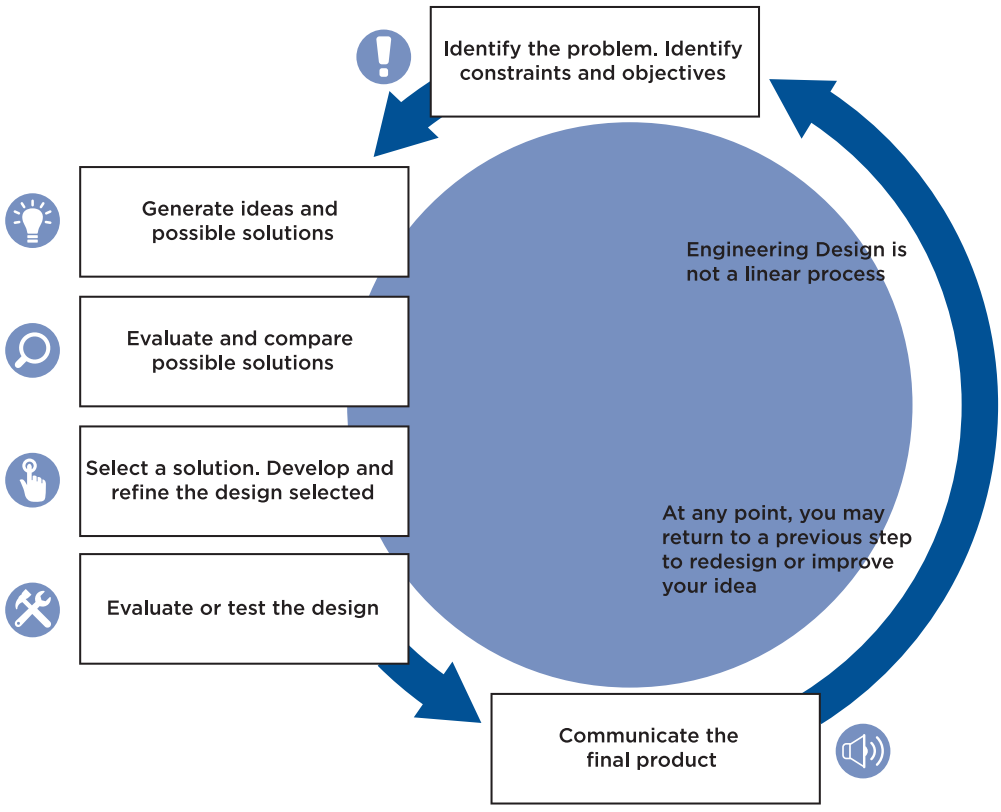
Engineering Design Process (EDP) Overview

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.



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.

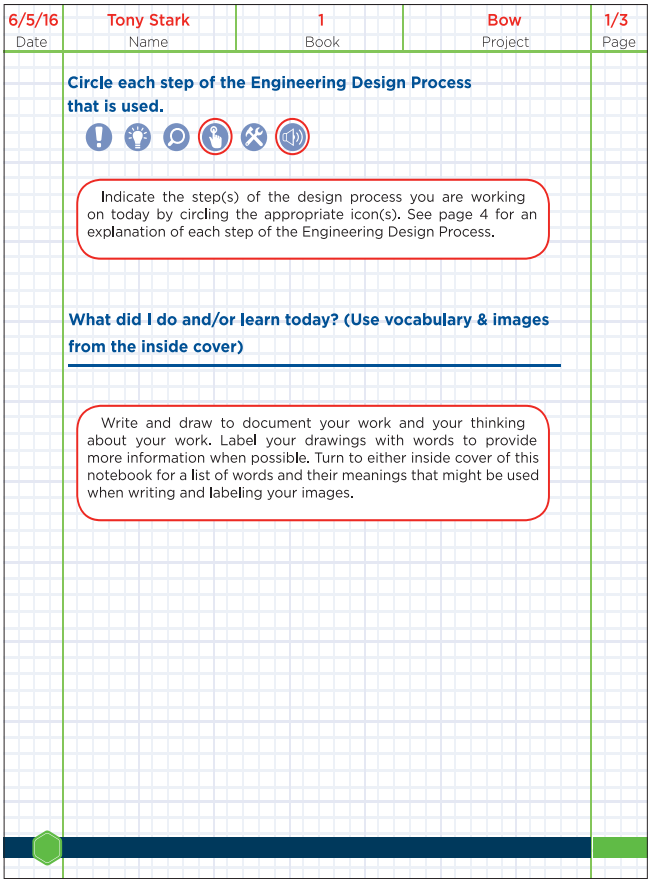
Write in this notebook daily to keep a record of your progress and next steps on WearTec projects. You, as the WearTec engineer in charge of your project, will make decisions regarding the writing and drawing that goes into this notebook.

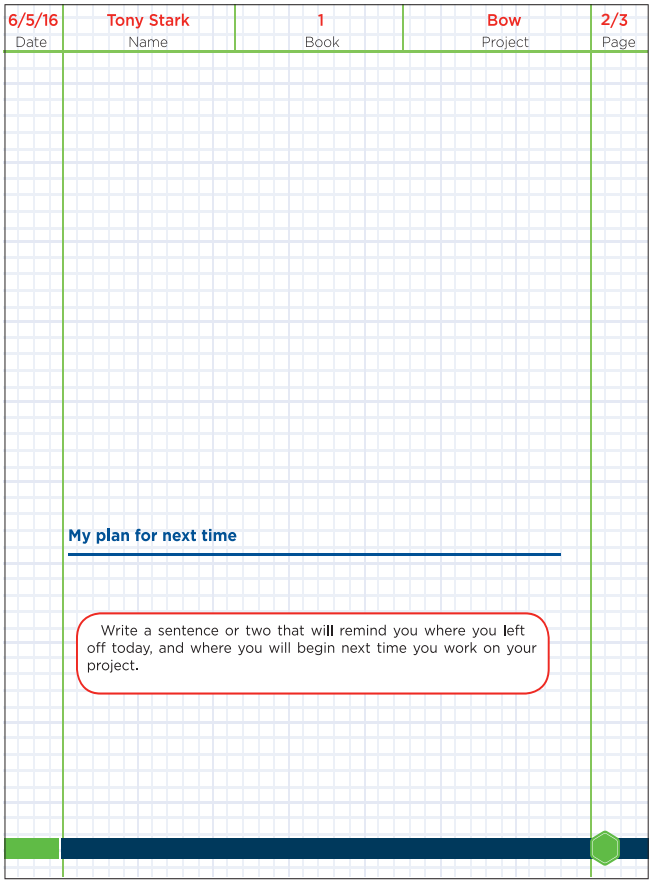
This page describes how engineers complete each page of their engineering notebooks using both words and images.

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





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)

My plan for next time: