EP1000

Module Project
Final Assignment

CA4 Module Project

- Design, fabricate, assemble and integrate a project
- Project requirements
    - Design of all digitally fabricated parts
    - Fabricate
        - 2D component (Laser cutting, vinyl cutting)
        - 3D component using 3D printing
    - Integrate
        - Smart controller using a microcontroller
        - Input sensor (s)
        - Output actuators or displays
        - Write the control program
- Present your project

Design

- Develop a design for your project
  - Initial ideas (sketches, drawings)
  - Digital design using CAD
  - Simulate a final product
- CAD design using Fusion 360
  - .f3d files
  - Raw files (.svg, .jpg. .png, .dxf)
- Must be included on project site

Fabricate

- Using the design files, fabricate your project
  - Laser cutting (housings, face plates, fixtures)
  - Vinyl/Paper cutting
  - 3D printing (irregular structures, containers)
- Do NOT 3D print
  - large housings e.g. boxes
  - Decorative/non-relevant parts e.g. cartoon figures, hinges that are not essential to your project
- Keep evidence of your work (photos, mini-videos)

Integrate

- You need to use a microcontroller
  - (preferably) Arduino Nano
  - Write the code, integration program
  - Power the system (without USB cable)
- Use
  - At least one sensor to read-in data
  - At lease one actuator or display device
- Power the system
  - Do NOT use the USB cable
  - (preferably) 5V input socket

Presentation

- Create a SINGLE slide/poster (1920x1080) showing your final product
  - Name: presentation.png (1920x1080)
  - Must have:
    - Project title,
    - Your name, student id, class, EP1000
    - Features
    - Construction details
- Create a 1-minute video on how your project works
  - Upload to You-tube/github (your website)
- 5-minute presentation to describe your project

To Do List

- Give your project a title
- Describe what your project does
- List the features that you wish to develop
- List the digital fabrication techniques you will use
- Write up a Bill-of-materials

Project title

- Here are some examples:
  - *My digital clock*
  - *A Mood lantern*
  - *USB Volume control for my PC*
  - *My Automatic Watch Winder*

- Title should be
  - Simple
  - To the point
  - Portrays the project in a few words

Description

- Write a short paragraph describing what your project does
- Example:

"*My watch winder will wind my automatic mechanical watch sufficiently to last 24 hrs. It will not overwind the watch and will do it once every 24 hours. The watch winder simulates the wearing of the watch for 8 hours on a wrist. Indicator LEDs show the status of the operation which can be reset.*"

Features

- List the features that you will implement in the project
- Examples:
  - *Simulates wearing the watch on the wrist with random motions*
  - *Capable of making the windings last for 24 hours*
  - *Indicator LEDs to show status, number of windings*
  - *Operates once every 24 hours or continuously.*
  - *Program and windings selectable*

What will you fabricate?

Technique	Makes
CAD Design, Graphics	*Casing design, side graphics patterns*
Laser Cutting, Vinyl cutting	*Box Casing, Motor mounts*
3D printing	*CPU frame, watch holder*
Processing system	*Arduino UNO/Nano compatible*
Input Devices	*Pushbutton Switches*
Output Devices	*Stepper Motor, Indicator LEDs, LCD panel*
Power	*Single 5V DC plug*

Bill-of-Materials

- The BOM helps us prepare your component list (don't go overboard or extravagant)

Sn	Qty	Description	Cost
1	1	Arduino Nano or compatible CPU	$6.50
2	1	28BYJ-48 Stepper motor with ULN2003 controller board	$3.24
3	3	3mm LEDs	$0.10
4	3	Mini Pushbutton switches	$1.05
5	1	5V DC Power Socket Panel Mount (female)DC-022B 5.5x21.mm	$0.30
6	1	A3 size 4mm Plywood	
7			

Material suppliers

- To aid you in obtaining your materials, please use the following online suppliers to indicate your needs. You may have to purchase the item on your own if the FabLab does not have it.
    - sg.cytron.io
    - shopee.sg
    - sg.element14.com
    - robot-r-us.com.sg
    - aliexpress.com
- Note that we may not have specialized items and even if ordered may not come in time.
- We will often supply best-alternative items.

Ideas and References

- Provide references from where you obtained your ideas, design and code.
- The objective is to design, fabricate and integrate the components, you can use ideas from others but the design must be your own.
- This may be your first full fabrication/integration project, start small, start simple.
- With experience, you should be able to tackle all sorts of projects.

Example Ideas – digital clock

- Arduino Project Hub – 231 clocks
- What you will learn
  - CAD design (your own housing)
  - Selection of display units
    - TM1637 LED Tube display
    - LCD Panel programming
    - 7219 digital dot display
  - Input programming using states from push button
  - Can add network time, RTC modules, etc
  - Programming selection of features
- Everyone should try building a clock at least once

Example Ideas – lamp for your desk

- Arduino Projects, 3D Illusion Mood Lamp
- What you will learn
  - CAD Design, 3D illusion engraving, housing/fittings
  - Mood lamp control using Neopixel LEDs
  - Temperature, humidity, proximity sensing
  - Using a single switch for control
  - Programming, integration
- Great project to light up your room!

EP1000
Module
Project
End