Lesson 1

Lesson Goals

The purpose of this lesson is to teach the students to use their creativity to make a glass sign using the Epilog Helix 350 Laser Engraver at the Champaign-Urbana Community FabLab. Each student will be allowed to choose one positive message or saying (that they've learned from classes at Dream Girls Academy Inc.) and engrave it on a glass frame.

Lesson Objective

In making this frame students will learn:

- How to manage time
- How to be creative
- How to use a laser engraver
- How to present ideas to a group
- How software interacts with hardware
- How to use resources to get materials needed for lesson

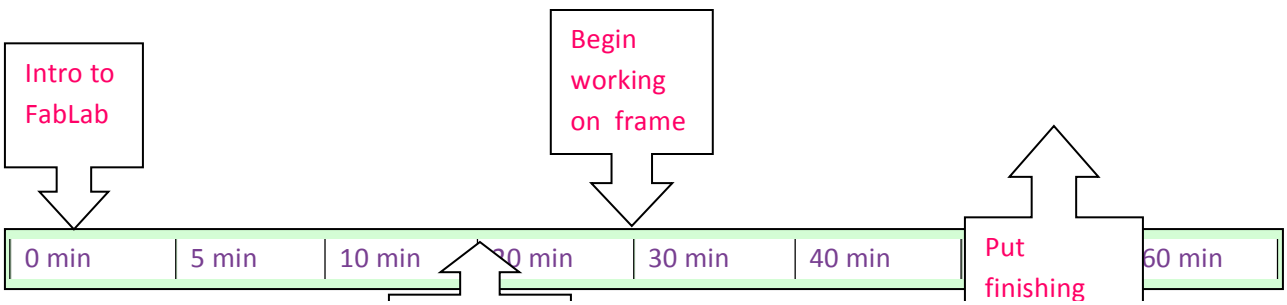
Materials

- Provide a copy of the FabLab's "Privacy Statement" for each student
- Photo Frame 5 in x 7 in (12.7cm x 17.7cm)
- Photo (optional)
- Cardboard Mat
- Protective Washable Paint (choose any color)
- Small Paint Roller
- Paper and Pen/Pencil

Teacher Preparation

Before beginning the lesson, introduce the students to the FabLab program and all of the services that are available. This will help students be comfortable using the resources at the FabLab and to be creative. Review the FabLab space that will be used for this project and identify which items are off limits to the students. Optional: Provide a printout of step-by-step instructions on how to make the glass frame or have a staff member at the FabLab assist students in this process.

Timeline



Lesson Plan

Introduction to FabLab

Introduce the students to the overall goal of the FabLab and outline some of the fun things that they will learning in this week and the upcoming weeks. Explain that details of the upcoming lessons will be provided the week of the lesson.

Brainstorm Ideas

Ask students to write down ideas they come up with for the design of their glass frame (including wording).

Have each student share their ideas with the rest of the class. Ask clarifying questions as needed to get precise feedback.

Glass Frame Project

Basic instructions

1. Put Laser Engraver in the proper settings for glass (information will be provided by FabLab)
2. Use Inkscape software to create design for glass frame (Ways to use this software will be explained during the introduction of the FabLab. Also a staff member will assist you if you need help).
3. Remove glass from frame
4. Place glass frame on cardboard mat
5. Cover glass in protective washable paint using a small paint roller
6. Be sure to turn on fan switch and compressed air
7. Place paint-covered glass in laser engraver machine, make sure the cardboard mat is placed under the glass
8. Select your print job from the laser menu and push the "go" button to begin the engraving process
9. After the engraving process is complete, remove the glass and cardboard from the laser engraver machine and carefully wash any loose paint from the glass (so that you can see your finished product clearly).
10. Set frame aside to dry

Example of a finished sample:

Photo taken from: https://www.flickr.com/photos/82047188@N05/7901633042/in/set-72157631339448696

Lesson 2

Lesson Goals

The purpose of this lesson is to teach the students how to solder using a Robot LED Badge. This project will introduce students to soldering practices and enable them to experience soldering techniques. Each student will be given a "Solder Skill Badge Kit" to complete this lesson.

Lesson Objectives

In making this badge, each student will learn:

- How to use a soldering iron
- How to use soldering techniques to create electricity
- How to make a connection between the LED (light bulbs) and the Printed Circuit Board (PCB)

Materials

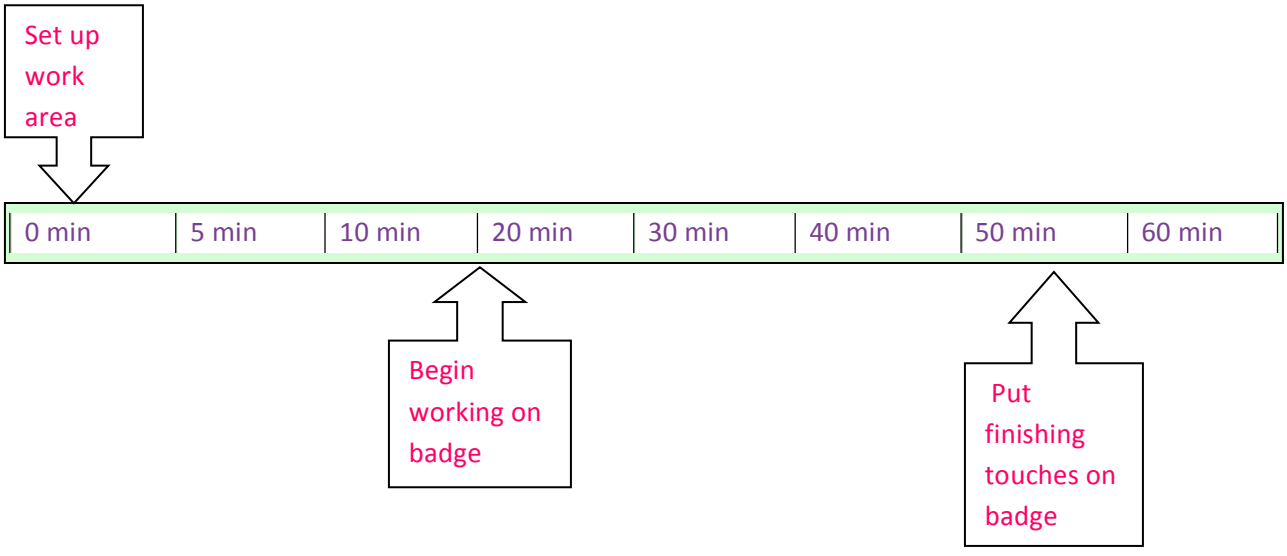
- Printed Circuit Board (PCB)
- (2) Light Emitting Diodes (LEDs)
- Battery holder
- 3v battery
- Tie-tack pin
- Tie-tack clutch

(All materials for this lesson will be provided in the "Solder Skill Badge Kit". This kit can be purchased at the FabLab or on the Maker Shed website: http://www.makershed.com/products/learn-to-solder-skill-badge-kit)

Teacher Preparation

Before teaching this lesson, schedule an event (date and time) with the FabLab to guarantee there will be enough materials and space to teach this class. Review the FabLab space that will be used for this project and identify which items are off limits to the students. Optional: Provide a printout of step-by-step instructions on how to solder the badge or have a staff member at the FabLab assist students in this process.

Timeline



Lesson Plan

Set Up Work Area

Turn on soldering irons. Have all students check their "Solder Skill Badge Kit" contents (to make sure they all have the materials needed for this project).

Soldering Project

Basic Instructions

1. Add some solder to the battery pad on the back of the badge by heating up the pad for 2-3 seconds.
2. Add some more solder (enough to cover the entire surface of the silver pad) and spread it around with the tip of the iron.
3. Position the battery holder on the back of the badge, by feeding the arms of the battery holder through the front of the badge (through the "knee joints"). (Be sure to leave enough space between to the battery holder and the badge so that your battery will be able to fit.)
4. Gently flip the badge over to the front and solder the battery holder in place by heating up the "knee joints" of the badge.
5. Apply solder where the points of the battery holder peek through the knee joints.
6. While the badge is still facing frontward, place the gold pin in the hole between the eyes of the badge (the center hole). It should be inserted from front to back.
7. Solder the gold pin into place by applying heat to the pin from the back of the badge.
8. Flip the badge over to the front and add the LED lights (inserting them into the eyes of the badge). Make sure that the longer wired LED is inserted into the hole marked (+) and that the shorter wired LED is inserted into the hole marked (-).
9. Flip the badge over and spread the wires apart.
10. Solder the wires into place from the back making sure none of them are touching.
11. Trim all of the wires, as low as they can be trimmed. (After trimming they should look like 4 dots.)
12. Insert the battery into the battery slot, making sure the (+) side of the battery is facing up.
13. Enjoy your new Robot LED Badge.

Example of a finished sample:

Photo taken from: http://www.makershed.com/products/learn-to-solder-skill-badge-kit

Lesson 3 (Warning: This lesson will take 2 days to complete)

****Lesson Plan Draft****

Lesson Goals

The purpose of this lesson is to teach the students to use their creativity to create a puzzle using Mod Podge Photo Transfer and the Epilog Helix 350 Laser Engraver. Each student will be allowed to use one 4in x 6in photo and transfer it onto a 5in x 7in piece of plywood.

Lesson Objective

In making this puzzle students will learn:

- How to transfer a photo to a piece of wood
- How to use a laser cutter to create a puzzle
- How to use resources to get materials needed for lesson

Materials

- 5in x 7in (12.7cm x 17.7cm) piece of plywood
- 4in x 6in photo
- Cardboard Mat
- Mod Podge Photo Transfer Medium With Foam Brush (2 Ounces)

Teacher Preparation

Before teaching this lesson, schedule an event (date and time) with the FabLab to guarantee there will be enough materials and space to teach this class. Review the FabLab space that will be used for this project and identify which items are off limits to the students. Optional: Provide a printout of step-by-step instructions on how to create a wooden puzzle or have a staff member at the FabLab assist students in this process.

Lesson Plan

Personalized Puzzle Project

Basic instructions

1. Place photo on cardboard
2. Apply a generous amount (thick layer) of transfer solution to the photo. After this process is complete the entire photo should be covered (you should not be able to see the image on the photo at all)
3. Carefully place the photo (photo side down) onto the plywood.
4. Press the photo down on the plywood and rub firmly to smooth out the image and remove air bubbles.
5. Let it stand for 24 hours to dry completely.
6. After 24 hours has passed, use a damp cloth or sponge to wet one section of the paper at a time. Begin rubbing gently to remove the paper and expose the transferred image.
7. Use Inkscape software (already installed on the computers in the FabLab) to construct a grid for your puzzle. You will be able to type in the dimensions (height and width) of your puzzle.
8. Next set the amount of puzzle pieces you would like to have by selecting a one number for across and one for down (example: 5 across and 3 down).
9. Select the type of material you are using for puzzle (wood).
10. Select The “Make it” button from the computer screen.

Example of a finished sample:

Photo taken from: http://makeitlabs.com/laser-cut-jigsaw-puzzles/