
Lunch Box Project Instructor Guide




Time Line

Day 1	Introduction to the Lunch Box Project
Day 2	Project Day – Starting to Sew the Lunch Box Circuit
Day 3	How to code your Lunch Box
Day 4	Project Day – Sewing the Lunch Box Circuit and programming the Lunch Box
Day 5	Project Day – Sewing the Lunch Box Circuit and programming the Lunch Box

Icons

	Objectives
	Preparation
	Supplies
	Time

	Bell Ringer Questions
	Content
	Standards

	Troubleshooting
	Practice
	Homework



Step 7: Connect the Sensor to the Microprocessor

Now we sew in the rest of the temperature sensor. You will sew from **the positive pin of the sensor to pin number A4** on the Lilypad. Sew and tie off with a knot. Then sew from **the S pin on the temperature sensor to pin number A5** on the Lilypad. Tie a knot and cut.

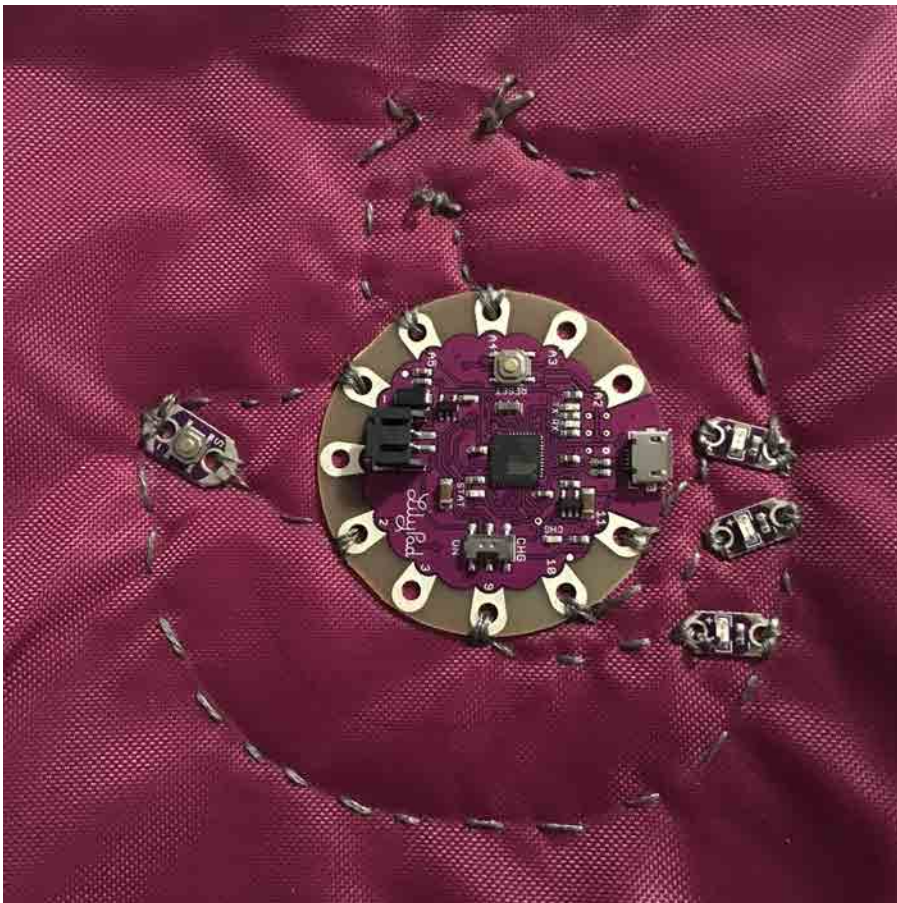


Step 8: Sew in the Positive Leads

At this point we will be following the same steps to sew down all the positive lines of all our components. Each component needs to be sewn through three times and tied off with a knot before cutting the line. Below is the list of pins that should be sewn to from each component.

- **Button S to Lilypad 2**
- **Green light bulb (bottom bulb) to Lilypad 9**
- **Yellow light bulb (middle bulb) to Lilypad 10**
- **Red light bulb (top bulb) to Lilypad 11**

When all of those are sewn down, your lunchbox should look like this:



NOTES:

Day 3 – How to Code Your Lunch Box



Content – Codebender Video

 *10 Minutes*

Show the following video to introduce Codebender

<https://www.youtube.com/watch?v=wsXDtCsIXro>

Codebender is an IDE – an Integrated Development Environment. It is where you will write your programs (called Sketches in Arduino) and where you will load them onto the Arduino board.

Because the codebender software runs from a browser, your code will be available to you wherever you are. We say the code is in “the cloud”. This is convenient for those of you who work various places. Plus the code is easy to share with others.



Content – Coding the Lunch Box: The Code

```
/* Temperature Sensing LunchBox
 * by Ben Leduc-Mills
 * LilyPad Simple, hooked to a temp sensor, soundPin, button, and 3
 * LED's - green, yellow, and red. Press button to set initial 'good'
 * temp (green), temp + 5 = yellow, temp + 25 = red
 * Modified by Vlcki Allan 6/29/16
 */

//LED ASSIGNMENTS
int redLED = 11; //pin number for red led
int yellowLED = 10; //pin number for yellow led
int greenLED = 9; //pin number for green led
int myLED = 13;
int tempPin = A5; //pin for temp sensor
int soundPin = 3; //pin number for buzzer
int buttonPin = 2; //pin number for button
int powerPin = A4; // hardcoded as HIGH

int initTemp = 0; //variable to hold initial temp

//NOTES These definitions are included in the pitches.h file
// since we only need four values, it is easier just to type them
int NOTE_C4 = 262;
int NOTE_G3 = 196;
int NOTE_A3 = 220;
int NOTE_B3 = 247;
int REST = 0;

//medoy and noteDurations are used together.
int melody[] = {NOTE_C4, NOTE_G3, NOTE_G3, NOTE_A3, NOTE_G3, REST, NOTE_B3,
NOTE_C4};
// note durations: 4 = quarter note, 8 = eighth note, etc.:
int noteDurations[] = {4, 8, 8, 4, 4, 4, 4, 4 };
int tuneLength = 8;

float giveMeFarhenheit(int value)
{
    // From data collected in 6/30/16
    float temperaturef = .7724 * value - 109.459;
    return temperaturef;
}
```

```

void setup()
{
    Serial.begin(9600); //begin Serial communication
    pinMode(redLED, OUTPUT); //set LED's to output
    pinMode(greenLED, OUTPUT);
    pinMode(yellowLED, OUTPUT);
    pinMode(buttonPin, INPUT_PULLUP); //buttons are inputs
    pinMode(tempPin, INPUT_PULLUP);
    pinMode(soundPin, OUTPUT);
    pinMode(powerPin, OUTPUT); //supply power for temp sensor
    digitalWrite(powerPin, HIGH);
}

```

```

void loop()
{
    int buttonState = digitalRead(buttonPin); //test for button push
    if (buttonState == HIGH)
    {
        digitalWrite(myLED, LOW);
    }
    else
    {
        //if button is pressed, set initial reading as base temp
        digitalWrite(myLED, HIGH);
        initTemp = analogRead(tempPin);
        Serial.print("My Init Temp: ");
        Serial.println(initTemp);
    }

    //keep testing current temperature
    delay(2000);

    int temp = analogRead(tempPin);
    Serial.print("Current Temp: ");
    Serial.println(temp);
    //float fTemp = (giveMeFarhenheit(temp));
    //Serial.println(fTemp);

    //green everything ok
    if(temp <= initTemp + 5)
    {

```

```

        digitalWrite(redLED, LOW);
        digitalWrite(yellowLED, LOW);
        digitalWrite(greenLED, HIGH);
    }
    else if (temp <= initTemp + 25)
    {
        digitalWrite(redLED, LOW);
        digitalWrite(yellowLED, HIGH);
        digitalWrite(greenLED, LOW);
    }
    else
    {
        digitalWrite(redLED, HIGH);
        digitalWrite(yellowLED, LOW);
        digitalWrite(greenLED, LOW);
        playAlert();
    }
}

//play a sound if your lunch has warmed up too much
void playAlert()
{
    for (int thisNote = 0; thisNote < tuneLength; thisNote++)
    {
        // to calculate the note duration, take one second
        // divided by the note type.
        //e.g. quarter note = 1000 / 4, eighth note = 1000/8, etc.
        int noteDuration = 1000 / noteDurations[thisNote];
        tone(soundPin, melody[thisNote], noteDuration);

        // to distinguish the notes, set a minimum time between them.
        // the note's duration + 30% seems to work well:
        int pauseBetweenNotes = noteDuration * 1.30;
        delay(pauseBetweenNotes);
        // stop the tone playing:
        noTone(soundPin);
    }
    delay(5000); //wait five seconds before playing the tune again.
}

```

} Day 4 to 5 – Project Work Days



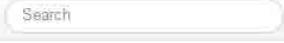



Activity – Lunch Box Project

Draft Reference Worksheet for Code Bender

List of terms and what they mean

List of error messages and what they mean

General Navigation

	Search field	This allows you to find projects that others have written. Codebender makes all the files public, so you can search them.
	Home	Clicking on the house gets you to your home page. There it shows all the sketches you have written.
	Examples and Libraries	This is a great place to get starter code or learn things you can do with Arduinos. For example, under "Basic" you can see our blink code. The fade code is also interesting as it allows the brightness of the LED to get dimmer and dimmer, and then reverse to get brighter and brighter.
	Getting Started	This takes you through the installation steps.

Keyboard Shortcuts

Ctrl + h	Find/ replace
Ctrl + f	Find
Ctrl + Alt+ [Reformat code (to indent meaningfully)
Ctrl + shift + d	Duplicate selected code
Ctrl + z	Undo

Label and Color Code Worksheet

Directions: Color the negative wires red and the positive wires blue.

Label the following parts of the diagram:

- Sensor
- Button
- Lights
- Lilypad On Switch
- Lilypad USB Port

