MODULE 9: VLC Applications

SUMMER CHALLENGE

Electrical Engineering: Smart Lighting

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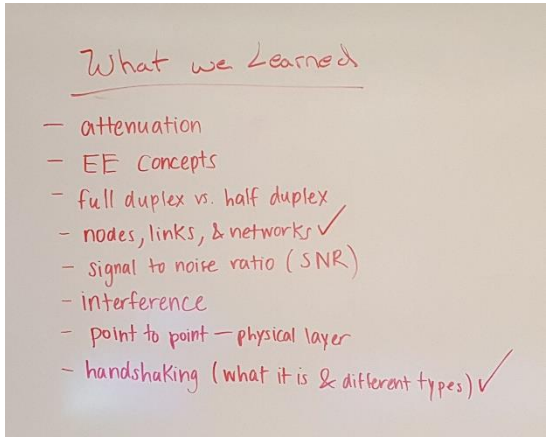
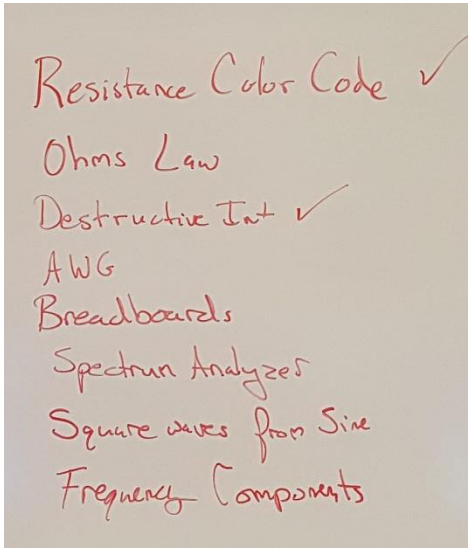
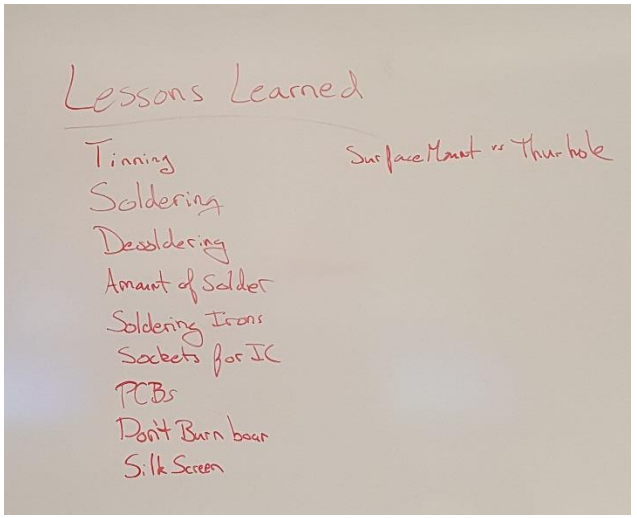
Overview

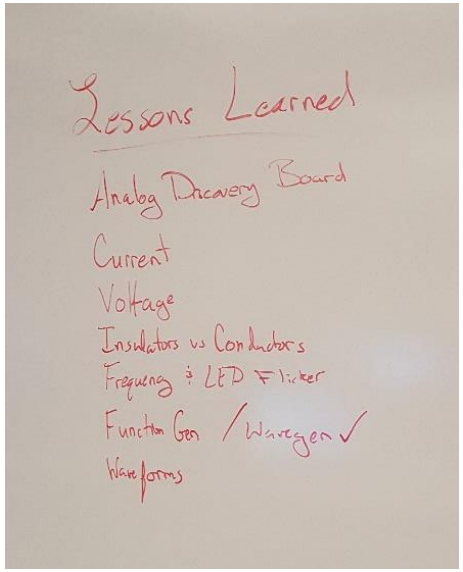
- Course Review
- Arduinos
- Experiment
  - VLC Texting!
- Finalize Presentations

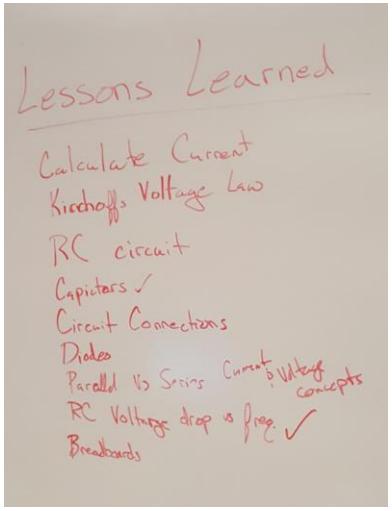
What did we learn here??

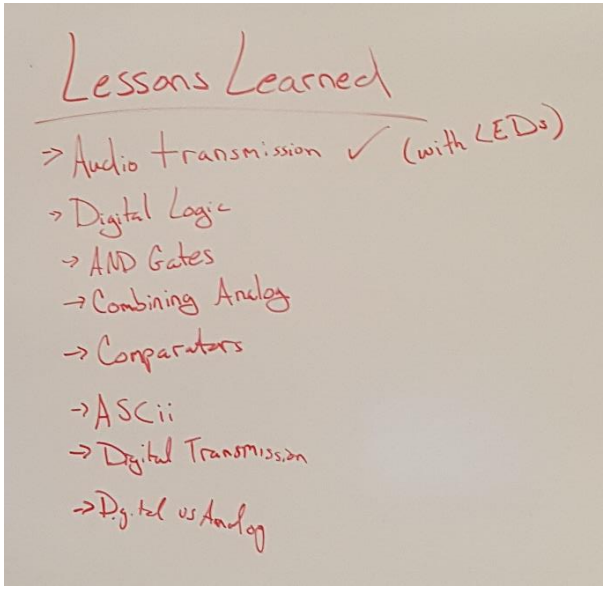












What did we learn here????

- How does the signal travel on the cup & strings phone?
- What is the difference between a scope and spectrum analyzer?
- What is the purpose of the trigger on the oscilloscope?
- What are the definitions of amplitude, frequency, and phase?
- What is Ohms law?
- What is the difference between series and parallel circuits?
- What is a PCB and how are PCBs different from breadboards?
- What happens in the frequency domain when you clip a sine wave?
- What is the decimal equivalent of the binary value 1011001?
- What is the truth table for an AND logic gate?

Reference Websites

- Physics Classroom: www.physicsclassroom.com
- All About Circuits: www.allaboutcircuits.com
- Khan Academy: www.khanacademy.org
- Code Academy: www.codecademy.com
- Arduino: www.arduino.cc/
- Digilent Course:

  www.digilentinc.com/Classroom/RealAnalog

Arduino

- Microprocessor vs. Microcontroller
  - Microprocessor: Takes data input, *processes*, and outputs new data
  - Microcontroller: Interacts with, or *controls*, hardware
- Embedded Software
  - Code - or instruction set - that runs on a microcontroller
  - Defines what the microcontroller does and how it reacts to input
- Arduino
  - Platform that makes embedded systems more accessible
  - Hardware is a development board containing a microcontroller and other peripherals
  - Software is simplified for ease of use and fast implementation

Serial Communication

- Process of sending data 1 bit at a time
- Serial Port
  - General purpose interface for communicating between devices
  - Typically viewed as an RS-232 connection

- Arduino Serial Port
  - Arduino uses the USB as a serial connection
  - Before running: Used to upload code to the Arduino
  - After running: Used to send data between the Arduino and monitor
  - Additional serial port: Rx and Tx pins of the Arduino (Pins 0 and 1) can be used to communicate with other serial devices!

Experiment

- Arduino
  - Serial port and LEDs
- VLC Texting
  - Send text messages to your partner via VLC!

Test

```
void setup() {
  // put your setup code here, to run once:
  Serial.begin(9600);
}

void loop() {
  // put your main code here, to run repeatedly:

  // check for incoming serial data:
  if (Serial.available() > 0) {
    // read incoming serial data and print "Hello!"
    char inChar = Serial.read();
    Serial.println("Hello!");
  }
}
```

Other Items

- Group Photo!
- Course Evaluations
- Finalize Presentations