

MODULE 9: VLC Applications

BU SUMMER CHALLENGE

Electrical Engineering: Smart Lighting Project

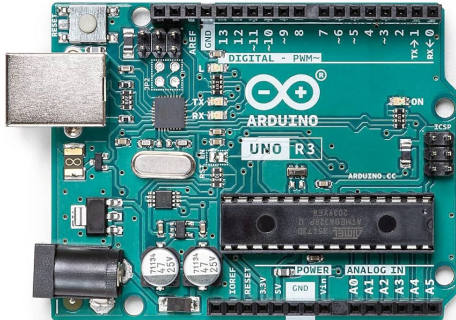
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Overview

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

Arduino

- It is a microcontroller
- We can write code to tell it what to do and how to react to input
- It can communicate with other devices and peripherals
- Communication is serial
 - Serial ports: USB, Rx and Tx pins of the Arduino (Pins 0 and 1)
 - Write/read from these ports is serial (i.e., 1 bit at a time)



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```
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!");
  }
}
```

Experiment

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

Lessons Learned

Classroom activity!

What did we learn?

- How does the signal travel on the cup & strings phone?
- What is the purpose of
 - scope
 - spectrum analyzer
 - the wave generator
- What is Nyquist's sampling theorem?
- Define
 - Signal-to-noise ratio (SNR)
 - Ohm's law
- What is the difference between series and parallel circuits?
- What is a PCB and how are PCBs different from breadboards?
- What is the decimal equivalent of the binary value 1011001?
- What is the truth table for an AND logic gate?
- Bonus: What is the maximum audio frequency recognizable to humans?

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/

What is left?

- Group Photo!
- Course Evaluations
- Finalize Presentations
 - Please email your slides (PowerPoint or Google Slides) to boztop@bu.edu by tonight.
 - Note: 5-6 minute presentation per group and both the team members should present (~2.5 minutes each)

Finalize Presentations

Presentation Order

- Team 1 Soldering
- Team 2 Visual Light Communication
- Team 3 LEDs
- Team 4 Analog signals
- Team 5 Resistors
- Team 6 Parallel and series circuits
- Team 7 Photodiodes
- Team 8 Resistors and Capacitors

Think – Pair – Share

