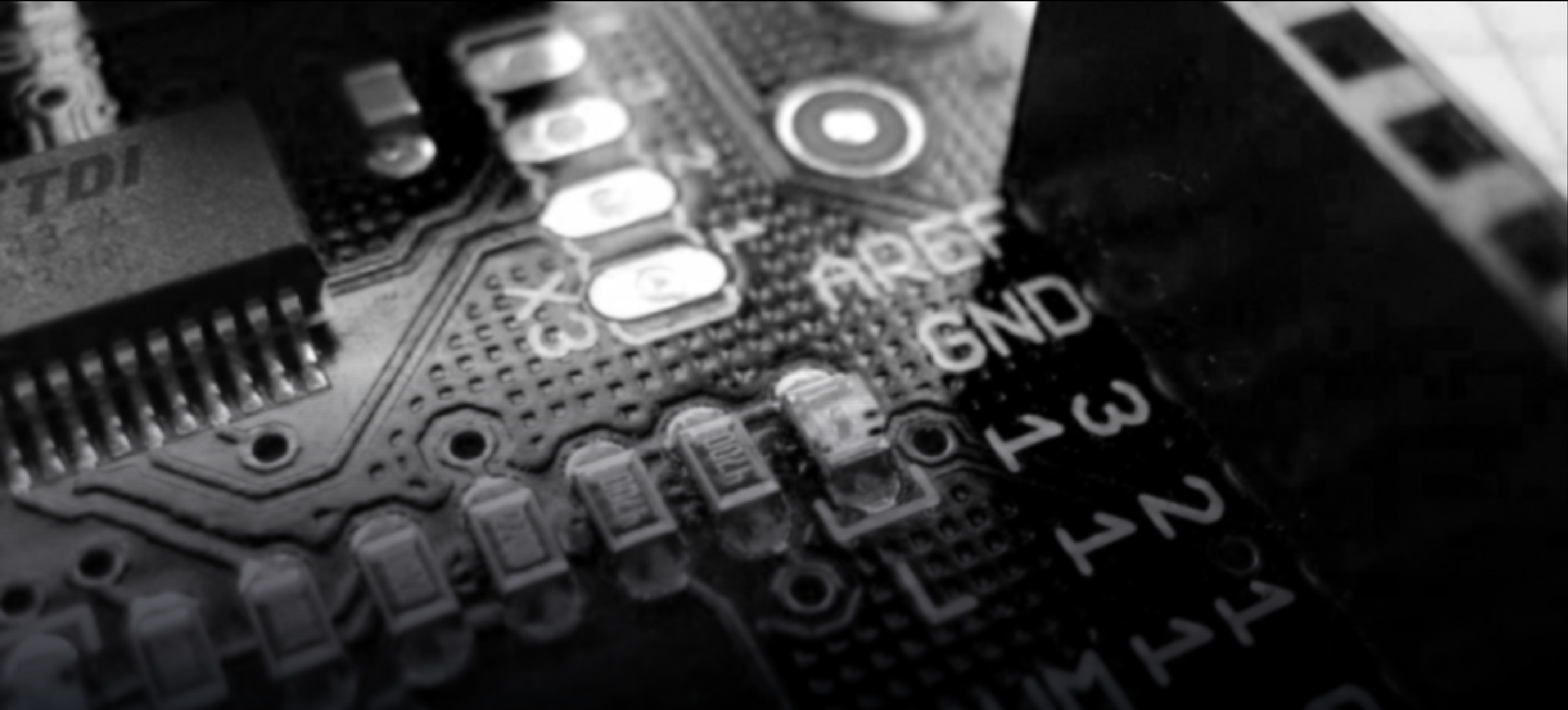

LEARNING TO PROGRAM - MICROCONTROLLERS

Michael Gary Dean

OVERVIEW

We will cover the basics of microcontroller programming, focusing on the Arduino platform. Arduino code can also be run on other microcontrollers, such as Teensy.

We will cover the 10 projects found in the Arduino Starter Kit. There is good reference materials for these projects and they cover a nice range of topics and programming concepts.

Each session combines three skills:

_Connecting a basic circuit with the microcontroller
_Writing code that interacts with the circuit
_Analysing and understanding existing Arduino code

After completing the projects, you'll be able to:

_Program different sensors and control software with them
_Control hardware, such as LCD displays
_Write code that is easy to read and understand
_Use and understand code written by other people
_Debug code and troubleshoot hardware issues

Before each session, you should assemble the circuit for the project we are working on. We want to focus on learning programming and solving problems!

FEES

165€/week + 90€ equipment fee
(Tax incl., and net of any bank transfer fees)

This covers:

_3 hours per week of 1-on-1 instruction
_Instructor's preparations for each lesson
_Email and Slack support (during the training period)

Payments can be made via direct bank transfer, TransferWise or PayPal.

INSTRUCTOR

Michael Gary Dean

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OUTLINE (4 weeks)

Project 1 + Arduino Basics

Bootloaders
Circuit Simulators and diagramming
Documentation, tutorials and additional reference materials

Uploading and running a project on the microcontroller
Debugging

Project 2 + Programming Basics

An overview of an Arduino program
Programming Syntax and Style
How to read an API (Language Reference)

Comments, variables and constants

Data Types
- float
- integer
- String()

Functions
Arguments
- Returning values and return types
- setup()
- loop()

Control structures
- if statements
- Loops

Project 3 + Sensors and serial communication

Objects
The Serial object

Serial ports

Printing to the console (the Serial monitor
- Serial.print() vs. Serial.println()

I/O - Analog vs. Digital (PWM)
- pinMode()
- digitalWrite()
- analogRead()

Boolean and Comparison Operators
Arithmetic and Compound Operators

Project 4 + Sensors and timing

A review of logic

Control structures II
- while() vs for() loops

Timing
- delay()
- millis()

Translating numbers to a new range
- map()

Project 5,6 + Sensors and motors

Data Types II

Arrays
- char
- String() reviewed

I/O II
- digitalRead()

Project 7,8 + Advanced sensors and LCD displays

Importing Libraries

Objects II
- Static vs. non-static objects
- Creating objects
- Members and methods

Control Structures II
- Switch statements

Project 9,10 + Controlling software and connecting to a network

Serial ports II

Arduino shields

Data Types III
- char
- byte
- boolean

Integrating code from GitHub

Next steps...

Interfacing with software
Interfacing with hardware

Networking with ethernet
OSC communication

Teensy vs. Arduino
The Teensy Audio System Design Tool

Using Git and using version control

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