**Lab 5 Report**

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3360:0001 - Embedded Systems

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## Introduction

Embedded Systems lab 5 provided a taste of the power C programming holds in the world of microcontrollers. The use of C – code enabled the use of coding libraries giving the programmer the ability to do much more complicated tasks while writing less code. While utilizing C code, a remotely controllable analog signal/data logging system was created using the built-in analog to digital converter on the ATMEGA328P controller and an external digital to analog converter (MAX518). Communication between the terminal and the microcontroller was handled by RS232 asynchronous serial communication and communication between the microcontroller and the MAX518 was handled via I2C communication.

Listed below is an exhaustive list of all the hardware necessary to complete this remote logging system, including a potentiometer to generate analog voltages of variable levels.

|  |  |  |
| --- | --- | --- |
| Hardware | Quantity | Description |
| Atmega 328P µC | 1 | Programmable µC |
| 10KΩ Resistor | 2 | Pull-Up resistors for I2C communication |
| 0.01µF Capacitor  B103 Potentiometer | 1  1 | Decoupling Capacitor  Potentiometer for Analog Voltage Control |
| MAX518 DAC | 1 | Digital to Analog Converter |
|  |  |  |

Figure 1: Materials List

## Schematic

A computer screen shot of a computer

AI-generated content may be incorrect.

Figure 2: Electrical circuit schematic created using KiCAD

## Discussion

## Conclusion

## Appendix A: Source Code

## Appendix B: References

Beichel, Reinhard. *Embedded Systems Lab 2, ECE:3360. The University of Iowa, 2025* <<https://uiowa.instructure.com/courses/248357/files/29567265?module_item_id=8134634>>

Beichel, Reinard. *Embedded Systems, Rotary Pulse Generators and Lab 3. The University of Iowa, 2025 <*[*https://uiowa.instructure.com/courses/248357/files/29778930?module\_item\_id=8162158*](https://uiowa.instructure.com/courses/248357/files/29778930?module_item_id=8162158) *>*

Beichel, Reinard. *Embedded Systems, Lecture 8: Timers. The University of Iowa, 2025 <*[*https://uiowa.instructure.com/courses/248357/files/29853139?module\_item\_id=8165716*](https://uiowa.instructure.com/courses/248357/files/29853139?module_item_id=8165716) *>*

Components101. *7 Segment Display. 22 September 2019.*  <<https://components101.com/displays/7-segment-display-pinout-working-datasheet>>

Pighixxx. *The Definitive Arduino Uno Pinout Diagram*. *May 5, 2013. <*<https://uiowa.instructure.com/courses/248357/files/29320694?module_item_id=8042318>>

Texas Instruments. *SNx4HC595 8-Bit Shift Registers With 3-State Output Register. September 2015*. <<https://www.ti.com/lit/ds/symlink/sn74hc595.pdf>>

XLITX. *5161AS Datasheet <*<http://www.xlitx.com/datasheet/5161AS.pdf>>