**Lab 4– “Adding Functionality” Report**

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# Software Implementation

We did the extra credits for the Data Logging task.

Table

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**Figure 1. System Block Diagram - showing the ATMega input and output ports (and port numbers) labeled per I/O component**

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**Figure 2*.* Structure Diagram - showing functional decomposition of tasks within the System Controller**

**Diagram, engineering drawing

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**Figure 3*.* Class diagram - showing the structure of the tasks within the System Controller as reflected in the Structure Diagram.**

Diagram

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**Figure 4*.* Data flow diagrams - shows data flow for inputs/outputs**

Diagram

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**Figure 5. Activity Diagram - shows the System Controller’s dynamic behavior from the initial entry in the loop() function**

Diagram

Description automatically generated

**Figure 6. Use Case Diagram for Measurement Screen**

Diagram, schematic

Description automatically generated

**Figure 7. Sequence Diagram for Measurement Screen**

A picture containing diagram

Description automatically generated

**Figure 8. Front Panel Design for Measurement Screen**

Diagram

Description automatically generated

**Figure 9. Use Case Diagram for Alarm Screen**

Diagram, schematic

Description automatically generated

**Figure 10. Sequence Diagram for Alarm Screen**

Graphical user interface, diagram

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**Figure 11. Front Panel Design for Alarm Screen**

Diagram

Description automatically generated

**Figure 12. Use Case Diagram for Battery Screen**

Diagram, schematic

Description automatically generated

**Figure 13. Sequence Diagram for Battery Screen**

Diagram

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**Figure 14. Front panel Design for Battery Screen**

Diagram

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**Figure 15. Use Case Diagram for Remote Terminal**

Diagram

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**Figure 16. Sequence Diagram for Remote Terminal**

Diagram

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**Figure 17. State Diagram for HVIL Alarm**

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**Figure 18. State Diagram for Overcurrent Alarm**

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**Figure 19. State Diagram for High Voltage out of Range Alarm**

Diagram

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**Figure 20. State Diagram for Contactor**

Diagram

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**Figure 21. State Diagram for Touch Screen Display**

# Contributions

We both worked equally on this project. Almost all of the time spent working on this project we were in a zoom call, so we were both providing the same amount of input.

# Appendices

## Code File Names

StarterFile.ino: file that the program starts in. This file includes the startUpTask and

  two ISR() function.

StarterFile.h: header file for StarterFile.ino

Alarm.c: code for the alarm task

Alarm.h: header file for alarm.c

Contactor.ino: code for the contactor task

Contactor.h: header file for Contactor.c

Measurement.c: code file for the measurement task

Measurement.h: header file for Measurement.c

Soc.c: code file for the state of charge task

Soc.h: header file for Soc.c

Scheduler.c: code for the Scheduler task

Scheduler.h: the header file for Scheduler.c

TaskControlBlock.h: header file defining TaskControlBlock struct

TouchScreenTask.ino: code file for the touch screen task

TouchScreenTask.h: header file for TouchScreenTask.ino

DataLogging.h: header file for the data logging task

DataLogging.ino: code file for the data logging task

RemoteTerminal.h: header file for the remote termial task

RemoteTerminal.ino: code file for the data remote terminal task