

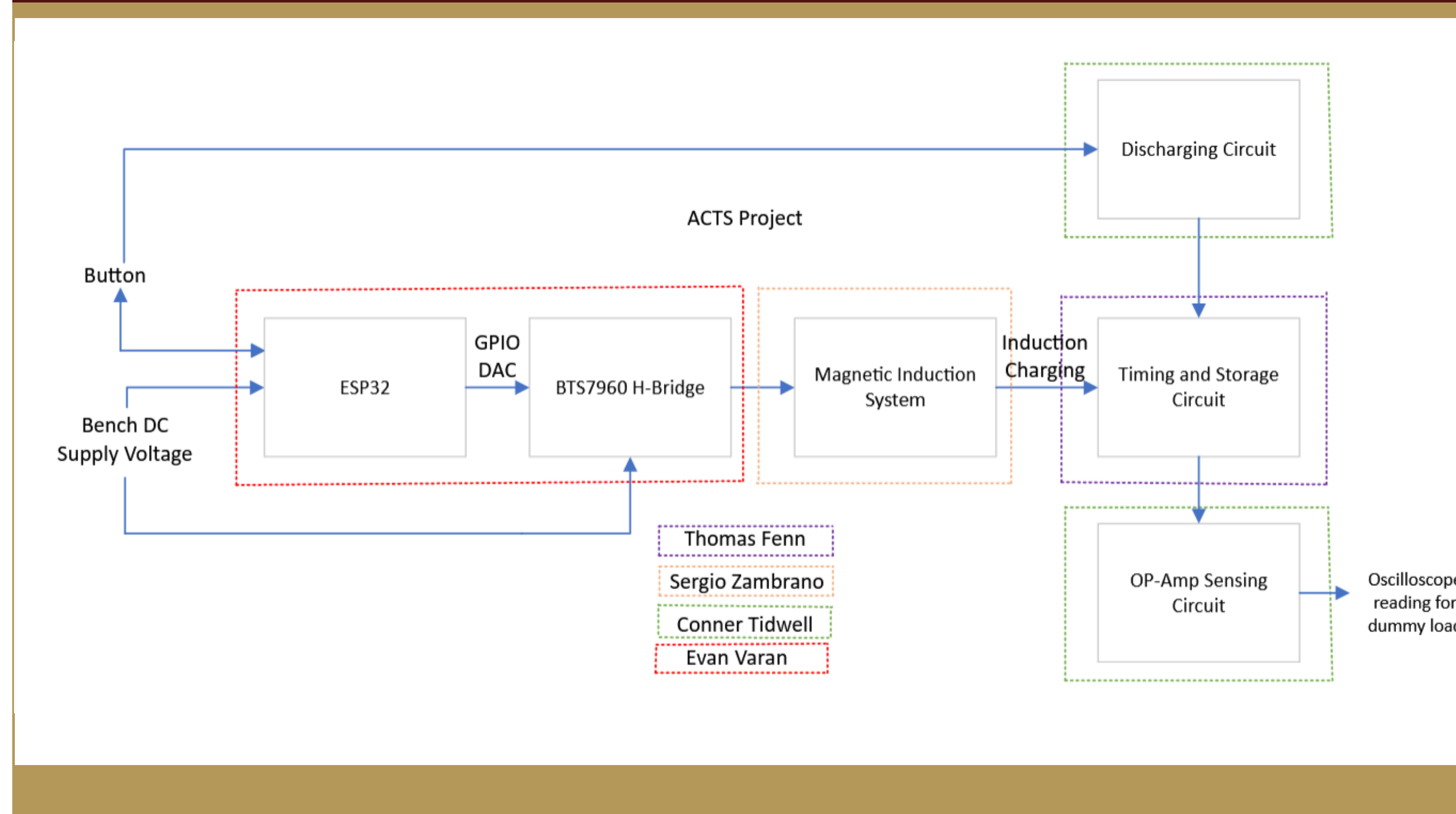
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Project Overview

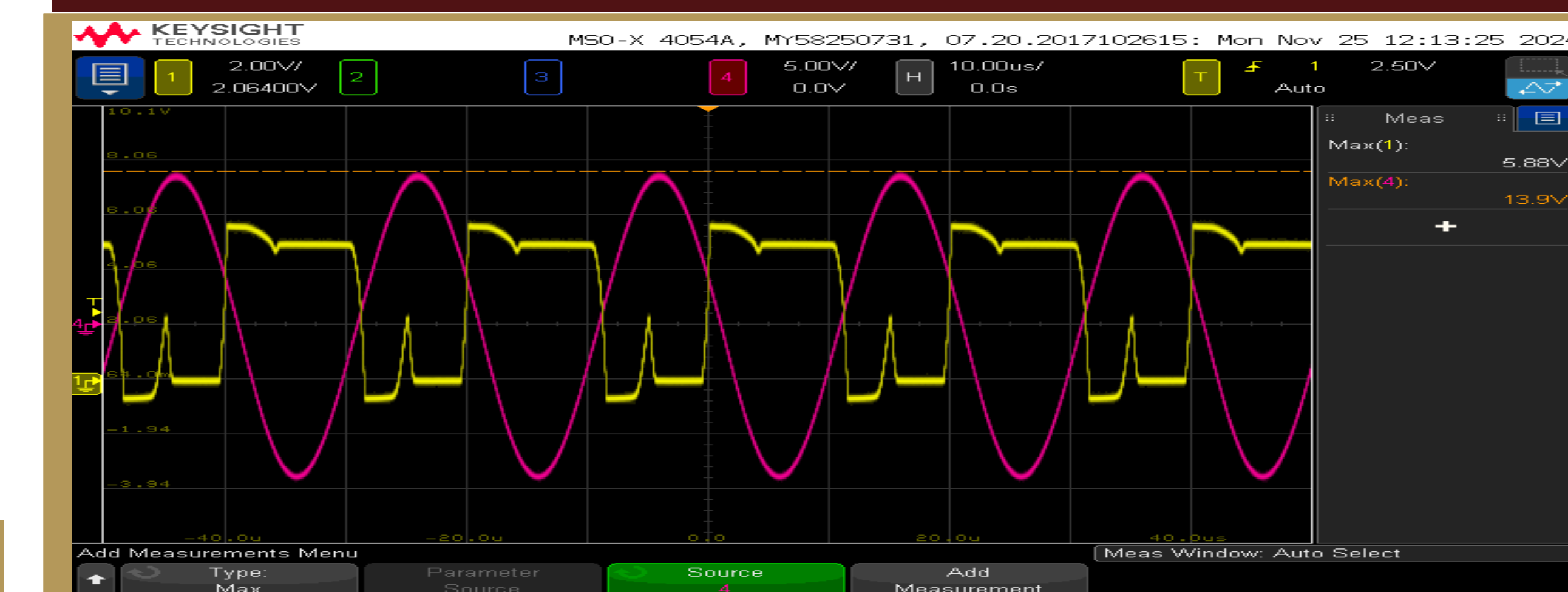
Our project is an RC-analog timing circuit that goes into a projectile, with the goal of deploying a payload without direct contact with the intended target.

- Designed specifically for Non-Lethal Enterprises (NLE)
- Features a transformer driven by an H-bridge which generates the voltage pulse that activates the timing circuit.
- Controls the release of pepper spray with precise timing.
- Our system will offer a safe alternative to traditional tasing methods.

Top Level Block Diagram



Electromagnetic Induction



Features and Requirements

Features

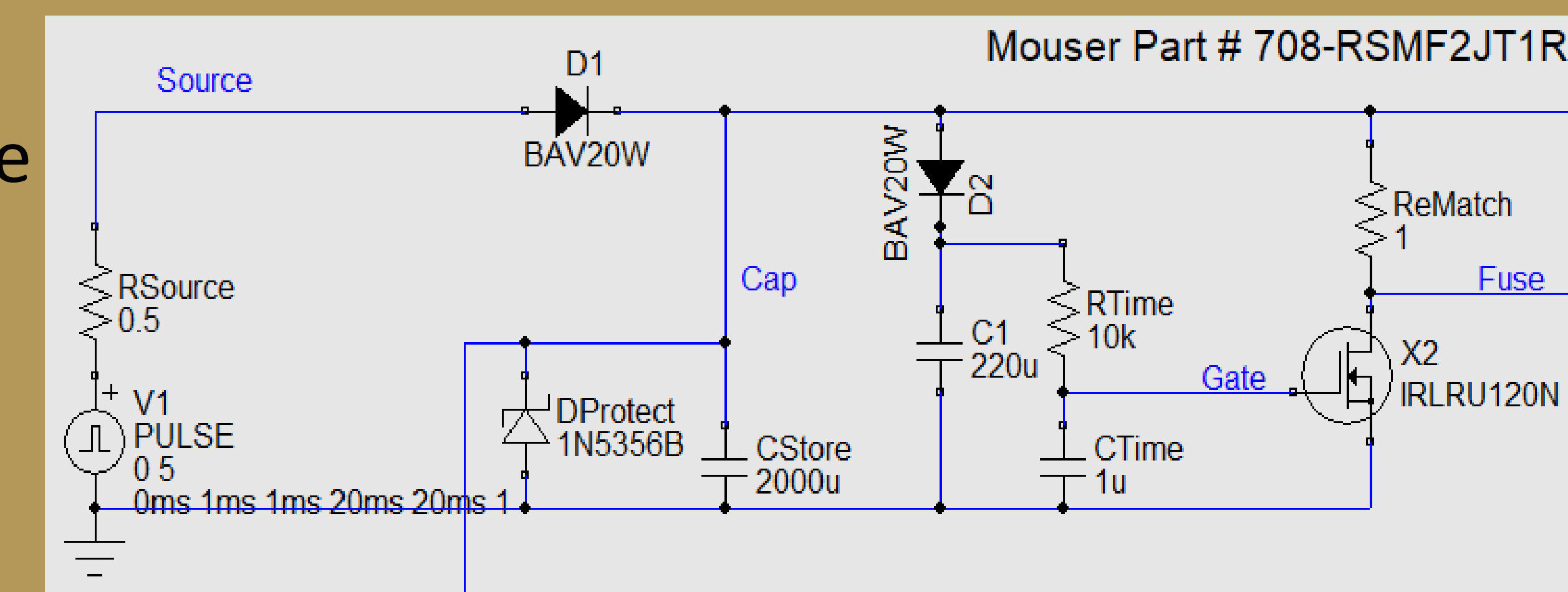
- ESP32 microcontroller and BTS7960 H-Bridge used to simulate transmission and receiving coils.
- Coil characterization within physical design parameters.
- Functioning timing delay circuit custom PCB.
- Stretch goal: Achieve constant flux rate of change.

Requirements

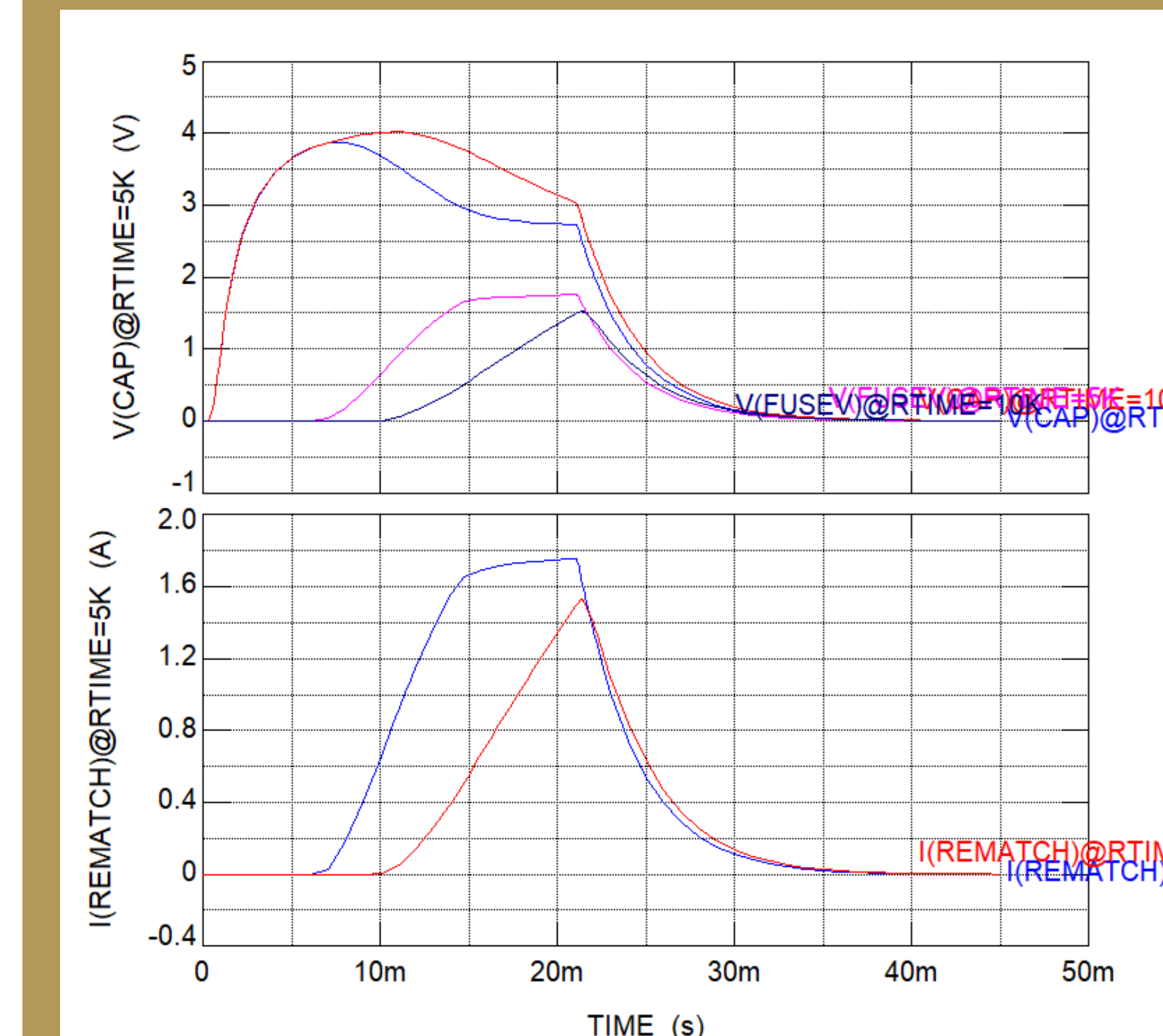
- Dummy load must reach at least 600mA for 10ms.
- (Stretch Goal) Full circuit must fit within 17.27mm diameter envelope.

Timing And Storage Circuit

This circuit controls the timing of current delivery and manages the storing of charge from secondary or receiving coil from the transformer.



Simulation Results



Expected results with 10k Time resistor and 1 uF timing capacitor

Results

- Designed coils and their forms for magnetic induction circuit
- Microcontroller controls H-Bridge for transformer
- Circuit has been placed onto PCBs
- Subsystems have been tested and integrated into the system for functionality

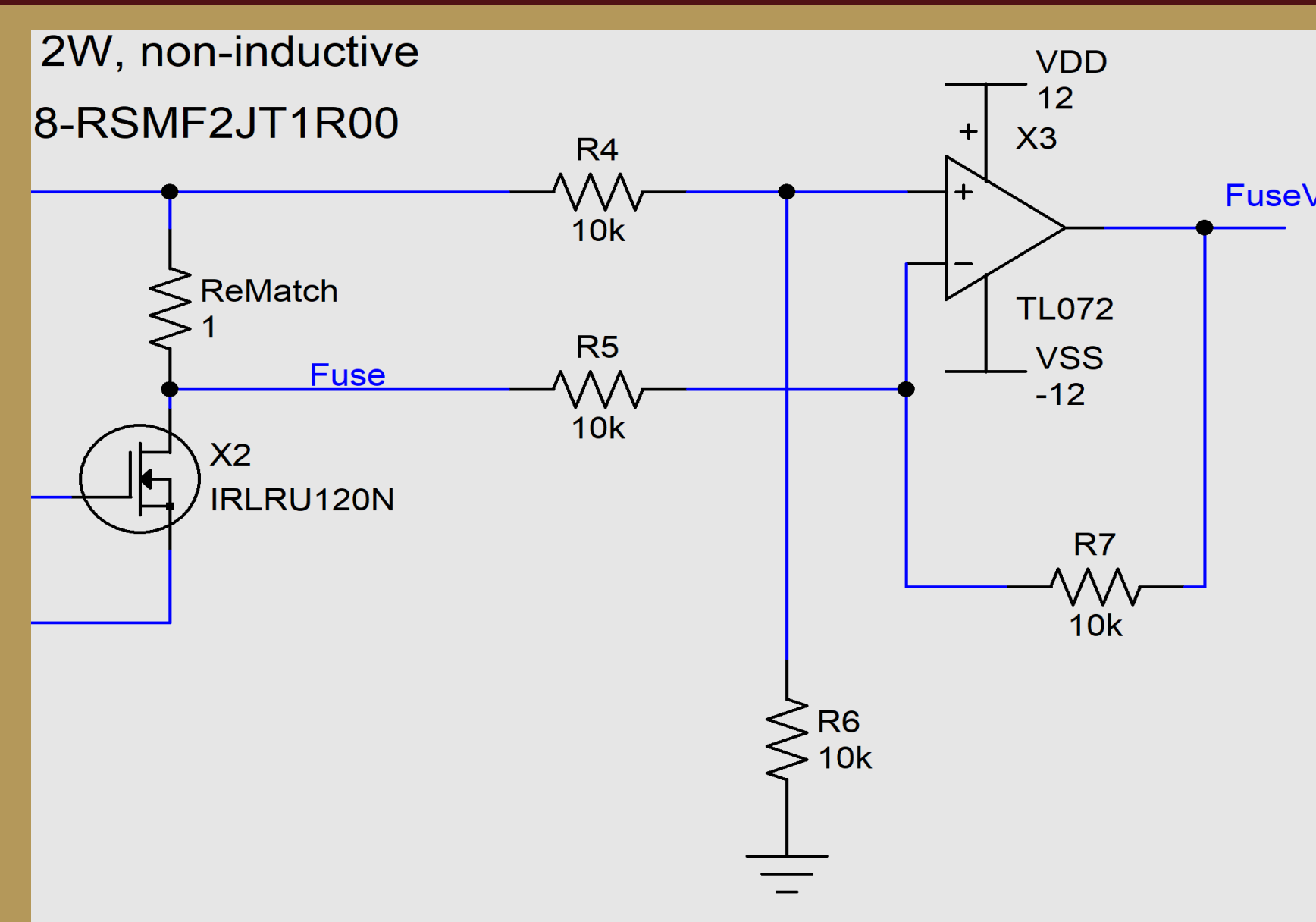
Acknowledgments

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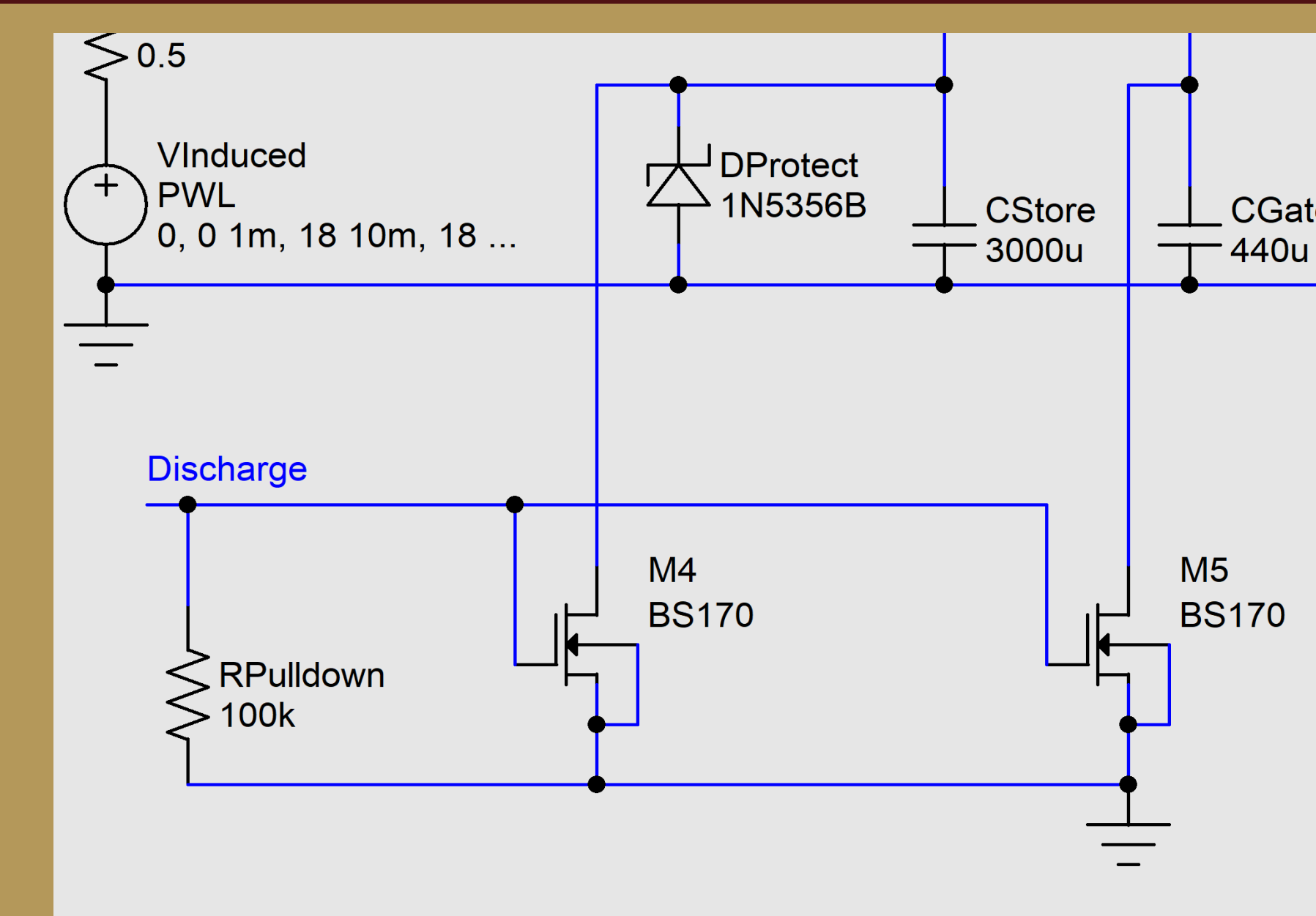
Initial Circuit Design: Dr. Compeau

OP-Amp Sensing Circuit



A difference amplifier OP-Amp reads the difference in voltage across a 1 Ohm resistor, which will give us a current reading on our oscilloscope

Discharging Circuit



Circuit for discharging to a zero state for testing purposes.

Real Results

