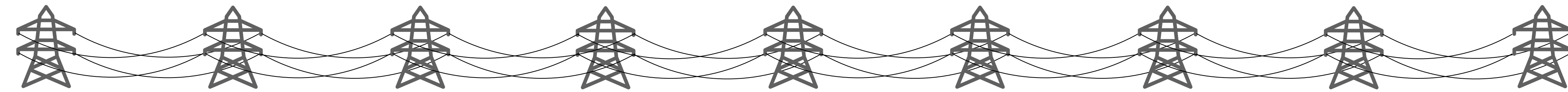


Jedidiah Jones (EE), Bryson Threlkeld (EE), Colton Royals (EE), Ryan Nearing (CompE), Jon Watkins (CompE), Isaac Harrison (ME)



OBJECTIVE

Create a learning tool for a non-technical audience that models a small power grid, provides visuals of grid behavior, and simulates common faults.

BACKGROUND

The process of generating, transmitting, and consuming power is not fully understood by most.

The concept of power system protection is unknown to many.

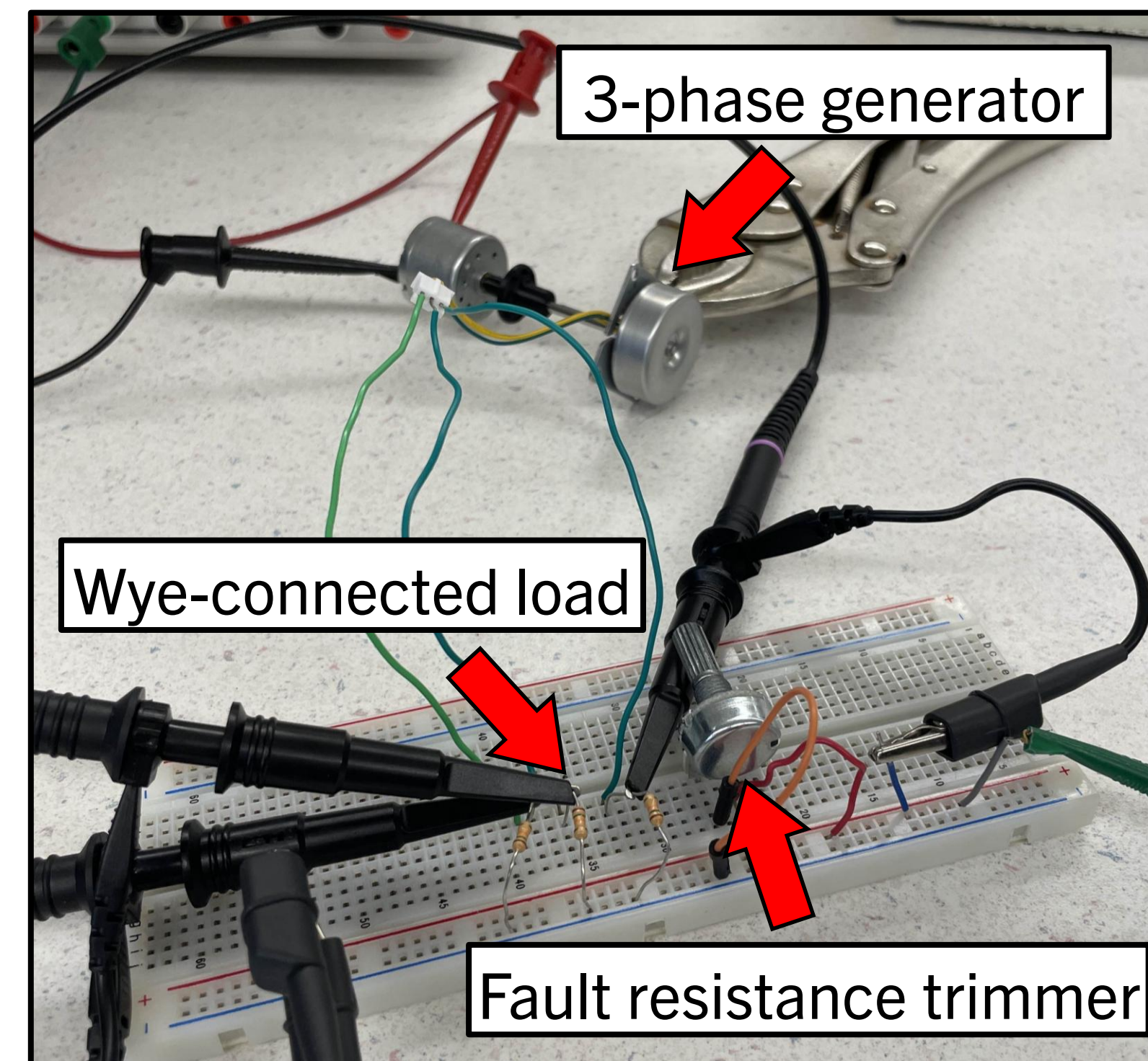
VALUE PROPOSITION

- I Few educational scale model power systems exist.
- I A “bird’s eye view” of a power grid can help with conceptual understanding.
- I Demonstrating events causing interruptions in power flow, and how the system reacts, introduces the concept of power system protection.

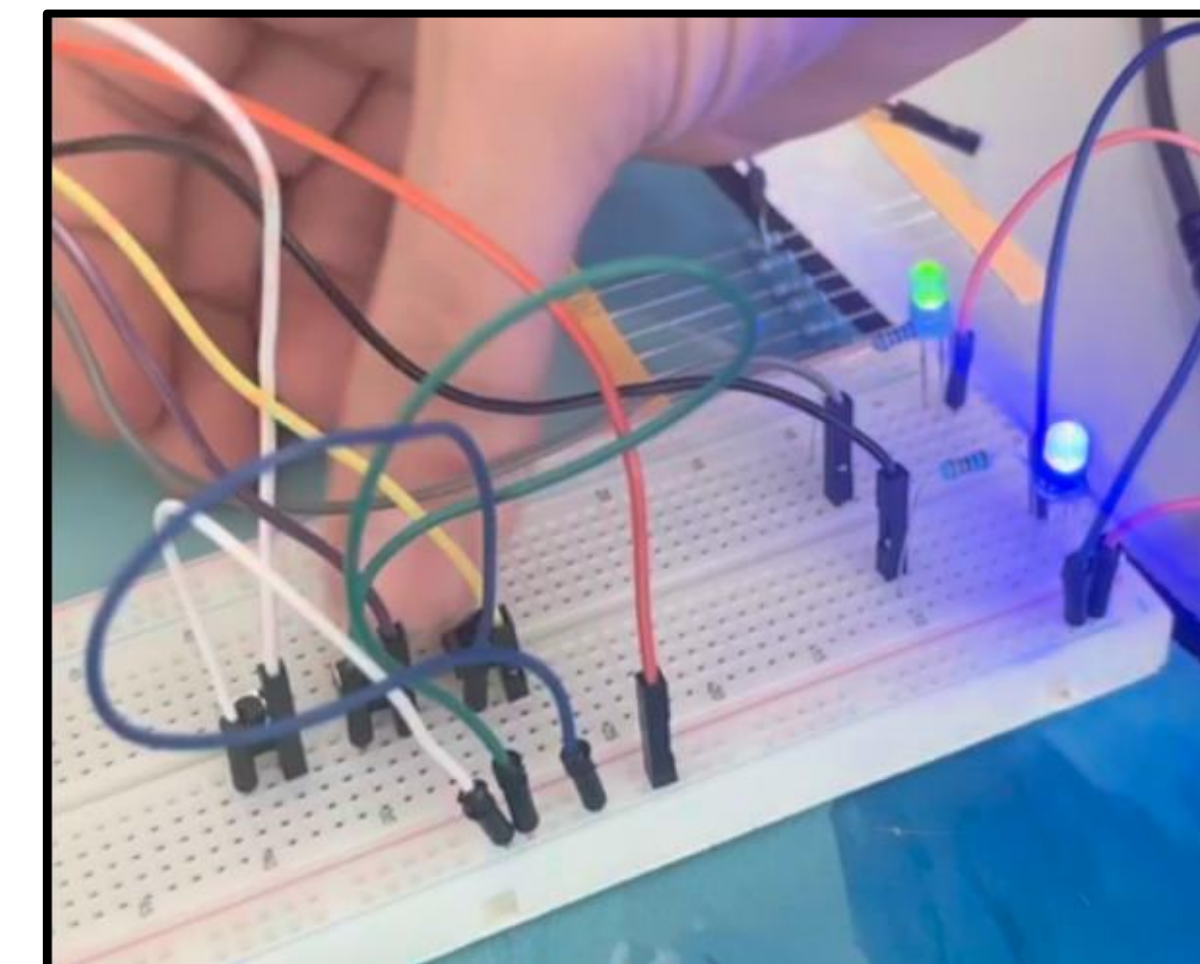
KEY REQUIREMENTS

- I Demonstrate power generation, transmission, and consumption.
- I Show the system reacting to faults.
- I Interactive/entertaining features.
- I Educational aspects should align with a 5th grade complexity level.
- I Portable design.

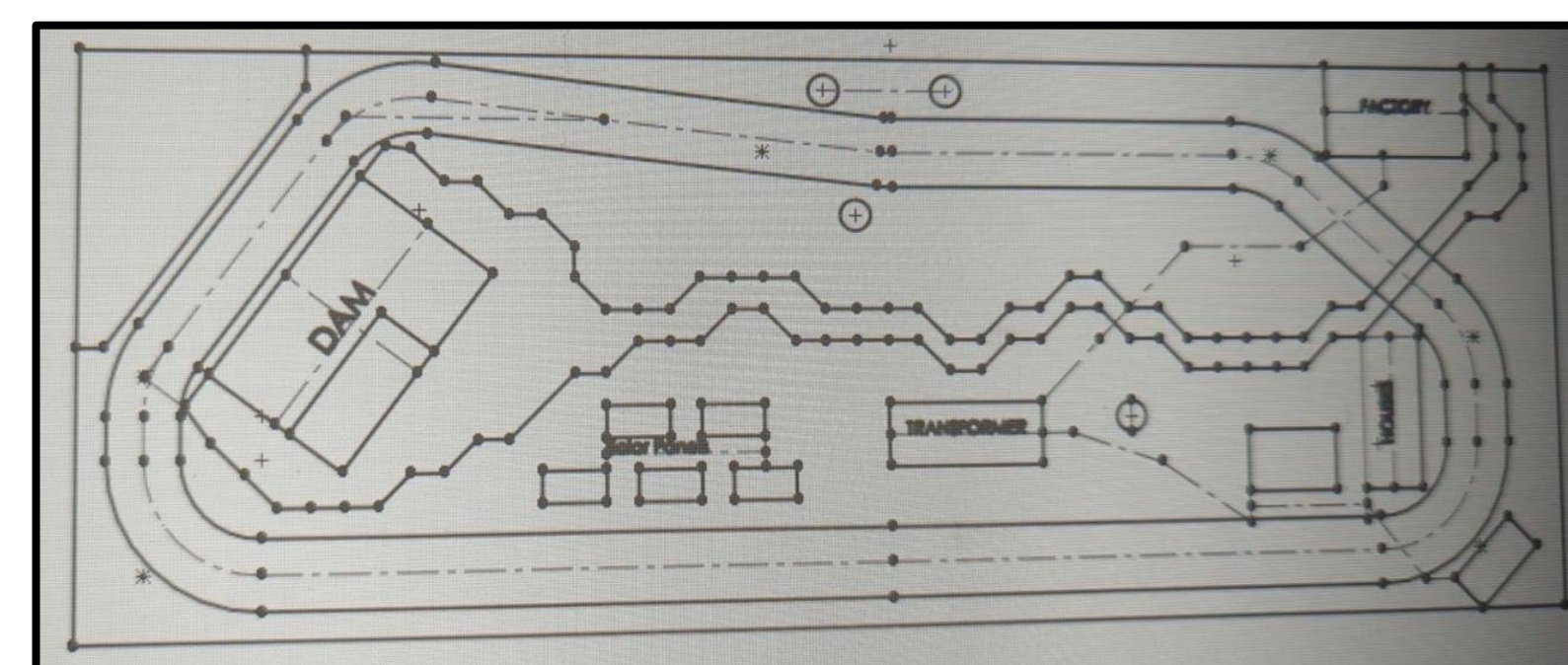
CONCEPT DEVELOPMENT



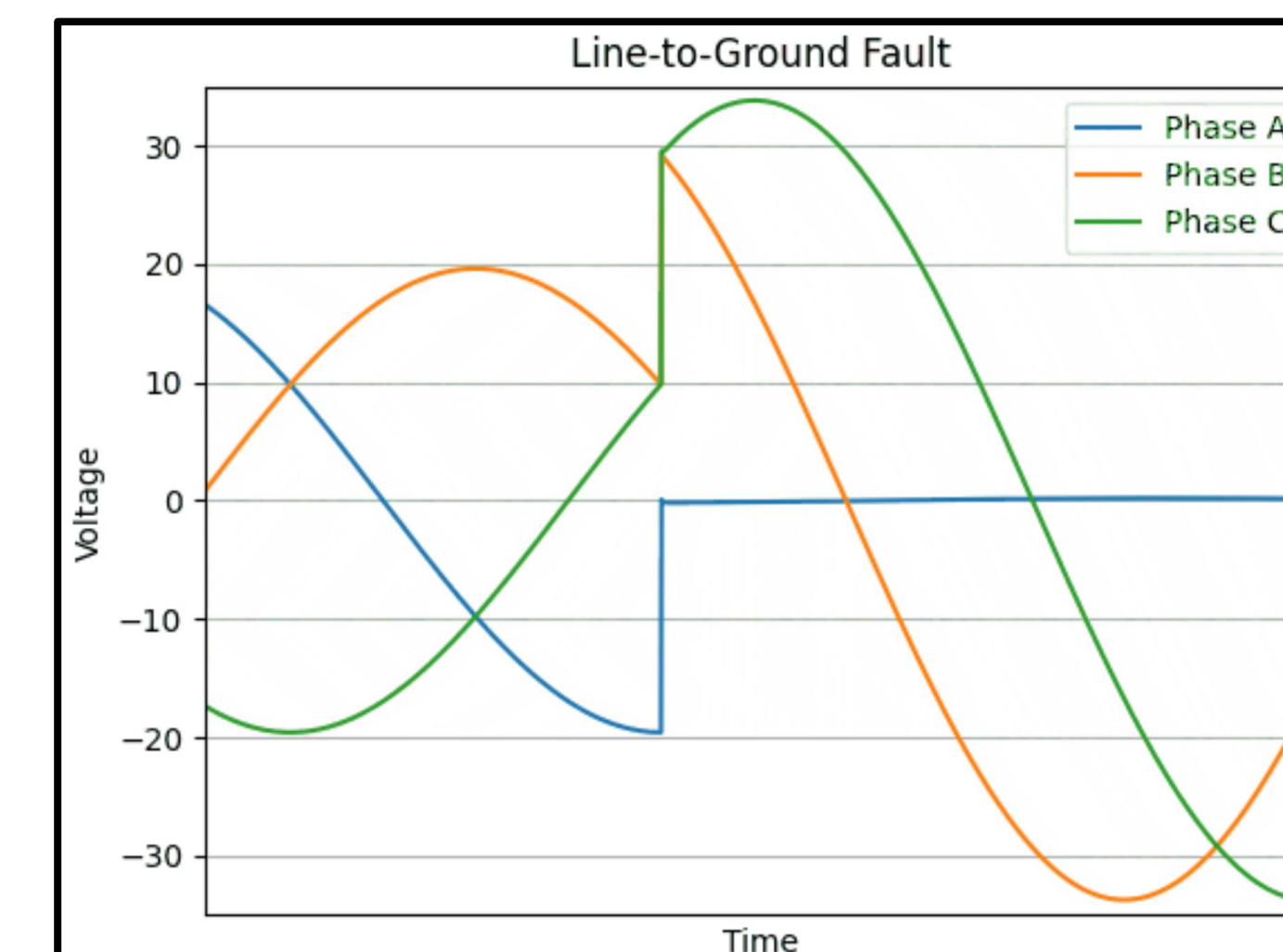
Modeling a miniature AC power system



Fault simulation using buttons and LEDs



3D model design



3-phase fault simulation for display

FINAL DESIGN

- I 3D printed model reinforced with aluminum T-slots.
- I 3-phase generator supplying power over transmission lines to residential and industrial buildings.
- I Buttons to cause faults at 3 different locations in the power system.
- I Two screens displaying educational information.
- I Controls driven by a Raspberry Pi 5.

VALIDATION

- I Tested power system operation.
- I Printed 3D model prototypes to verify dimensions.
- I Displaying educational content on screens using Raspberry Pi.



Honey, I Shrunk the Grid team

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- I Kip Sikes (Instructor)