**EEE 488: Team 41**

**Merging Machine Learning with Conventional Relays**

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**Executive Summary**

Insert paragraph here.

**Introduction**

The power grid is the critical infrastructure of a nation. Relays are used to protect various components in the power grid such as transmission lines and generators. These relays are essentially small computing devices that can analyze the currents and voltages of a component in real time and take decisions to operate a switch. The relays trade off conflicting requirements of keeping the generator or transmission line in service as much as possible without false disconnections, while at the same time making sure that the components are protected from any over-voltages or over-currents. They use complicated signal processing algorithms and information about the power system to reduce false operations and accurately take the decision of protecting device. In this senior design project, the students will explore the merits of merging machine learning with conventional relays to improve their accuracy and to offer additional information for system restoration such as fault localization and identifying the type of fault.

**Problem Statement**

Protective Relays

Communications: there is not relay in industry that can communicated efficiently its information to the engineer at the office (relay’s current setting). The innovation part of this project would come from the creation of an application that would show the setting of each relay in the field and able to change the settings remotely. The other part would be the relay would calculate the most optimal settings for the given feeder installation.

Problem: Relays are currently designed to handle a single output load, with minor variations from the design causing faults or being incompatible without faults. Solution: Machine-learning is well suited to the solution of this, a muC or muP can be used to automatically detect ranges being input, and set to allowable supplies, for a variety of voltage and current ranges.

Problem: Heat generation in relays and associated loads can accelerate faults and damage to the components. Solution: Electrically isolated supplies to the relay (e.g. induction based) will allow for a proportionally stepped down input for comparison and evaluation by the muC/muP. This proportional reduction results in I^2R losses to be reduced by proportionally squared amounts of loss, significantly reducing heat production in the relay, and protecting components.

**Customer Discovery**

Insert paragraph here.

**Previous Works**

Insert paragraph here.

**Scope**

Insert paragraph here.

**Team Capabilities and Facilities**

Insert Paragraph here.

**Conclusion**

Insert paragraph here.

**References**

Insert references here. (Example Below)

1. J. Jones. (1991, May 10). *Networks.* (2nd ed.) [Online]. Available: http://www.atm.com