# EE542 Project Abstract

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The goal of this project is to design and implement a digitally controlled inverter. Inverters convert DC to AC using pulse with modulation. Generally, these are used to convert power from either a battery or solar panel into 60 Hz AC to transmit across the power grid. In the past, the feedback/control loop of an inverter is usually done using analog/discrete components such as op amps, capacitor, resistors, etc… The same mathematics that was previously emulated using op amps, resistors, and capacitor can be performed digitally inside of a microprocessor. There are several benefits in performing the control loop inside of a microprocessor:

* Complex components such as sine wave, triangle wave, and multipliers (which are all needed for controlling an inverter) are easier to implement digitally.
* Control parameters such as feedback gain & pole/zero placements can be modified through software
* Size and cost is reduced by using a microprocessor instead of opamps + capacitor + resistors

The plan is to build an inverter powertrain and control the powertrain using a microprocessor. The powertrain will have 6 high power mosfet that needs to be controlled in real time and synchronously. The mosfet control will implement dead time control to eliminate “shoot-through.” Output voltage and inductor current will be sensed as feedback to the control loop. State space control with kalman/state estimators will be used to regulate the output. Functional specifications of the inverter are as follows:

* Must be able to handle loads with power factors from 0.7-1, leading and lagging
* Must have input ripple current of < 20%
* Must have input ripple voltage of < 3%
* Must have DC-AC efficiency of greater than 90%
* Must have total harmonic distortion + noise on both voltage and current of < 5%
* Outputs 100 V, 60 Hz AC single phase