Torque Control for Scaled Offshore Wind Turbine Experimental Setups

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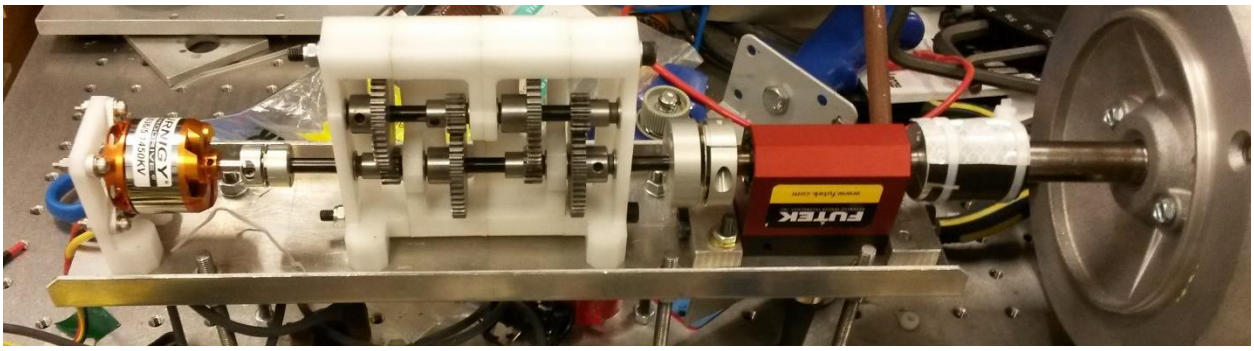

Figure 1: Mechanical experimental setup for scaled wind turbine rotor torque control

Traditionally, onshore wind turbines in wind farms based on land are used to harvest wind energy. However, they do have some drawbacks including the introduction of negative noise and visual impacts. On the other hand, offshore wind turbines based on bodies of water introduce less of these negative impacts. They are also able to harness the abundant source of clean energy found offshore. But before large-scale use and commercialization, further research and development is required. This introduces the need for small-scale offshore wind turbine experimental setups for R&D purposes.

This project explores the development of a torque control method for small-scale offshore wind turbine experimental setups. The basis of the torque control method is managing the current drawn from a generator that is mechanically connected to the main rotor of the wind turbine. The main rotor is connected to the input of a gearbox to boost the rotational speed at the output of the gearbox. The output of the gearbox is connected to a brushless DC motor operated as a generator. The 3-phases of the generator are rectified, and the current is sunk through a MOSFET acting as an active load. Analog electronic devices including op-amps are used to performed closed-loop current control with respect to a current reference from a DAC device.