Team 1602: Fiber Optic Control System for an Electric Motor

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GENERAL DYNAMICS
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The purpose of this project is to develop a proof-of-concept system for remotely powering, controlling, and monitoring an electric motor entirely through fiber optics. Currently there are no fiber-based motors available in industry, so our system must be able to do the conversion between the fiber optics and the copper signals. There are a variety of benefits which can be derived from incorporating fiber optics into the system of an electric motor. Namely, fiber optic systems are resistant to electromagnetic interference (EMI) and operate more efficiently, in terms of both temperature and speed of transmission.

To ensure proper operation of the motor, a variety of sensory devices have been selected. These sensors will be powered through a commercially-available, power-over-fiber system and will provide remote feedback on the status of the motor's operating condition.

The power-over-fiber system takes an electric power supply, to modulate a laser system, and transmits over fiber optic cables. The light is converted back to electrical power, at the output end of the fiber optic cable, to drive the motor. The conversion from fiber optic light to standard electronic power uses photodetectors (or photovoltaic cells) and is based on a mechanism similar to solar energy conversion using solar panel.

The development of entirely fiber-based systems serves to increase the efficiency and speed of transmissions, particularly through noisy or insecure mediums, prevents electrostatic and electromagnetic interferences, and provides an alternative to copper in various applications.