

## Raspberry Pi HMI and Control System for an Electromagnet Water Filter

The purpose of this senior design project was to take an ongoing project's manually controlled water filtration system with no data logging and transform it into an automated process with data logging. Instead of using an OTS PLC, a Raspberry Pi was chosen to act as the master controller and data logger. This choice enabled easier end-user HMI, convenient data log accessibility, and a wide variety of future expansion opportunities. The physical system being controlled consists of three pumps, four valves, and two magnets that are energized or de-energized by relays which operate according to signals sent from the Raspberry Pi. A touchscreen and a python coded GUI allows user input of mode run times and the number of cycles the process should repeat while displaying current system information. In addition to automated control, the user has the option of manually controlling the system by way of physical switches on an external panel with LEDs that serve as a visual indicator of system status. In order for this project to be considered a success, a data log must be produced of the systems operation with temperature and pH data that match expected system operation through an automated cycle and a manually controlled cycle.