John Deere Frugal Electronic Hydraulic Valve Control

Overview
John Deere has asked our group to redesign the existing electronic hydraulic control system to make it as frugal as possible and user friendly. To accomplish this, we are replacing the input device to provide ease of use for the customer and substituting the proportional valve for a cheap on-off valve to reduce cost. The main deliverable of the project will be a working physical demonstration model that will use a complete electrical hydraulic system to operate a cylinder that will lift and lower weight.

Objectives
Replace the input device and proportional valve for an inexpensive on-off valve to reduce cost. The main deliverable of the project will be a working physical demonstration model

Approach
- We met with our sponsor to understand the specifications and objectives of this project
- Reviewed existing prototype and removed parts we did not need
- Performed concept generation selection to determine the hydraulic valve to use
- Purchased all of the necessary products for the physical prototype
- Simulated PWM on an oscilloscope
- Put together electrical components and coded microcontroller
- Put together final physical model
- Performed testing on the valve
- Achieved goal in one direction of the valve

Outcomes
- The sponsor will save $500 as a result of this prototype
- This project made the prototype more user-friendly as a result of the joystick
- Our project proves that controlling a cylinder proportionally with an on/off valve and a joystick is possible
- The project resulted in a new and unique approach to John Deere products