Shutdown Circuit

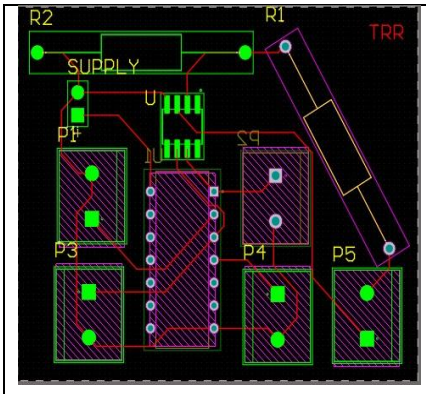
The primary function of BSPD is to ensure that the brake system operates within safe pressure limits. It uses sensors to measure pressure and other relevant parameters, and it can trigger warnings or shutdowns if the pressure exceeds safe thresholds, thereby preventing potential damage or failure.

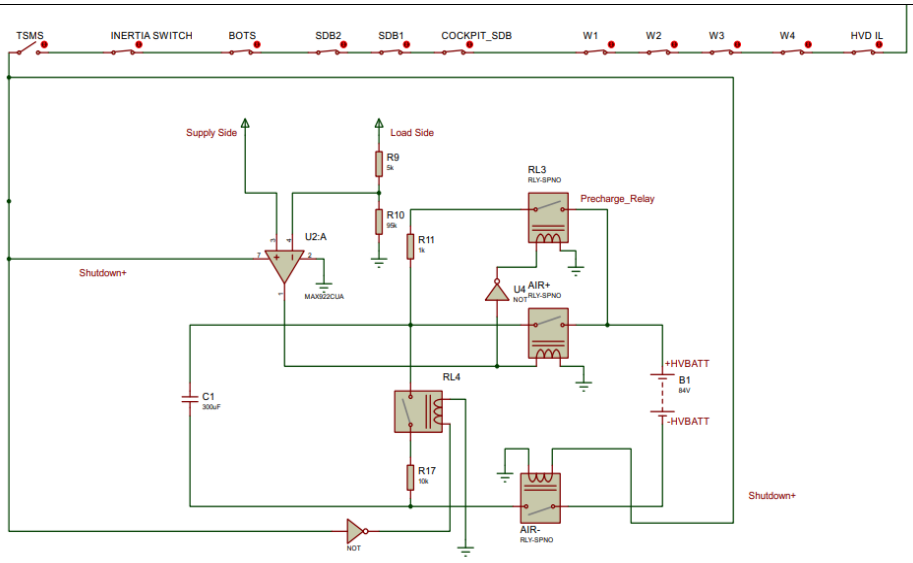
Design Constraints:

All design constraints for the Shutdown circuit were derived from the rules specified in the Formula Bharat competition, ensuring that the circuit complies with the competition's regulations and standards.

Design Procedure:

The SHUTDOWN circuit is designed based on the concept of a switch between supply and load by using opamp, along with pre-charge relay, discharge relay, AIR+, AIR- and a series connection of IMD, Inertia Switch, BSPD, TSMS, BOTS, HVD, 3 SHUTDOWN BUTTONS (SB1, SB2, SB3). If any fault is detected, the shutdown circuit gets opened by turning off AIR+ and AIR- signals, stopping all accumulator power flow immediately. The circuit incorporates a pre-charge circuit to prevent inrush current damage. When the system powers on, current is initially routed through a pre-charge resistor. This allows capacitors to gradually charge to at least 95% of the actual TS accumulator voltage. An opamp monitors this process and signals when it's complete, enabling the main relays (AIR+ and AIR-) to close and provide full power to the motor controller. During power-off, the discharge circuit activates. The discharge relay closes to safely dissipating residual capacitor voltage through a discharge resistor. This ensures no hazardous voltage remains.





Shutdown (PCB)	Shutdown (Schematic)