



#### Notes:

- 9 V DC input through barrel jack (J1) with 1 A fuse protection (F1).
- LM7805 linear regulator (U3) provides +5 V output for the system and motor driver.
- Bulk (47  $\mu$ F) and bypass (0.1  $\mu$ F, 0.33  $\mu$ F) capacitors used for power stability.
- All grounds unified as GND across the circuit.
- PIC18F57Q43 microcontroller (U1) operates at 3.3 V logic level.
- External 5 V input signals (UI\_BUTTON\_IN, CLAP\_IN, LAMP\_TOGGLE) protected by 10 k/20 k voltage divider networks to step down to ~3.3 V.
- TB6612FNG motor driver (U2) controls output motor M1; VM = +5 V, VCC = +3.3 V logic.
- STBY pulled down through 100 k  $\Omega$  resistor to ensure motor driver stays off at startup.
- Motor output (AO1/AO2) configured for single-channel use: channel B inputs tied low.
- Heartbeat LED provides system status indication (software controlled).
- UART pins (TX/RX) reserved for debugging or UI subsystem communication.
- Test points recommended on +5 V, GND, CLAP\_IN, LAMP\_TOGGLE, PWM\_MOTOR for verification.
- All unused inputs tied low through resistors to prevent floating nodes.

## Master Controller (Hub) Subsystem

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**Title:** Hub Subsystem (PIC18F57Q43 + TB6612FNG)

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