# Prototype Testing Form

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| **Test Area** | **Expected Result** | **Actual Result** | **Issue / Errors** | **Feedback** | **Changes Made** |
| **Fill-Level Detection** | Bin detects empty, half-full, and full levels accurately using ultrasonic sensor | Fill levels are accurately depicted using ultrasonic sensor and LEDs | Faulty wires and LED, Ultrasonic sensor Echo Pin not responding. | System correctly maps distance to LED colors after fix | Replaced wires and LEDs, added resistors, and adjusted code logic |
| **Motion-Triggered Lid** | Lid opens when motion is detected within 30 cm range | Bin lid opens when motion is detected in front of the bin | The PIR sensor had too wide of a range | Lid opens too easily if someone walks by nearby | Calibrated PIR Sensor with shielding, reduced detection field |
| **LED Indicators** | Green for empty, yellow for half-full, red for full | Does as Expected | LEDs didn’t respond well | Now synced with fill level and working well | Fixed faulty LED connections and ensured correct pin mapping |
| **Power Management** | NodeMCU enters deep sleep mode when idle | NodeMCU remains active throughout | Deep sleep not implemented yet | Might drain battery faster during long idle periods | Will implement deep sleep in next code update |
| **Data Logging** | Sensor data is logged every 5 minutes with timestamps | Not yet implemented | Logging to server not yet set up | Will be necessary for monitoring historical trends | Planning to integrate Firebase or Blynk datastream logging |
| **Connectivity** | Wi-Fi connects reliably to send data to the cloud/server | Wi-Fi connects successfully to Blynk | Occasional disconnection on weak signal | Stable when within router range | Added Wi-Fi reconnection loop in NodeMCU code |
| **Sensor Accuracy** | Sensor readings are within ±5% margin | Within acceptable range (±3–4%) | Slight fluctuation on ultrasonic readings | Acceptable for real-world bin usage | Added averaging logic for multiple readings |
| **Durability Test** | Bin withstands 5 cycles of physical usage (open/close, weight impact) | Passed 5 cycles during test | None | Mechanism is stable, no obvious wear | Secured internal components with better cable management |
| **App/Platform Sync** | Real-time bin status syncs with mobile/web dashboard | Status syncs with Blynk app in near real-time | Delay of ~1 second in updates | Works well under normal network conditions | Blynk virtual pins (V0-V2) used to reflect fill, motion, and lid status |
| **Battery Usage** | Device lasts at least 48 hours on full charge during testing | Lasted approx. 32 hours under continuous Wi-Fi + LED usage | Wi-Fi stays active constantly | Will need optimization (deep sleep, LED off when idle) | Plan to reduce LED usage and optimize code for power saving |