Battle Bot Framework for Schools

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Executive Summary

After thorough research, I've designed a framework for an intermediate-level battle bot competition tailored for Indian school students (grades 9–12) with a strict budget of 2500 per bot.

The goal? Make robotics exciting, educational, and safe.
Key Takeaways:

- **Cost-effective tech**: Use Arduino clones, DIY materials (cardboard, 3D-printed parts), and smartphone-based controls to cut costs.

Bot Design: Safe, Simple, and Effective

Recommended Designs

1. **Wedges**
    - Low-cost, easy to build (cardboard or plastic sheets).
    - Strategy: Slide under opponents and push them out of the arena.
2. **Lifters/Flippers**
    - Use servos or syringes for hydraulic lifts (yes, water-powered!).
    - Goal: Flip bots over—no damage, just smart mechanics.
3. **Pushers (Sumo-Style)**
    - Focus on strong drivetrains and traction.
    - Win by shoving rivals out of a ring.

Alternatives to damaging weapons:

- **Balloon poppers**: Attach skewers to pop balloons on opponents—fun and safe!
- **Jousting**: Use pencils or straws to knock off lightweight attachments.

Chassis Materials

- **Cardboard**: Ultra-cheap, great for prototypes.
- **Plastic sheets**: Durable but still budget-friendly.
- **3D-printed parts**: Ideal if schools have printers (free designs available online).

Electronics & Control

Key Components

- **Arduino Uno Clone** (500) – Original boards are overpriced; clones work just as well.
- **L298N Motor Driver** (80) – Controls two motors for movement.
- **HC-05 Bluetooth Module** (280) – Pair with smartphones for wireless control.
- **Motors** – Plastic gearbox motors (165 each): good balance of cost and performance.

Power Setup

- **18650 Li-ion Batteries** (100–200 each) – Rechargeable and reliable.
- **Battery Management System (BMS)** (150) – Protects from overcharge/short circuit.

Note: Use separate power lines for motors (12V) and Arduino (5V) to avoid frying components!

Cost Breakdown (Total: ˜2500)

Component	Cost ()	Notes
Arduino Clone	500	Robu.in / Flipkart
L298N Motor Driver	80	Thingbits.in
2x DC Motors	330	200 RPM plastic gear motors
Bluetooth Module	280	HC-05 for smartphone control
Batteries + BMS	450	3x 18650 cells + safety module
Chassis Materials	100	Cardboard / plastic sheets
Wheels + Misc.	200	Castor wheels, screws, glue

Note: All components are commonly available online or in local electronics markets. For schools with access to 3D printers or lab equipment, additional savings or enhancements are possible.