

BACKSENSE

Wearable biomechanical monitoring system that detects unsafe posture and load in real time — and corrects it within 5–7 seconds, before spinal damage accumulates

TEAM



Advika Kasliwal Shreedha Bhagat

OUR AIM

Every year, millions of school students quietly accumulate spinal damage they will not feel until adulthood. The cause is mundane overloaded backpacks, worn wrong, for hours at a stretch. No alarm sounds. No one notices until posture has already shifted.

SMART BAG is built to interrupt that process — not with an awareness campaign, but with a device that physically alerts a student the moment load or tilt crosses safe limits. Our aim is threefold:

1. Stop the damage before it happens — **5 to 7 second correction** windows, not retrospective diagnosis.
2. Build lasting habits — **alerts train students to self-correct** even when the device is off, as teacher observations confirmed.
3. Force institutional change — schools specify what students carry but not how much. We are **developing a policy paper** to close that gap with enforceable weight and ergonomic standards.

THE PROBLEM

Silent damage, visible too late

85% of students carry loads exceeding

15% of their body weight.

80% show measurable posture issues.

Most feel nothing — until the damage is permanent.

Risks: cervical strain · spinal curvature · lumbar fatigue

· chronic pain

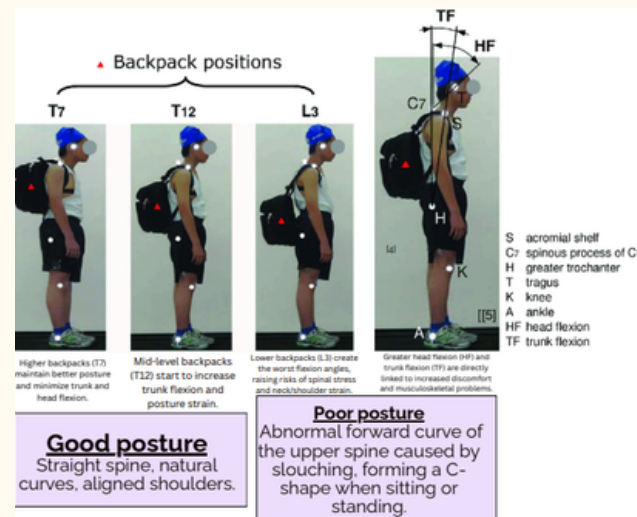
The System Intervenes before damage occurs Real-time alerts via buzzer, haptic signal, and companion app. Cloud dashboard for longitudinal tracking.

FSR sensors → load distribution

IMU sensors → tilt and alignment

Flex sensors → spinal curvature

POSTURE & IT'S EFFECTS ON HEALTH



LONG-TERM HEALTH CONSEQUENCES

Spinal Issues

- Kyphosis Development
- Intervertebral Disc Degeneration
- Nerve Compression Syndromes
- Chronic Back Pain

Neck & Shoulder Strain

- C5-C6 Disc Compression
- Muscle Tension Headaches
- Cervical Radiculopathy
- Limited Range of Motion

Physical Performance

- Reduced Endurance
- Muscle Imbalance
- Fatigue & Energy Loss
- Sports Performance Drop

Cognitive Impact

- Poor Concentration
- Sleep Quality Issues
- Mood & Stress Changes
- Academic Performance Decline

SDG 3



SDG 4



SDG 10



SDG 17



COMMUNITY ENGAGEMENT

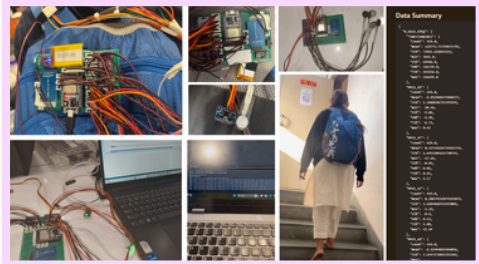
Awareness built in from the start

15+ structured sessions across Jaipur district conducted **Students, parents, and teachers** engaged on safe load limits and posture mechanics. 1,000+ students tested ·1,500+ students reached



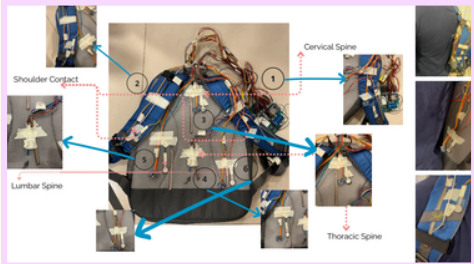
COST & ACCESSIBILITY

Built to scale
₹3,000 per unit · one-time purchase
Optional analytics subscription. Bulk procurement, institutional partnerships, and CSR-supported deployment in development.

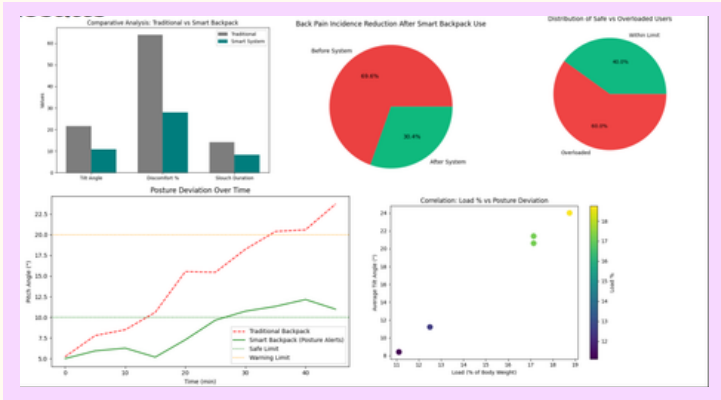
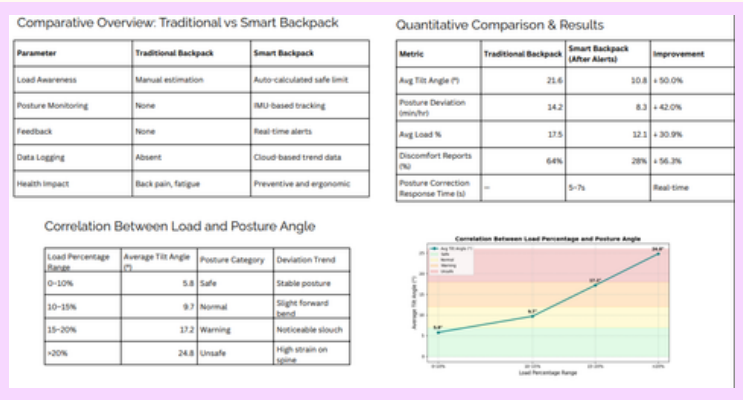


CHALLENGES

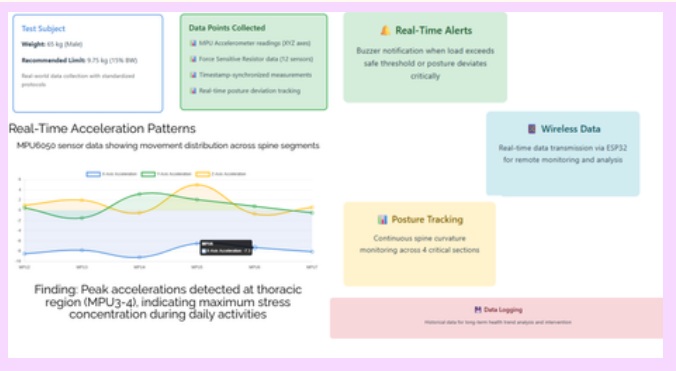
Getting the sensors to read consistently across different body types and bag designs was genuinely difficult — early prototypes gave us noisy data the moment conditions changed from lab to classroom. At the same time, we kept running into the tension between making the hardware better and keeping it affordable enough for schools that actually need it.



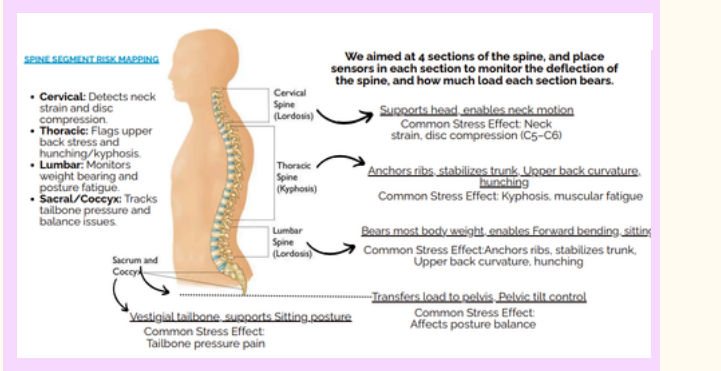
RESULTS



DATA COLLECTION & ANALYSIS



KEY TARGET PARAMETERS



MEASURED IMPACT

Biomechanical results + behavioural change



Students described SMART BAG as "a reminder that prevents wrong posture." Teachers noted improved posture during school hours — even when devices were not being worn.

LEARNINGS

The result that surprised us most was behavioural: students held better posture during school hours even on days they weren't wearing the device, which told us the correction window was doing something beyond just alerting. We also learned that getting schools, doctors, and industry mentors working together isn't automatic — it takes structured, repeated engagement before people trust the project enough to contribute meaningfully.