SakSat‑1 — Georgia’s First CubeSat Mission

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*This briefing package summarises SakSat‑1, a 1U CubeSat programme led by Kutaisi International University (KIU) to place Georgia’s inaugural satellite in Low‑Earth Orbit via the UNOOSA–JAXA KiboCUBE initiative. It is intended for university leadership, national agencies, and potential sponsors to demonstrate the project’s strategic value, feasibility, and investment readiness.*

# 1. Vision & Strategic Value

• Position Georgia as an emerging space nation by achieving an orbital first within a $20 k hardware budget.

• Deliver environmental and educational benefits via nine AI-enhanced missions (listed below).

• Create hands-on research and capstone opportunities for KIU Computer Science and Mathematics students.

• Align with UN Sustainable Development Goals (SDG 4 Quality Education, SDG 9 Industry & Innovation, SDG 13 Climate Action) and strengthen Georgia’s international profile.

# 2. Potential Missions

1) Weekly NDVI health maps of Georgia's vineyards and orchards.

2) Real-time wildfire and smoke plume alerts for early response.

3) Automated flood-extent mapping after heavy rains.

4) Landslide-precursor monitoring on Caucasus slopes.

5) IoT gateway relaying data from remote avalanche, weather, or seismic sensors.

6) Black Sea maritime traffic tracking via AIS with anomaly detection for illegal fishing.

7) Land-use-change and deforestation tracking through onboard image classification.

8) Black Sea ocean-color and algal-bloom monitoring for public-health insight.

9) Amateur-radio beacon and student uplink channel that lets school teams run code on orbit.

# 3. Mission Snapshot

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| Parameter | Baseline |
| Form factor / Mass | 1U CubeSat (10×10×10 cm) / 1.2 kg |
| Orbit & Launch | 400 km circular, 51.6° inc. via ISS deploy (UNOOSA KiboCUBE) — launch cost €0 |
| Primary Payload | Multispectral camera (visible + near-infrared) plus NVIDIA Jetson Nano for edge AI |
| Comm Link | UHF 437 MHz downlink (9 600 bps) / VHF 145 MHz uplink (1 200 bps) — amateur bands |
| Ground Segment | New SatNOGS station on KIU roof (DIY rotator + SDR) + global SatNOGS network |
| Mission Duration | 24 months (natural re‑entry < 3 yrs) |
| Total Hardware Budget | < US$20 000 (satellite $13k + ground $1.5 k + tests $3 k buffer) |

# 4. Innovation Highlights

• AI at the Edge – Jetson Nano runs neural networks on-orbit so we downlink insights, not gigabytes.

• Multispectral Imaging – Visible plus NIR enables both agriculture and disaster-response products.

• Ultra-low-cost Architecture – Entire spacecraft uses proven COTS components and open-source designs

• Open Ground Segment – SatNOGS-based station remains a long-term asset for university outreach.

• Pure CS and Math Focus – Project roles map directly to coding, data science, and orbital math skills.

# 5. Technical & Programmatic Readiness

# • Heritage Components: commercial CubeSat structure, power system, CC1120 radio, Jetson Nano.

# • Mentor Network: Libre Space Foundation (ground comms) and Kyutech BIRDS alumni (system integration).

# • 24-month schedule drafted; key lead items can be ordered immediately after funding

# 6. Risk Mitigation

• Redundant watchdog timers and a simple fail-safe beacon.

• Passive thermal design, single-string but flight-proven power system.

• Multispectral camera and AI tasks can be gracefully degraded to lower-power modes.

# 7. Budget & Co‑Funding Opportunity

The entire programme requires 20,000 USD. Funds will cover spacecraft hardware, environmental testing, a ground station, and outreach materials.

# 8. Call to Action

We invite KIU leadership, government agencies, and industry partners to endorse and fully fund SakSat1 so that we can finalize procurement in Q3 2025, complete assembly and testing in 2026, and launch in 2027. With your support, Georgia will fly its flag in space and inspire the next generation of Georgian computer scientists and mathematicians.