

## IN India: Salwan Education Trust – Education 5.0 in Action

### Segment Focus: Engineering, AI, and Human-Centred Innovation

The India hour is a **multi-campus showcase** of how the **Salwan** group of schools (Delhi NCR) is turning STEAM, AI, robotics, arts, and mathematics into **real products, services, and learning ecosystems**. The entire approach is strongly aligned with India's **NEP 2020** (National Education Policy) and an **Education 5.0** vision (human at the centre, technology as enabler).

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### 1. STEM, Agriculture & Wellness (Salwan Public School, Trans Delhi Signature City)

The core idea is **Science as a lens for healthier living** and sustainable futures, not just a subject.

#### Key Student Projects (Engineers & Agripreneurs):

- **Solar-powered “7-in-1 Automated Farmer”:** A multi-purpose, solar-driven farm vehicle that sows seeds, irrigates, harvests, and monitors soil moisture with sensors. It uses ultrasonic sensors and an RC system for obstacle detection, aiming to cut labour, fuel, and maintenance while increasing yields.
- **Smart School Bus:** A safety-focused prototype with drowsy-driver IR eye-blink monitoring (buzzer if eyes closed >2s) and laser-based child-hand-out-of-window detection. It includes face-recognition attendance linked to a safe database, addressing real transport risks.
- **Automated Pest-Detection & Spray System:** Sensor array that detects pest movement and targets only affected zones. This smart-farming prototype minimises chemical use and labour.
- **Future Pipeline Ideas:** Include an **E-tongue** (AI-based device to instantly test food purity) and **Safe Vahana** (2-wheeler safety system with airbags and crash response).

#### Wellness Integration

- **Hydroponics, Aeroponics & Microgreens:** Vertical hydroponic towers teach efficient water use, nutrient cycles, and pesticide-free cultivation.
- The **Microgreens project** teaches nutrition science (microgreens can have  $\sim 5\times$  more nutrients than mature leaves) and involves students designing recipes and posters to promote them at home.

- This work is complemented by yoga, mindfulness, sports, and nutrition education (\$\rightarrow\$ STEM + health + sustainability + habits).
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## 2. Generative AI in Early Years & Water Purification

### a) Generative AI for Early-Years Storytelling (Salwan Junior School, Naraina)

- **Experiment Design:** Teachers select a theme (e.g., “don’t trust strangers”). Students and teachers use generative AI to draft a short story, create illustrations for each scene (image generation), and prepare a printable sequencing worksheet.
- **Audio:** Narration is **always recorded by a human** (student, parent, teacher, grandparent) to preserve human warmth, deliberately avoiding AI voices.
- **Skills Built:** Listening comprehension, sequencing, organizing, basic numeracy, AI literacy, and collaborative content creation—AI as co-author, not replacement.

### b) Portable, Sustainable Water-Purification System (Salwan Girls School, Rajendra Nagar)

- A **portable, low-cost filter** aimed at off-grid / resource-limited communities.
  - It uses a **layered natural filter**: gravel, fine sand, ceramic stones, and activated carbon to remove particles, solids, bacteria, chemicals, taste, and odour.
  - The project is explicitly mapped to **SDG 6** (Clean Water & Sanitation), **SDG 3** (Health), and **SDG 13** (Climate Action).
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## 3. Human-Centred Robotics & Affordable Lab Tools (Salwan Public School, Rajendra Nagar)

Through the **Robocoders Club**, students work with school and industry mentors to build **market-ready** assistive and agricultural tech.

### Flagship Innovation

- **Socks-pairing device for visually impaired:** Device pairs socks by **both colour and weight** (low-cost sensors + microcontroller). It's designed so visually impaired users can match socks independently, with a cost target of about ₹2,500 (\$\sim\$28 USD), far below typical assistive tech prices. The project won 1st place in a national competition (Inspire Awards – MANAK).

## Other Sensor-Based Projects

- **GrainEye Guard:** Spoilage detection device for stored grain that monitors  $\text{CO}_2$ , moisture, and temperature, providing bilingual alerts (Hindi/English).
  - **DropExact** – India’s **first affordable motorised micropipette**: It has a 1–200  $\mu\text{L}$  range and an intended cost of  $\sim ₹7,000$ – $₹8,000$  versus imported models at  $\sim ₹94,000$ – $₹1.5$  lakh. This innovation opens precision lab work to schools and small rural labs.
  - **Robotic arm & robotic face** – 3D-printed arm and animated face using Arduino/servos for human–robot interaction experiments.
  - The running thread through all projects is that **tech is always framed as solving human problems** (autonomy, livelihoods, safety), not as tech for its own sake.
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## 4. Art as a “Language of Learning” (Salwan Public School, Gurugram)

The thesis is that **Art doesn’t just decorate learning; it makes learning visible**. This approach is anchored strongly in NEP 2020’s call for experiential, interdisciplinary, joyful learning.

### School-Wide Ecosystem

- **Hunar Mela / Skill Exhibition:** Craftspeople (folk embroidery, pottery, etc.) work side-by-side with students, who learn technique plus stories of livelihood and legacy.
- **Heritage Club:** Social science becomes theatre, artefact creation, and storytelling. Students recreate Indus seals or act out historical events.
- **Collaboration with IGNCA – “Vismrit Kriti / Lost Art Forms”:** Students research endangered art forms (Sanjhi, Ganjifa, etc.) and curate exhibitions to “bring them back into the conversation”.
- **Dharohar Festival:** Celebration of art, dance, music, and culture as a **living** part of identity.

### Art-Integration Inside Subjects

- **Math:** Fraction garlands, polygon art, square-root spirals, string-art graphs.
- **Languages:** Designing travelogues, newspaper-style layouts, and classified ads, connecting text and visual communication.

- **Observed Impact:** Deeper conceptual grasp, greater confidence in presenting, cultural rootedness, and natural development of the “4Cs” – creativity, collaboration, critical thinking, communication.
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## 5. From Abstract Maths to Applied AI & 3D Worlds (Salwan Public School, Mayur Vihar)

The talk is titled “**Abstract to Applied**”, showing how school-level mathematics underpins machine learning, data analytics, and 3D modelling.

### Machine Learning & Data Analytics

- **Mathematical Backbones:** Students frame ML around supervised, unsupervised, and reinforcement learning, understanding mathematical backbones like linear/logistic regression, SVMs, and neural networks.
- **Student Projects:**
  - **MindWell:** Mental-wellness support platform using supervised learning to analyze mood data and facial-emotion detection via deep learning.
  - **Voice-therapy Progress Tracker:** Converts speech into signals/graphs to track clarity, pitch, and fluency, providing visual feedback.
  - **Internal Analytics:** School IT department built a system that transforms student marks into vectors and radar charts to highlight growth patterns and inform differentiated teaching.
  - **AI-enabled smart wheelchair:** Integrates sensors for ECG/heart-rate, obstacle detection, and medication reminders, sending alerts to carers (\$\rightarrow\$ data + empathy + engineering).

### 3D Modelling & Low-Cost Sensing

- Students learn about vertices, edges, meshes, Fourier transforms, and Kalman filters as the math behind 3D graphics and sensor fusion.
  - **ForIO / PO project** – A low-cost alternative to LiDAR , using ultrasonic and IR sensors to measure distance and build a 3D awareness of surroundings. This project was recognized at **Techfest, IIT Bombay**.
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## 6. Closing Message from Salwan Leadership

- The shift is from teacher-centred  $\rightarrow$  student-centred  $\rightarrow$  **co-created** classrooms, where teacher and student learn **with** technology together, and neither claims to be “the” expert in a fast-changing world.
  - AI today is mostly used as a co-author of content, an amplifier of learning, and a future tutor/mentor for self-study.
  - The priority is to form **resilient, empathetic, adaptive learners** who:
    - Keep the **human** at the centre of Education 5.0.
    - Use AI and technology to enhance, not erase, creativity and responsibility.
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## Key Entities & URLs

### Salwan Group & Schools

- **Salwan Education Trust / Salwan Schools network:** <https://salwanschools.org.in>
- **Salwan Public School, Rajendra Nagar (New Delhi):**  
<https://salwanpublicschool.edu.in>

### Indian Institutions / Programmes Mentioned

- **INSPIRE Awards – MANAK (DST, Government of India):** <https://inspireawards-dst.gov.in>
- **India International Science Festival (IISF):** <https://scienceindiafest.org>
- **Techfest – Annual Science & Technology Festival, IIT Bombay:**  
<https://techfest.org>
- **Indira Gandhi National Centre for the Arts (IGNCA):** <https://ignca.gov.in>
- **Tata Consultancy Services (TCS):** <https://www.tcs.com>