Skills for Living
Skills for Life

AMMACHI LABS

Amrita Multimodal Applications and Computer Human Interaction

AMRITA VISHWA VIDYAPEETHAM

ammachi labs

Who We Are

AMMACHI Labs (Amrita Multi Modal Applications and Human Computer Interaction) is a multidisciplinary research center at Amrita Vishwa Vidyapeetham

Vision

Our vision is to strengthen the economic fiber and contribute to the social stability of the nation by empowering India's masses in a sustainable, cost-effective and scalable way by providing innovative technological solutions and resources for physical, vocational and social skill development.

> Education is our birthright and should be accessible without barriers of gender, caste, economic status, and geographic location.

Dr. Bhavani Rao R.

Dean, School of Social and Behavioural Sciences,
UNESCO Chair for Gender Equality & Women's Empowerment(India)
Director, AMMACHI Labs and CWEGE
Director, Center for Women's Empowerment and Gender Equality

Focus Areas

Learning Technologies for Skill Development

Pioneering accessible, tech-enabled solutions to enhance vocational education and training across India.

- Haptics, XR, Simulations, and E-Content for immersive skill training
- Computer-Human Interaction (CHI) studies to improve learning experience design
- VET Implementation & Evaluation for scalable deployment and measurable impact

Skills for Schools

Empowering school students with 21st-century skills through hands-on and future-ready education models.

- Robotics, STEM Education, and Digital Skills Training
- Computational Thinking integrated into classroom learning
- Maker Education and Design Thinking for creativity and problem-solving

Skill Intelligence

Data driven skill analytics of vocational skills and its effect on human skill performance

- Collecting objective data on cognitive and psychomotor skills involved in vocational skills through precise data capture of movement patterns using emerging technologies
- Analyzing the skill data using machine learning/deep learning frameworks to accurately determine skill level of learners
- Designing cognitive training strategies to reduce cognitive load and provide effective feedback to learners for continuous skill improvement

Social Robotics

Shaping minds and behaviors with the power of persuasive socially intelligent machines.

- Robot facilitation in behaviour change coaching through serious games
- Skill development through artificial cognitive systems and social robotics

Rural Technologies

Designing inclusive innovations for rural empowerment, sustainable livelihoods, and resilience.

- AI for agriculture to enhance productivity and precision farming
- Robotics to augment skills and reduce manual labour
- Drone development & training for disaster response and relief
- Solutions for mitigating human–animal conflict using technology

Our Focus: Skill Development

At AMMACHI Labs, we are committed to empowering communities through innovative, technology-enabled solutions that advance vocational, physical, and social skill development. We collaborate with governments, academic institutions, and industry partners to drive application-oriented research, design, and scalable deployment of high-quality, cost-effective digital learning tools that strengthen economic resilience and promote inclusive growth.

Over the past 15+ years, we have established a strong foundation of methodologies, standards, and best practices for implementing scalable skill training solutions across formal, non-formal, and informal education settings.

Our offerings include:

- Blended learning modules tailored to industry demands and learner needs
- Immersive AR/VR content
- Interactive 3D simulations
- Advanced haptics simulators
- Data driven skill analytics for cognitive and psychomotor skill training
- Capacity building, advisory and implementation support for integrating learning technologies in Vocational Education and Training (VET) ecosystems

Our state-of-the-art Skill Intelligences Lab supports cutting-edge research in learning design, equipped with neurotechnologies, motion capture technologies, gaze and eye-tracking devices, AR/VR prototyping, and more.

We have developed the CVET (Computer-based Vocational Education and Training) framework, recognised as a UNESCO-UNEVOC TVET Promising Practice, which supports the integration of blended and technology-enabled training across vocational institutions in formal, non formal and informal settings.

A key focus of our mission is the empowerment of rural youth and women. With a presence in over 100 villages through our parent organisation, Mata Amritanandamayi Math, we deliver vocational training that combines technical skill-building with life skills and values-based education.








We also have deep experience in designing and delivering vocational and 21st-century skills training for secondary school children, working in partnership with state governments and central government initiatives like the Atal Innovation Mission, NITI Aayog's Atal Tinkering Labs. One such innovation includes Haksh-E, an AI-powered social robot designed to teach handwashing to children in an engaging, embodied format.

Our deep engagement in rural India has inspired us to co-create practical, technology-driven solutions that address the everyday challenges faced by these communities. This has led to the development of several innovative products—such as the Elephant Monitoring System, Rice Transplanter, and Plant Health Monitoring Tools—as part of our ongoing Rural Technologies initiatives aimed at enhancing livelihoods and promoting sustainable development.

Through these initiatives, AMMACHI Labs continues to bridge technology and inclusion, shaping a resilient, skilled, and future-ready India.

LEARNING TECHNOLOGIES FOR SKILL DEVELOPMENT

Technologies

Over the past 15 years, we have designed and deployed a range of cost-effective, scalable, and accessible learning technologies aimed at improving learning outcomes and ensuring quality and standardisation in skills-based education. These innovations have been tailored for diverse learners—ranging from school children and ITI/vocational students to adult learners, including low-literate users.

1 E-Learning and MOOCs

- Interactive online courses and video-based learning for self-paced skill development.
- 20+ vocational education and training (VET) e-content courses made publicly accessible
- Over 300 hours of instructional videos
- 100,000+ students trained through online platforms
- Available in 6 regional languages

2 Haptic Simulators

- Physical training devices that use force-feedback to simulate real-world skill-based tasks.
- 4 types of haptic simulators developed with integrated LMS and analytics
- 6 simulators deployed across L&T Construction Skills Training Institutes (CSTIs) in India
- 2,000+ L&T personnel trained in rebar bending and related construction skills

3 Learning Simulations

- Immersive 3D skill training modules accessible via mobile phones and PCs.
- 25+ simulations covering skills across 9 key sectors
- Widely deployed across National Skill Training Institutes (NSTIs), Industrial Training Institutes (ITIs), and secondary schools

4 Extended Reality (AR/VR)

Augmented and virtual reality modules offering experiential, safe, and repeatable training environments.

- AR modules developed for Solar Installation and Electronics Mechanic trades
- VR modules created for Solar Panel Maintenance and Scaffold Assembly
- Deployed at NSTIs and ITIs for enhanced immersive learning

Collaborators

We work in close partnership with leading government ministries, national institutions, and international universities. Our collaborators have supported us in content development, research, deployment, and scale-up of learning technologies across India.

Key collaborators and funding agencies include:

- Ministry of Skill Development & Entrepreneurship (MSDE)
- Ministry of Education, Government of India
- National Instructional Media Institute (NIMI)
- National Council of Educational Research and Training (NCERT)
- Tel Aviv University, Israel
- Ludwig-Maximilians-Universitat Munchen, Germany

Our Products

Our team has developed a suite of innovative educational products that combine instructional excellence with cutting-edge technology to support scalable and inclusive skill development.

1. E-Content – Amrita Skill for Life YouTube Channel

A comprehensive repository of over 3,600 instructional videos spanning 15 vocational courses, freely available in multiple regional languages. Courses cover:

- Technical skills such as Two-Wheeler Maintenance, Masonry Basics, Optical Fibre Splicing, Plumbing
- Non-technical skills such as Tailoring, Fabric Painting, Jewellery Making

2. Haptic and Virtual Reality Simulators

a. APTAH – Amrita Progressive Training Assistance using Haptic Simulation

- A cost-effective 4 Degrees of Freedom (4 DoF) haptic simulator designed to train the use of over 19 hand-held and powered tools across multiple vocations. It provides audio, visual, and tactile feedback to support independent learning.
- Used to train and certify 15 women in collaboration with NSDC
- Deployed at L&T CSTIs in Bangalore and Kanchipuram

b. Bar Bending Simulator

A specialised haptic training system for construction rebar bending. This multimodal environment offers visual, auditory, and force-feedback cues for skill acquisition and evaluation.

- Deployed at 4 L&T CSTIs
- Over 2,500 students trained

c. VR Scaffolding Simulator

An immersive simulator replicating real-world scaffolding tasks. Learners assemble and dismantle cuplock scaffolds in virtual high-rise environments.

- Trains on safety procedures and reduces fear of heights
- Includes multiplayer and collaborative learning features

3. Learning Simulations

Highly interactive 3D skill-based simulations accessible via mobile phones, tablets, and PCs. These simulations provide a safe and repeatable space for hands-on learning and feedback. Features include:

- Multilingual support, hint system, scoring, x-ray view, and 3D exploration
- Topics include Drone Technology, Two-Wheeler Servicing, Solar Technology, and Electric Vehicles

4. AMPLE LMS Platform

A robust, cloud-based Learning Management System (LMS) designed for large-scale vocational training programmes.

Key Highlights:

- Successfully deployed in partnership with MSDE and NSDC
- Hosted over 250 skill courses
- Trained more than 2.5 lakh users
- Supports content delivery, assessment, tracking, and multi-level user roles

Featured Learning Technologies Projects for Government of India

We have partnered with key ministries and national agencies to design, develop, and deliver high-impact skill development initiatives across India. Highlighted below are select projects demonstrating our innovation, scalability, and commitment to inclusive learning.

Project 1: Skill-eLabs – Simulated Training Packages for VET

Funded by: National Instructional Media Institute (NIMI), Ministry of Skill Development & Entrepreneurship (MSDE)
Period: 2023–2024

Launched under the SANKALP scheme, Skill-eLabs aims to transform vocational education through immersive learning tools. Spearheaded by AMMACHI Labs, the project delivered a blended solution combining videos, digital simulations, AR/VR tools, and a cloud-based LMS. The project aimed to co-design learning modules with NSTI experts, develop it, pilot it, and conduct an impact evaluation. The results and experiences were documented as guidelines, standards, development and rollout strategies that MSDE may employ in future projects.

- 6 bilingual (English/Hindi) Skill-eLabs packages developed for Solar Technician and Electronics Mechanic trades
- Piloted at 4 institutions (NSTIs & ITIs), reaching 160 students and 17 instructors
- Included hardware kits, immersive content, and AMPLE LMS integration
- Expert committee oversight and full impact evaluation completed
- SOPs developed for nationwide scale-up

Project 2: Virtual Skill Labs (VSL) for Secondary Schools

Funded by: Ministry of Education (MoE)
Period: 2024–2025

A flagship initiative by NCERT and PSSCIVE, the VSL project seeks to enrich vocational education in schools via mobile-friendly 3D simulations and engaging video content.

- 20 Virtual Skill Labs created across 9 sectors, including Healthcare, EV Automotive, Beauty & Wellness, Green Energy, Telecom, Food Processing, Plumbing, Tourism, and Manufacturing
- Each VSL includes 3D simulations, videos, assessments, and assignments for enabling knowledge acquisition and practice in virtual environments.
- Available on the DIKSHA platform, enabling mobile, tablet, and desktop access

Project 3: Blended Learning for VET

Funded by: National Instructional Media Institute (NIMI), MSDE
Period: 2023–2024

This project bridges the gap between industry needs and available skill supply through multilingual, media-rich blended learning content.

- Developed e-learning courses for ITIs in Cosmetology, Electronics Mechanic, Solar Technician, and Principles of Teaching
- Content included instructional videos, 2D/3D animations, and interactive quizzes
- Available in English and 8 Indian languages
- Courses hosted on Skill India Digital (SID) and NIMI's YouTube channel
- Recognised by NIMI for outstanding video and animation quality

Project 4: Pradhan Mantri Arogya Mitra – E-Content Development

Funded by: National Skill Development Corporation (NSDC), MSDE
Period: 2019–2020

As part of the Ayushman Bharat mission, this project created the e-Content and practice simulations that supported the training of over 1 lakh Ayushman Mitras across India.

- Developed digital training content in English, Hindi, and Malayalam
- Covered critical areas such as beneficiary identification, BIS/TMS operations, patient interaction, and claim processing
- Enhanced the effectiveness and reach of frontline healthcare worker training
- Contributed to the government's goal of digitally enabled last-mile healthcare delivery

Project 5: Sakshat Amrita Vocational Education

Funded by: NMEICT Mission, Ministry of Education (then MHRD)
Period: 2010–2013

A pioneering initiative that laid the foundation for technology-integrated vocational training in India.

- Developed two vocational training courses and a custom haptic simulator
- Delivered a complete training model, including curriculum, content, and simulator hardware/software
- Focused on Technology-Enhanced Learning (TEL), motor skill acquisition, and instructional design
- Trained India's first batch of women plumbers
- Successfully piloted in tribal regions of Kerala with strong positive learning outcomes

Featured ICT-Enabled Pilots

AMMACHI Labs has successfully led several national and international pilot projects to test, validate, and scale innovative ICT-enabled skill development models. These pilots have informed national strategies and demonstrated the impact of blended, digital, and immersive learning approaches.

1. ICT-Enabled Skills Training (Motorcycle Repair), Rwanda

Partner: Step Up Innovations Africa Ltd., Kenya
Year: 2018

This pilot was conducted under the Step Up Rwanda initiative in collaboration with the Workforce Development Authority (WDA), Rwanda, to introduce ICT-based vocational training in formal TVET institutions.

- Custom motorcycle repair curriculum developed by AMMACHI Labs
- Training of Trainers (ToT) conducted for 3 instructors at IPRC Kigali
- 20 first-year Automotive Engineering students trained using blended digital modules
- Extended outreach to 10 students from Circle of Pontiff, a slum area in Kigali
- Community-led outcome: Women trainees initiated a female-run motorcycle garage

2. CSC Blended Learning Pilot – Optical Fibre Splicer Course

Partner: Common Service Centres (CSC), MietY, Government of India
Year: 2017–2018

The pilot explored the potential of CSCs as rural skill training centres by implementing a digital Optical Fibre Splicing course.

- Conducted at CSC E-Governance Centre, Jagjeetpur, Haridwar
- 10 Village Level Entrepreneurs (VLEs) from different villages trained in technical and employability skills
- AMMACHI Labs provided content and facilitation
- 12 day training was conducted, and the students were taught using AMPLE platform and E-Content, followed by hands on practice
- Students fared excellently in the evalulation
- Final report submitted with positive feedback and scale-up recommendations

"I worked for 2 years in the optical fiber field, but I learned a lot more about concepts from the videos provided in this training"

Aman Singh
Splicing Trainer

3. National ITI Blended Training System Pilot

Partner: Directorate General of Training (DGT), MSDE
Year: 2018

This pilot aimed to modernise pedagogy in Industrial Training Institutes (ITIs) and National Skill Training Institutes (NSTIs) through blended learning.

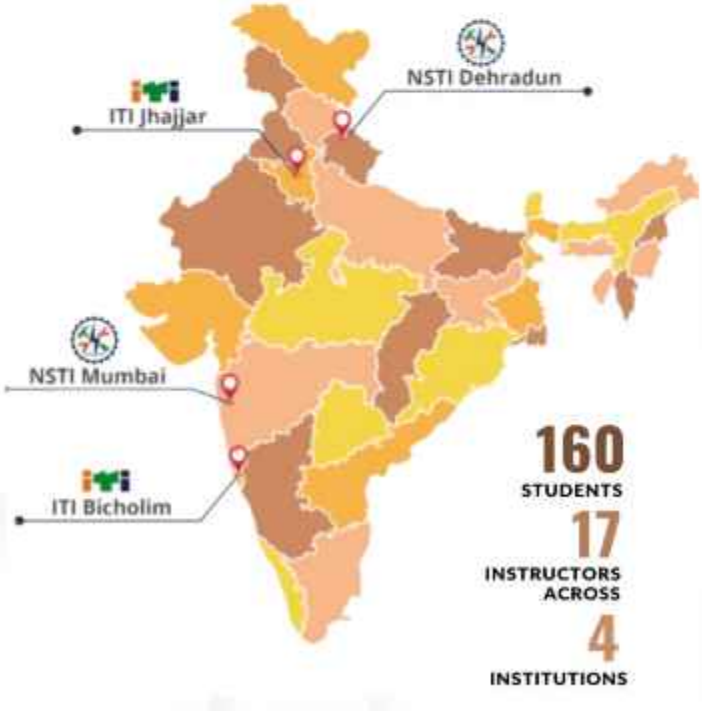
- Conducted across 7 NSTIs and ITIs in India
- Trades covered: Two-Wheeler Servicing and Sewing Machine Operator
- Digital content and analytics delivered via AMPLE LMS
- Instructors used real-time dashboards and AMRITA Cards for active classroom interaction
- The project concluded with a presentation to the DGT, MSDE, with key learnings and recommendations for institutionalising blended learning in ITIs.

4. Skill-eLabs Pilot – AR/VR and Simulation-Integrated Training

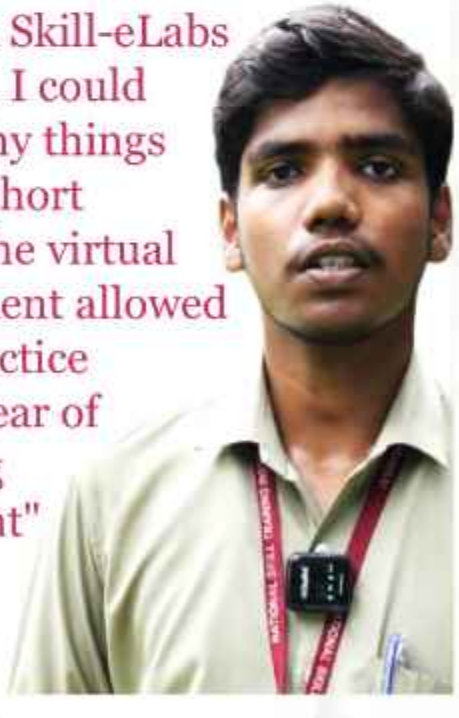
Funding Agency: National Instructional Media Institute (NIMI), MSDE
Year: 2024

This pilot tested the effectiveness of Skill-eLabs packages (videos, 3D simulations, AR/VR) in enhancing skill acquisition and learner confidence with minimal instructor intervention.

- Trades piloted: Solar Technician and Electronics Mechanic
- Conducted at 4 institutions: NSTI Dehradun, NSTI Mumbai, ITI Jhajjar, and ITI Bicholim
- 160 students and 17 instructors participated
- Experimental group trained using Skill-eLabs vs. control group with traditional methods
- Impact Evaluation: Experimental group showed significantly better outcomes in practical skills, safety compliance, and learner confidence
- Culminated in a presentation to the Secretary, MSDE with recommendations for national adoption



"Through Skill-eLabs exercises, I could learn many things within a short period. The virtual environment allowed me to practice without fear of damaging equipment"



Recognitions

AMMACHI Labs has been widely recognised for its pioneering contributions to technology-enabled vocational education and skill development. Our innovations, research, and implementation practices have received both national and international acclaim.

- Patents Granted: 11
- Research Publications: Over 126 publications in Scopus-indexed journals, conferences, and edited volumes
- UNESCO Recognition: Featured as a TVET Promising Practice by UNESCO-UNEVOC for the CVET Methodology used to train skills in non formal and informal settings using technology.
- Empanelled by National Instructional Media Institute (NIMI) as a Blended Learning Content Development Agency for vocational education
- Empanelled by National Skill Development Corporation (NSDC) for Research and Analytics

SKILLS FOR SCHOOL

The 2nd Foundation

Do. Think. Learn

The 2nd Foundation is a national initiative focused on building essential 21st-century skills among school students through hands-on STEM education. Our aim is to provide practical and accessible learning experiences in technology and innovation, especially for students from rural and underserved communities.

We promote digital and maker Skills, Robotics and STEM, computational thinking, vocational education, design thinking, and entrepreneurship through interactive workshops and project-based learning. These programs help students develop both technical skills and the confidence to create meaningful solutions for real-world challenges.

Since its inception, The 2nd Foundation has trained over 6,210 students across 11 states in India, creating opportunities for young learners to explore and apply technology in creative ways.

Key Areas of Focus

- Hands-on STEM and robotics workshops using tools like Micro:bit, Scratch, and Tinkercad
- Exposure to emerging technologies such as Artificial Intelligence and the Internet of Things
- Training in design thinking methods to develop problem-solving skills
- Entrepreneurship sessions to help students understand innovation, branding, and pitching
- Project-based learning that encourages teamwork and critical thinking
- Participation in innovation challenges and competitions

Our Impact

- 6,210 students trained
- 146 workshops conducted
- 120 student teams trained for national-level STEM and innovation competitions
- Programs delivered in 11 states, including tribal, rural, and urban schools
- 2 US patents granted for prototypes developed with students
- 15 research articles published in international conferences and journals

Our Partners and Collaborators

THE 2ND FOUNDATION WORKSHOPS

Objective: To introduce students (Grades 6–10) to foundational and future-ready technologies through fun, practical, and creative workshops.

Funding Agency: Internal Funding – Amrita Vishwa Vidyapeetham

Workshop Themes

- Robotics & IoT – Build smart systems using Micro:bit and sensors
- Game Development & AI – Create interactive games and explore machine learning
- 3D Modeling & Designing – Design real-world objects in Tinkercad
- AI & ML Basics – Train models with tools like Teachable Machine
- Virtual Circuit Design – Simulate electronics using Tinkercad & Micro:bit

Approach

- Activity-based sessions using easy-to-use hardware/software
- Real-life problem framing and ideation
- Peer collaboration and mini-project showcases

Impact

- 500+ students impacted across Kerala and Tamil Nadu from 2024 to present through core workshops
- Boost in critical thinking, design thinking, and digital confidence
- Dozens of student-built projects addressing local and social issues
- High engagement even among first-time tech learners

Student Testimonials:

"I was nervous at first, but the course helped me understand everything clearly and with confidence."

"The teaching was clear and hands-on. We first learned the concepts, then applied them using a variety of tools."

"The practical sessions were excellent and made the experience truly worthwhile."

Photos:

THE 2ND FOUNDATION X IHFC

Project Name: Transforming Education in India: Empowering Students and Teachers for the Digital Age

In Collaboration With: I-Hub Foundation for Cobotics (IHFC), Technology Innovation Hub at IIT Delhi

Funding Agency: I-Hub Foundation for Cobotics (IHFC), Technology Innovation Hub at IIT Delhi

Overview:

As part of our mission to make STEM education accessible and relevant, The 2nd Foundation partnered with IHFC to deliver a series of hands-on workshops for school students from underserved communities. These workshops were conducted in the states of Tamil Nadu, Odisha, Chhattisgarh and Bihar, focusing on building digital skills, creativity, and an innovation mindset.

The program was designed to expose students to real-world technologies and guide them in applying those tools to solve local challenges.

Workshop Themes

- Digital Ed Tech Tools & Generative AI
- Game Development using MIT Media Lab's Scratch Programming Language

Impact

- Workshops delivered across 4 states in rural and low-resource settings
- Students with limited prior exposure to technology gained hands-on experience
- Focus on creativity, teamwork, and problem-solving
- Idea pitching helped students develop presentation and communication skills

Student Testimonials

"The workshop experience was excellent. It increased my interest in technology."

"This was my first time learning something like this, and I really enjoyed it. I now feel inspired to create something new."

"This workshop gave me the confidence that I too can create something new."

Photos:

MENTORSHIP FOR NATIONAL INNOVATION PROGRAMS

The 2nd Foundation has mentored hundreds of students through some of India's leading national-level innovation challenges. Our mentorship programs are designed to support school students in identifying real-world problems, developing creative solutions, and presenting their ideas with confidence and clarity.

We offer end-to-end guidance—from idea development and design thinking to prototyping and pitching—ensuring students are well-prepared for both competitive platforms and future innovation journeys.

Programs Mentored

- ATL Marathon: A nationwide problem-solving challenge by Atal Innovation Mission. We mentored student teams to identify local issues, apply design thinking, and build functional prototypes with social impact.

- ATL Tinkerpreneurship: A digital entrepreneurship bootcamp where students develop product ideas, create business models, learn branding and marketing, and pitch their ventures. We guided students through every stage—from idea to market readiness.

- School Innovation Marathon (SIM): A student innovation program that encourages practical, problem-based thinking. Our mentors supported students in ideation, prototyping, and final submission processes.

- SHE STEM: A focused mentorship initiative to support girl students in STEM and innovation. We provided tailored mentoring sessions to encourage participation, build technical confidence, and help girls take the lead in solving real-world problems through technology.

Impact Highlights

- 120+ student teams mentored across multiple innovation programs
- Student projects submitted under themes such as sustainability, safety, health, education, and agriculture
- Enhanced student confidence in communication, collaboration, and problem-solving
- Several teams shortlisted at regional and national levels

What We Offer Through Mentorship

- Idea refinement and problem definition
- Support in prototyping and tool selection
- Training in video documentation and presentation skills
- Guidance for online submission and review processes
- Continuous encouragement to pursue innovation independently

Photos:

SOCIAL ROBOTICS

HaKsh-E Social Robot

HaKsh-E: An AI-Powered Social Robot for Promoting Hand Hygiene

HaKsh-E is an AI-powered social robot co-designed with children across India to promote proper hand hygiene. It features a 2-DOF head, an LCD-rendered face, and a gender-neutral voice. The robot uses conversational AI and Handwashing Action Recognition (HAR) aligned with WHO guidelines to provide real-time feedback and reinforce positive hand hygiene behavior in Hindi and English. HaKsh-E has been deployed through the Community COVID Resilience and Resource Centres in Haryana and Odisha and has demonstrated a scalable impact in children's sanitation education having outreached over 1200 children.

Funding Agency

- Department of Science and Technology and Amrita TBI

Collaborators

- Osaka University, Japan
- University of Twente, Netherlands

Geographical Area

- Bhuvaneswar, Odisha
- Kanti village, Mahendragarh, Haryana

Accomplishments/Impact

- Research paper won the best presentation award in 2024 in ICRAS 2024
- Winner of 2024 IEEE R10 Humanitarian Technologies Conference Innovation Challenge
- Winner of Toycathon 2021-22

Research outcomes

- Publications: 5

Photos:

RURAL TECHNOLOGIES

Rural technologies

AI Enabled Elephant Detection System

Project Name: AI Enabled Elephant Detection System

Project Objectives: AI Enabled Elephant Detection System aims to detect elephant movements in real-time and notify stakeholders to facilitate proactive interventions, thereby promoting human-animal coexistence. The system seeks to protect crops, infrastructure, and human lives by providing timely alerts. This proactive approach is crucial for fostering coexistence between humans and elephants.

Funding Agency

- CSR funding

Collaborators

- National Bank for Agriculture and Rural Development (NABARD)

Geographical Area

- Madukkarai Forest, Tamil Nadu, India.
- Brahmanipal , Odisha, India

Research Outcomes

- Indian patent filed

Accomplishments/Impact

- The system was showcased at the Global Partnership on Artificial Intelligence (GPAI) Summit in 2023, receiving recognition for its innovative approach to wildlife conservation.
- Successful deployments with 24/7 Day and Night detection capabilities in Tamil Nadu (Madukarai Forest, operational since May 2024, with over 15+ detection instances in 12+ months) and Orissa (operational since March 2025, with 4+ detections in 2+ months) have demonstrated the system's effectiveness and practical value; notifications are provided via app, Telegram, and SMS, enabled by 24/7 Day and Night monitoring.

Testimonials

"Thanks to ElephantWatch, we receive timely alerts of the elephant movement," says a local farmer from Odisha."

Photos:

THE HINDU

Amrita university develops advanced AI-based elephant monitoring system

ஏழு தொழில்நுட்பத்தில் யானைகள் நடமாட்டம் கண்காணிப்பு

Amrita Vishwa Vidyapeetham launches an AI powered elephant watch system

COIMBATORE, AUG 16:

Amrita Vishwa Vidyapeetham has launched an innovative AI-powered monitoring system called "Amrita Elephant Watch" to address rising human-wildlife conflicts, particularly involving elephants.

Developed by the university's Amritachi Labs, the system aims to harmonise human and wildlife coexistence by using real-time elephant tracking and AI-powered alerts.

This technology not only provides elephants access to essential resources within designated perimeters but also monitors their movements to prevent conflicts.

The system leverages advanced AI algorithms and IoT technology, analysing video feeds from strategically placed surveillance cameras to detect and track elephant movements.

It is connected to mobile networks, enabling immediate alerts to be sent to farmers, landowners, and authorities, allowing them to take timely actions and mitigate potential conflicts.

Bala Mohandas Menon, Team Lead for Rural Technologies at Amritachi Labs, expressed excitement about the project, stating, "Amrita Elephant Watch is a significant step towards wildlife conservation while safeguarding people's lives and livelihoods.

We are thrilled to bring this technology to our communities and positively impact the ecosystem."

The system, developed by a team led by Menon, including Ayyappan Ajan, Ramakrishnan K, and B Gokul Dev, has undergone successful pilot testing.

The Amrita Elephant Watch was recently showcased at the GPAI Summit 2023, receiving praise from industry experts and policymakers.

The project has also been recognised by the Ministry of Electronics and Information Technology (MEITY) under the "AI in Agriculture" initiative, highlighting its potential to address human-elephant conflicts in rural areas.

Intelligent Agriculture Monitoring System

Project Name: Intelligent Agriculture Monitoring System

Project Objectives: The objective of the project is to develop an AI-enabled mobile and cloud-based system capable of real-time classification of crop and sapling health, with full offline functionality tailored for rural and low-connectivity areas. The system aims to enhance usability and farmer engagement through multilingual interfaces and localized feedback, ensuring accessibility for users across varying literacy levels. Additionally, it seeks to provide geo-tagged analytics and actionable insights to agricultural officers and policymakers, supporting data-driven decision-making in crop management, planning, and subsidy distribution.

Collaborators

- WADI project in collaboration with National Bank for Agriculture and Rural Development (NABARD)

Geographical Area:

- Odisha

Research Outcomes

- Indian patent filed

Accomplishments/Impact

- Real-time Offline AI Classification: Enables real-time crop and sapling health classification using AI directly on mobile devices, with full offline functionality, making it ideal for rural and low-connectivity environments.
- Operational Rollout Achievements: Over 25,000 saplings were successfully geotagged and monitored using the system within a span of just six months, demonstrating its scalability and field effectiveness.
- Localized Multilingual Feedback: Provides health results and agronomic feedback in regional dialects through a multilingual interface, improving accessibility for semi-literate or illiterate users.
- Geo-tagged Predictive Analytics: Integrates geo-tagged image data with spatial-temporal trend analysis to offer predictive insights, including early warnings for pests or nutrient deficiencies.
- Policy-Level Integration: Incorporates a module for automated data sharing with governmental systems, facilitating evidence-based agricultural planning and subsidy distribution

Data Center Environment Monitoring System

Project Name: Data Center Environment Monitoring System

Project Objectives: To design and implement a real-time environment monitoring system for data centers that tracks temperature, humidity, and smoke levels. The system delivers instant alerts to users via Telegram, SMS, automated call alerts, and a dedicated web portal, ensuring operational continuity and quick incident response.

Accomplishments/Impact

- Deployed a fully integrated Raspberry Pi-based system housed inside the server rack for real-time monitoring of temperature, humidity, and smoke levels.
- Enabled multi-channel real-time alerts through Telegram, SMS, a dedicated web dashboard, and automated call alerts
- Developed a web interface with user management, allowing role-based access and dynamic threshold updates.
- System successfully ran for over one year with consistent performance and reliability.
- Enabled faster response times and strengthened infrastructure safety within the university's data center.

Testimonials

The novelty of the system lies in its ability to send call alerts, which truly sets it apart and ensures immediate attention to potential risks.

- Data Center Team, Amrita Vishwa Vidyapeetham

SKILL INTELLIGENCES LAB

Lab Working Facilities

- Infrastructure: Equipped with modern tools, ergonomic workstations, and high-speed connectivity to support hands-on learning and experimentation.
- Collaborative Environment: Open lab spaces designed to encourage teamwork, innovation, and interdisciplinary collaboration.
- Flexible Access: Extended lab hours with scheduled access to resources for project development, prototyping, and research work.

Cutting-Edge Technologies

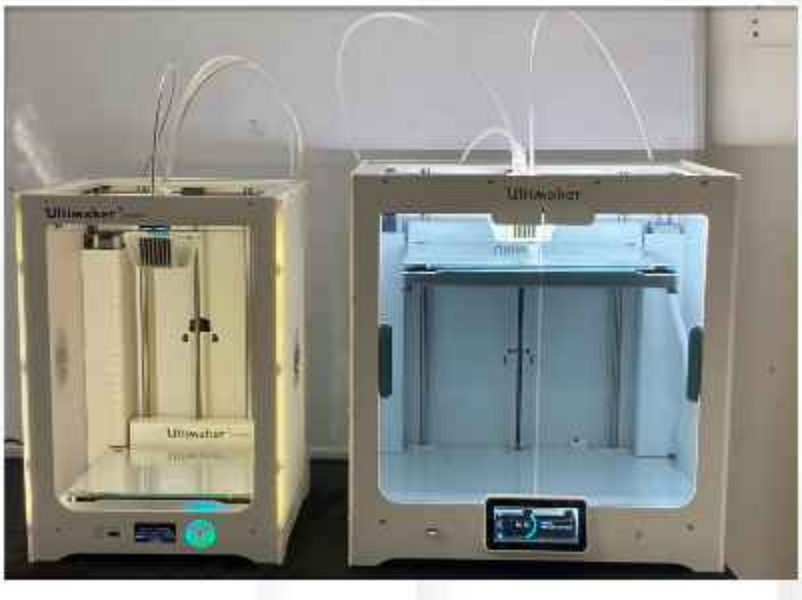
- Neurocognition: Brain products LiveAmp, Emotiv Epoc-X, EMotiv Flex 2
- Augmented Reality/Virtual Reality (AR/VR): Hololens, Oculus Quest
- Motion capture: Rokoko
- Haptics: Tesla suit, Sense Glove

Machinery Workshop Facilities

- Precision Machining Tools: Wide range of mechanical machines, soldering booths, and precision tools for fabricating mechanical components and developing functional prototypes.

Internship Opportunities

- Skill-Aligned Internships: Access to cutting edge technologies so that students get real-world exposure through short and long-term internships.
- Mentorship by Experts: Interns receive guidance from experienced professionals, researchers, and faculty members.



Projects

Enhancing Teaching and Learning of Hand Dexterity Skills through Cognitive Training

- Project Name: Enhancing Teaching and Learning of vocational skills through Multimodal Cognitive Training (MCT)
- Project Objectives: AMMACHI Labs has pioneered immersive technologies in motor and soft skills training for over a decade. Our goal with Skill Intelligence is to integrate different indigenous technologies that have been developed by AMMACHI labs over the decade and also accommodate future technologies in the area of motor skills training and soft skills training. We propose a multi-modal system architecture blending Cognitive Sciences and Artificial Intelligence (AI) for capturing data from various modalities and analysing the multi-modal data to better understand what is involved in teaching and learning of vocational skills.

Funding Agency:

- Department of Science and Technology

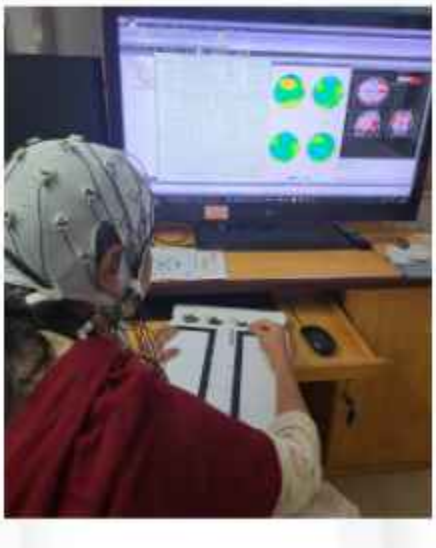
Collaborators:

- Harvard University, USA
- University of Wisconsin School of Medicine and Public Health, USA

Geographical Area:

- Vishwarmit tailoring centers, Kerala, India

Photos:



“There are two types of education: education for a living and education for life. When we study in college, striving to become a doctor, a lawyer, or an engineer, that is education for living. But education for life requires an understanding of the essential principles of spirituality; it is about gaining a deeper understanding of the world, our minds, our emotions, and ourselves.

Sri Mata Amritanandamayi Devi
Chancellor, Amrita Vishwa Vidyapeetham

“The training that you have given women to become masons and to construct toilets is a great example of human resource development and skill development. Women were always ahead in matters of cleanliness and sanitation. But now you have also given them skill and empowerment as well. I offer my pranams to all the efforts being rendered by you.

Shri Narendra Modi
Prime Minister of India

“Normally, technological innovation stays with the elite. Amma’s organization is the only one who takes technology to the rural masses. It is remarkable.

Shri Dharmendra Pradhan
Minister of Education of India

AMRITA
VISHWA VIDYAPEETHAM

Ammachi Labs

Amrita Vishwa Vidyapeetham
Amritapuri, Clappana P.O.
Kollam - 690 525, Kerala, India

info@ammachilabs.org
www.ammachilabs.org