ESCAP

CSAM
Centre for Sustainable Agricultural Mechanization

Artificial Intelligence and Technological Innovations in Indian Agriculture

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National Initiatives

- AgriStack: It is an Indian government initiative that aims to improve agriculture in the country by leveraging data and digital services. It's essentially a digital platform that connects various stakeholders in the agricultural sector.
- Farmer Registry: This is the foundation of AgriStack. It's a federated database containing information about all farmers in India.
- Farmland Plot Registry: This registry links farmer data from the Farmer Registry with their corresponding farmland plots.
- Crop Sown Registry: This registry keeps track of the crops sown by farmers across different regions

National Initiatives…

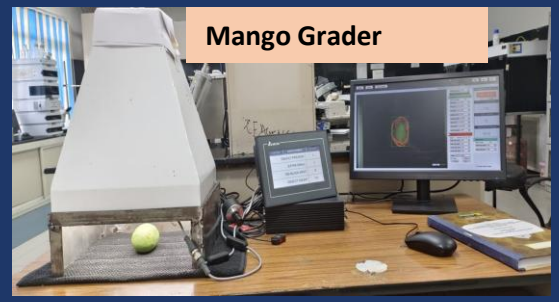
IndiaAI Mission

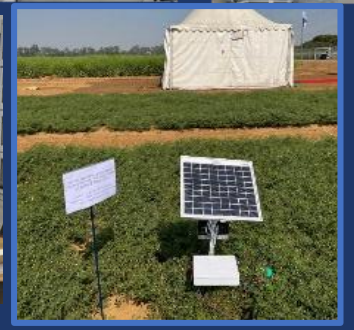
Under this, Key initiatives are:

- **IndiaAI Compute: Development Public AI Cloud Infrastructure**
- **IndiaAI Innovation Centre: Deploying Large Multimodel Models**
- **IndiaAI Dataset Platform : Making public dataset AI ready**
- **IndiaAI Application Development Initiatives: Making impactful AI solution**
- **IndiaAI Future Skill: AI education and skill development**
- **IndiaAI Start-up Financing: Startup development and comercilization**
- **Safe and Trusted AI: Implementation of responsible AI projects**

Relevant Technologies

- Drone based Crop Nutrient Monitoring and Management
- Sensor based Rapid Fertility Assessment and Mapping
- IoT base Intelligent Irrigation System
- Smart Production System for Protected Cultivation
- Post Harvest Quality Monitoring and Grading, counting and tracking of fishes.
- Harvesting of fruits, Weeder, Paddy transplanting, Variable rate fertilizer applicator, crop health monitoring.
- Fish and Water Quality for Precision Aquaculture.
- Smart Hatchery and IoT based Fish Feeding Device





Development Scenarios @ Different ICAR Institutes

Robotic Weeder

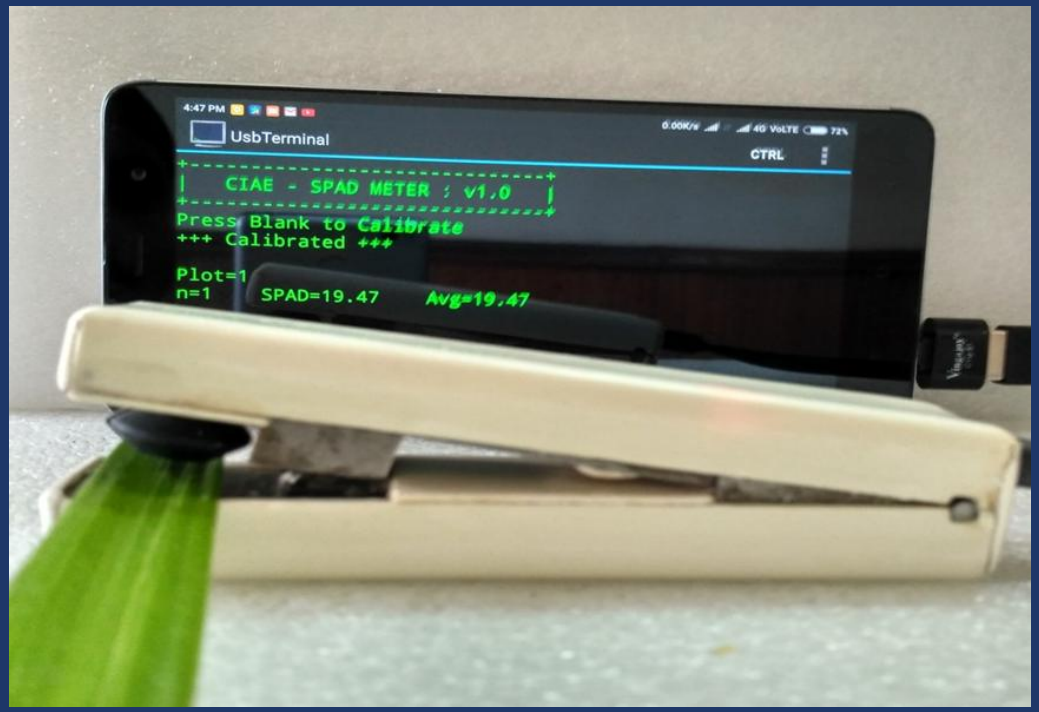
Unmanned ground vehicle (UGV) for agriculture fields

DL-based Crop Stress Detection Device

Development Scenarios @ Different ICAR Institutes

Autonomous Spraying System for Polyhouse

NDVI Based Variable Rate Urea Applicator



Low-Cost SPAD Meter

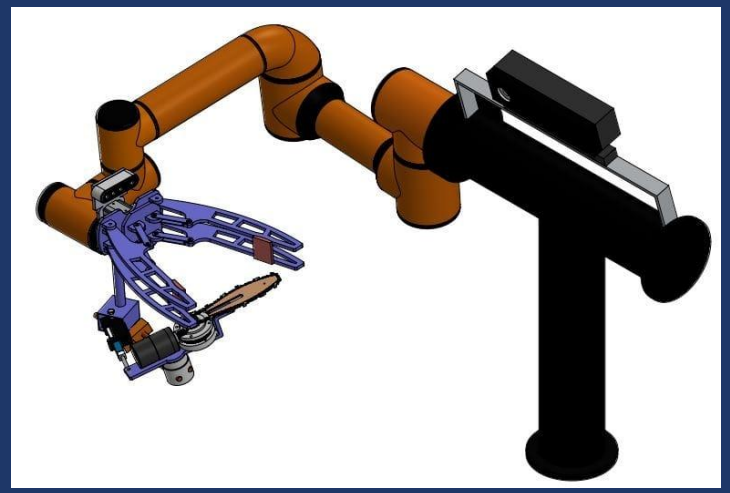
Hand-held Plant Disease Detection Device

Development Scenarios @ Different ICAR Institutes

Unmanned Rice Transplanter

Unmanned Self-propelled track-type vehicle for small farm

Robotic Pineapple and Apple Harvester

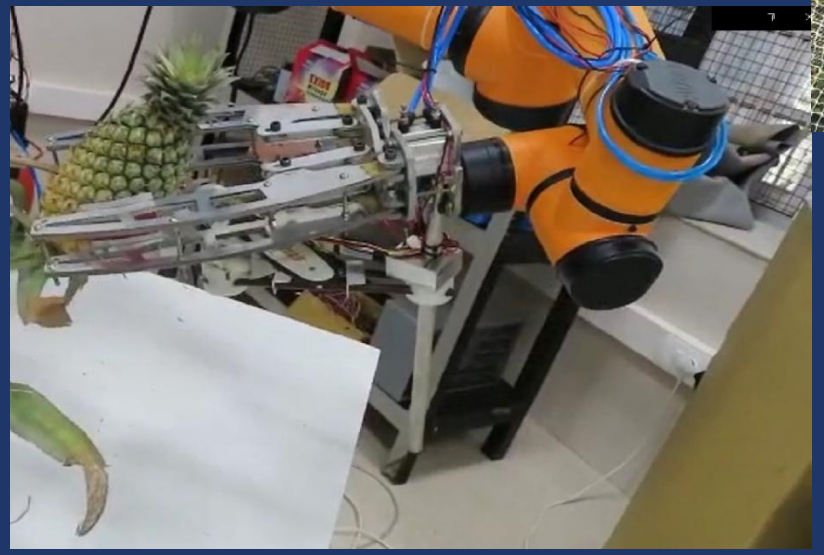


Suitability: Robot based harvesting of pineapples

Consists:

- **Machine vision system**
- **Manipulator**
- **Gripping unit**
- **Cutting unit**

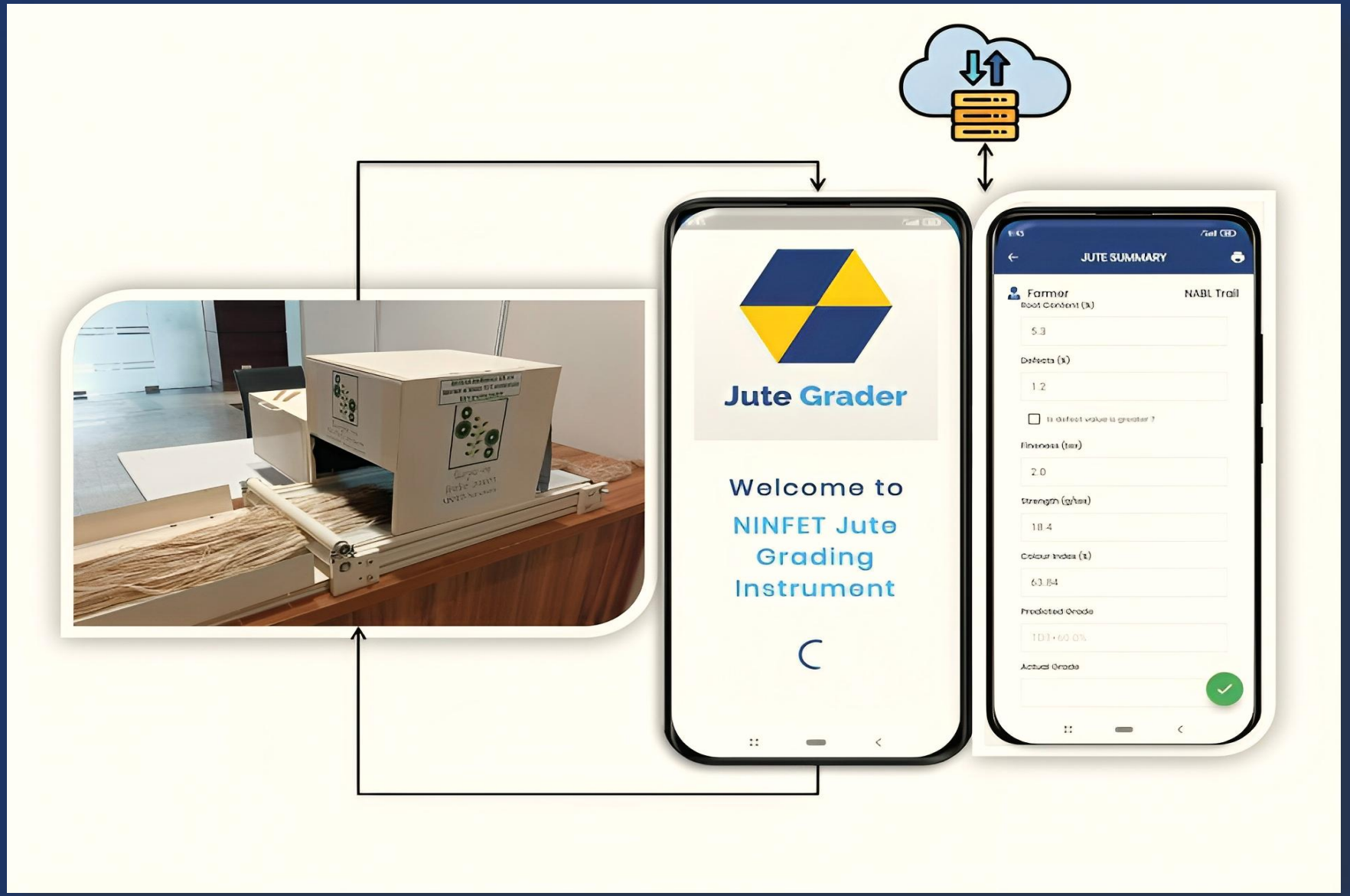
- **Sensitivity : 0.96**
- **Accuracy : 0.94**
- **Time taken for identification: 500 ms**

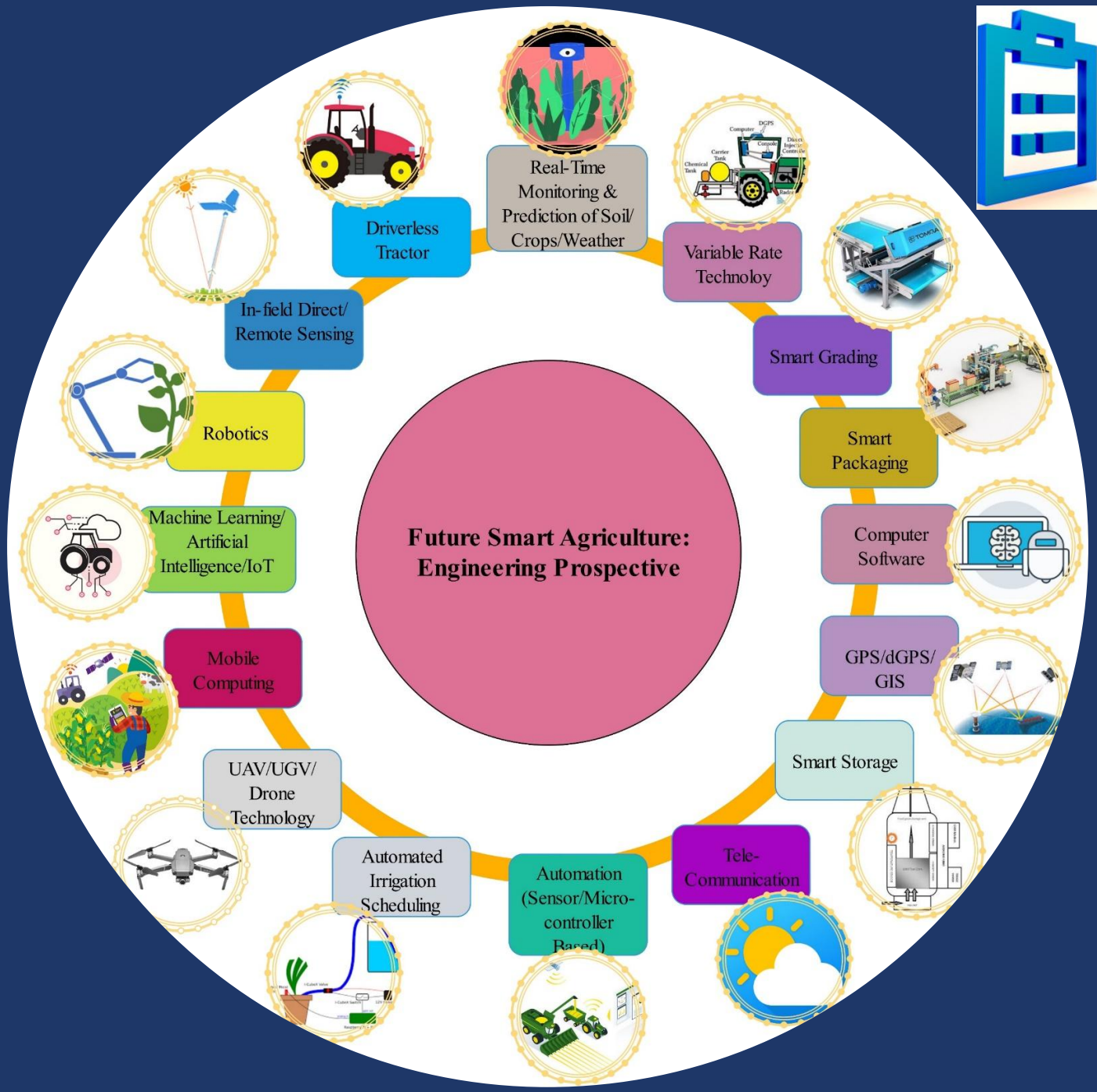


Development Scenarios @ Different ICAR Institutes

Automated Packing Line for Spherical Horticultural Produce

AI and IoT based natural fibre continuous grader





Foreseen Application

- Robotic Pollination
- Robotic Phenotyping
- Robot assisted breeding
- Robotic transplanter
- Precision Livestock Farming
- Grafting Robots
- Farm/store guards
- 3-D food printing/alternate source of foods
- Farm and Home Assistants

MTS humanoid Robot

Inclusivity and Accessibility

- Subsistence farmers in countries like India battle extreme weather and financial desperation to support their families.
- The AI for Agriculture Innovation initiative helps farmer to access the AI tools they need to farm more efficiently and earn more.

Some success stories:

- **Kisan sarathi App:** Multimedia, multilingual, multichannel, agri-technical localized advisory system – 25.5 million farmers, 4000+ experts of 731 Farm science centres – 8000 farmers uses per day.
- **UPI** -transformed payment system. **Over 707 million transactions daily**
- **E-NAM platform – Over 17.9 million farmers with 1522 mandis (market places)**
- The imitative transformed the chili farming for many in Khammam district, India with bot advisory services, AI-based quality testing, and a digital platform to connect buyers and sellers. Participating farmers reported that they doubled their income.

Challenges

- **Ethical considerations: Standards emphasize fairness, transparency, and accountability in AI development.**
- **Risk management: Standards advise on identifying and mitigating risks associated with AI systems throughout their lifecycle.**
- **Governance: Standards encourage organizations to establish clear governance structures for AI development and deployment.**
- **Integration and customization: AI based digital agricultural technologies needs to integrated and customized as per the requirement of the stakeholders, specially farmers as per their requirements. Standardization ensure proper communication and packaging of needed technology.**

Opportunities

- Largest Network of Research Institutions in the Country and diversified agricultural data landscape.
- Strong Government Push for Agri-Digitization such as digital agriculture mission, Agristack, PM-Kisan, and soil health card.
- Large farming population needing scalable solutions through digital media with deep penetration of digital infrastructure.
- High mobile and internet penetration in rural areas with affordable data access and high digital literacy.
- Growth in sensor, IoT and VRT based technologies and agritech start-up system
- Strong computing talent pool in AI and engineering with rapidity expending digital market.
- Need for climate-resilient solutions due to depleting natural resources.
- Increasing public-private investment in Agr-AI solutions.

THANK YOU

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