

Applying Digital Solutions to Mechanization

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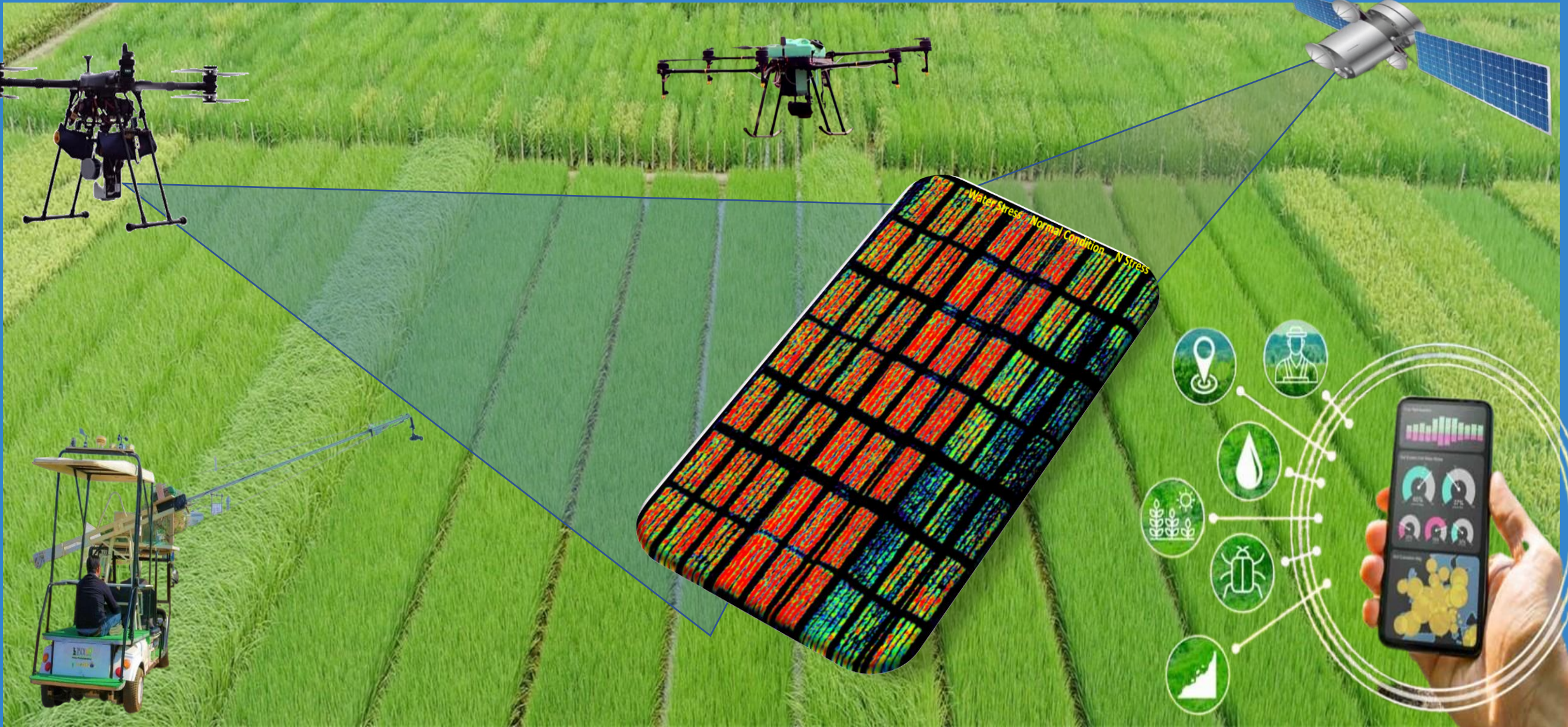
**Indian Council of Agricultural Research (ICAR),
New Delhi, India**

Area and Agricultural Workers

- Net sown area - 140 million ha (42.6%)
- Operated area – 157 million ha
- Contributes 18.2% to the GDP
- Agricultural workers - 263 million
- No. of land holdings – 146 million
- Small and marginal land holdings of less than 2 ha account for 86% of total operational holdings and 47% of total operated area (Agriculture census 2015-16).

Digital Agriculture and so the mechanization work is one of the high attention area of the Govt. of India

Application of Digital Solutions in Agriculture



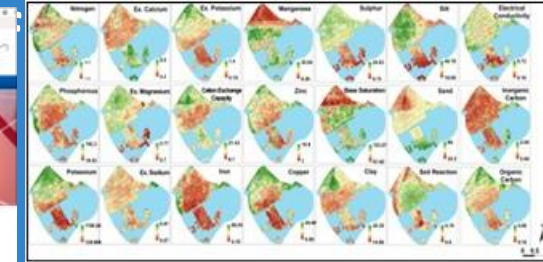
- Digital Solutions in Indian Agriculture

Major Achievements

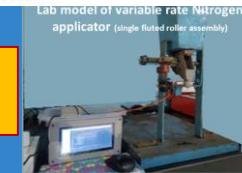
- **Drone:** Crop Nutrient Monitoring and Management
- **Remote Sensing:** Near-Real Time Crop Condition Monitoring
- **Sensor:** Rapid Fertility Assessment and Mapping
- **Precision Soil Fertilizer Recommendation (PSFR) System**
- **IoT:** Intelligent Irrigation System
- **Smart Production System for Protected Cultivation**
- **Drone and Sensor:** Monitoring of Fish and Water Quality for Precision Aquaculture
- **Sensor:** Precision Dairy Farming
- **Smart Hatchery** and IoT based Fish Feeding Device
- **Micro Tracking** of Banana Supply Chain
- **Sensor and Computer Vision** based Post Harvest Quality Monitoring and Grading, counting and tracking of fishes.

Soil Health

Crop Health



Precision Management



VRTs/Robotics



Post Harvest quality



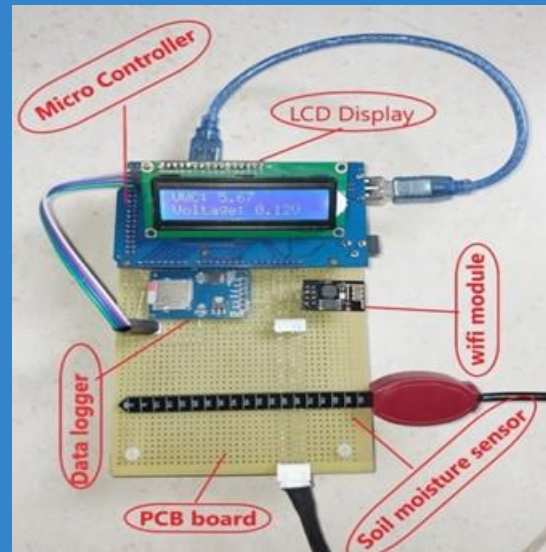
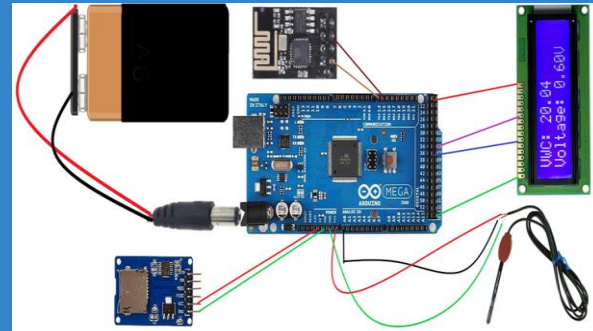
Precision Dairy



Precision Fishery



Development of Low cost Sensor and IoT Enabled Automated Irrigation Management System (IoT-AIMS)



Transplanted rice with Alternate wetting and drying schedule

IoT enabled irrigation water management systems



IOT-AIMS in Direct Seeded Rice (DSR) field



Controller



Irrometer tensiometer



IOT-AIMS in Banana field



IOT-AIMS in vegetable grown in polyhouse

➤ Sensor based drip irrigation (at **22%** Soil moisture): **66.54%** water saving and produced **22.38%** higher yield of indeterminate tomato



➤ Sensor based fertigation at **18 %** Soil moisture content brought about 66.08% water saving and produced **11.27%** higher yield



Application of Digitally Controlled Mechanization Technologies



Variable rate fertilizers applicators



Remote controlled Weeder



Variable rate fertilizers applicators



IoT-enabled flume in open channel flow measurement



Automatic spraying system for polyhouse



Robot for pollinator and spraying operation in greenhouse



Sensor based site specific chemical applicator

PIR sensor based safety device

Hydro Mechanical Braking System

Servo Motor



Sensor-based braking system for powered chaff cutter using PIR sensor

AI based Important Mechanization technology contd.....



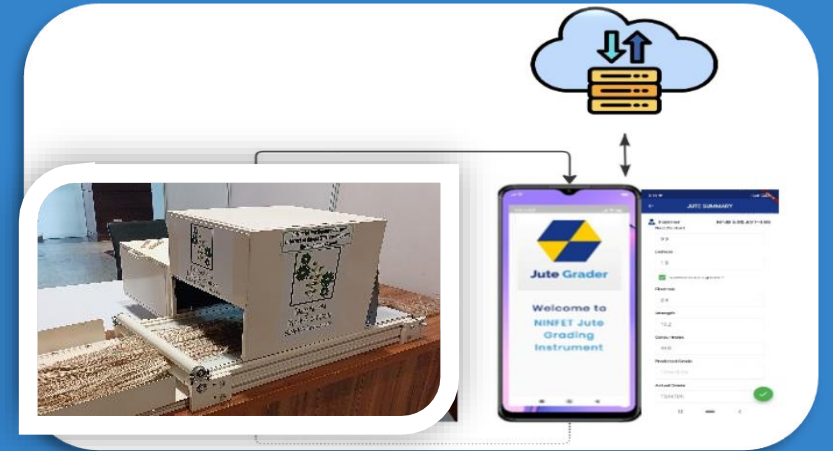
Robotic apple picking



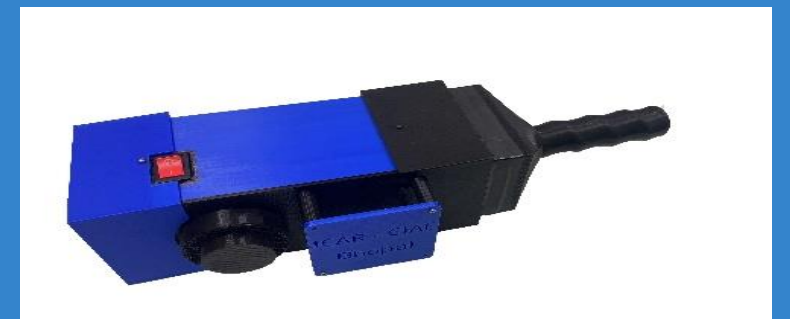
Banana Supply Chain

Digitally controlled Quality sorting system.....

X-ray and image based fruits sorting system



AI & IoT enable jute grading system



Rapid detector for Aflatoxin-B1 in maize

Digital Agriculture Initiatives in India

- Digital Agriculture Mission 2021–2025 was launched in September 2021 by Ministry of Agriculture.
- Over 1,000 agri-tech start-ups have innovative ideas that assist farmers in improving farming techniques and produce.
- In August 2019, Cisco created an Agricultural Digital Infrastructure (ADI) solution to improve farming and knowledge exchange.
- The Jio Agri (Jio Krishi) platform was introduced in February 2020, and it digitalised the agricultural ecosystem along the entire value chain to empower farmers.
- Custom hiring and Common Service Centres connected with Apps helps greatly in mechanization

There are numerous schemes and Initiatives have developed world's largest Agri-Startup ecosystem in Indian Agriculture mechanization

Thank you all