IoT shaping agriculture

Things to consider before developing the smart farming solution

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Modern Agriculture

- Agriculture was the key development in the rise of human civilization, whereby farming created food surpluses that enabled people to live in cities.

- Major types: Cultivation of Land & Breeding of Animals / Animal Husbandry

- History:
  - 105,000 years ago: Wild grains gathering
  - 11,500 years ago: Planting / Domesticated grains
  - 10,000 years ago: Domesticated animals

- Traditional methods have been improvised often with application of new technologies and information.

- Major Success Parameters: Improved Soil Fertility, Effective Irrigation, Advanced Harvesting, Enhanced Livestock Yield, Crop protection

- Results in Efficient Produce to Market to Consumption

- IoT strengthens modern day agricultural goals
Why IoT for agriculture

- An expected growth of population to 8 billion by 2025 (FAO - Food and Agriculture Organization Prediction).
  - IoT techniques *enhance the produce quantity and quality with reduced cost and precision*.
- Effects of climate change will have greater impact on agriculture (IPCC - UN Panel on climate change prediction).
  - IoT based methods provide improved irrigation techniques and help decide the *right quantity and right time* for water.
- Various studies have indicated improvisation of agriculture by modern techniques over past century.
  - IoT gives a major leap to this with direct benefit of *technology and information*.
- Automation has been the main driver in meeting the rising demands in agriculture.
  - IoT drives automation to next level with *sophisticated decision making* by use of *connectivity and data*.
A few use cases implemented for IoT

- **Monitoring**
  - Basic cameras for monitoring the field / livestock.
  - Intelligent cameras - motion detection with buzz / alarm, smart fishery.
  - Aerial Monitoring systems using drone

- **Irrigation**
  - Remotely operated irrigation systems
  - Smart irrigation controllers (Sensors / Forecasts / Plant-care information)
  - Soil moisture / leaf wetness / Temperature based automation

- **Automation**
  - Aerial planting techniques to sow seeds
  - Pest detection using Infrared sensors
  - Harvesting techniques for crop readiness detection and automation
A few emerging Agriculture use cases

- Crop protection using Early prediction systems with data crunching
- Harvesting predictions using customized crop monitoring
- IR camera and heat sensor based night-predator protection
- Cattle tracking using GPS based sensors
- An “Uber” like app for Agri vehicles and equipment
- Pregnant Cow Monitoring using tail sensors
- ...and many more
Things to consider on IoT

- Major IoT Objectives
  - Operate
    - Perform specific operations remotely
    - Eg: Irrigation systems, fence activation, Alarm systems, etc
  - Monitor
    - Data collection and make decisions
    - Eg: Alert mechanisms, early predictions, Harvest decisions, etc
  - Monitor and Operate
    - Take automated decisions
    - Eg: Soil moisture based irrigation triggers, Camera feed to alarm systems, etc

- Coupling to new age systems for robust enhancements
  - Centralized data analysis system
  - Block chain based multi party decision systems
  - Connectivity with business applications
Field Connectivity is the Key

- Connectivity is the key aspect for IoT in order to achieve remote capabilities.

Data is the decision

- It is important to aggregate data using centralized / distributed platforms.
- Next leap in smart farming involves data collection and analysis.
- Community platforms enable right decisions from the historic as well as neighboring patterns.
- **Social Farming:** Connect and provide Data feed to public or shared systems, Or use of blockchain based decentralized platforms.
- Implementation of Analytics for early predictions
- Artificial intelligence for visual data processing coupled with textual data feeds from sensors
Smart Tagging with IoT

- **Production**
  - Farmer / Produce Source
  - Geography / Region
  - Factory of Processing
  - Supply chain participants
  - {Volume of Supply / Lack of produce}

- **Quality**
  - Quality certifications at various stages
  - Date of Produce and Life (Age and expiry)
  - External factors of Agri environment (Rain, Humidity, Dryness, etc)
  - Fertilizer inputs: Organic, Chemical, etc

- **Consumption**
  - Consumer / Segment
  - Geography / Region of consumption
  - {Over-produce / wastage / lack of demand}
International Trade: Produce to Consumption

- Farmer / Production
  - Factory / Processing
    - Packaging
    - Transport
  - Cross border
    - Cargo (Air / Ship / Land)
      - Customs
      - Distribution & Retail
      - Customer / Consumption
Need of the hour

- Sustained Innovation
  - Practical problem solving
  - Data distribution & availability
  - Efficient technologies in hardware and software
  - Certification mechanisms
  - Durability of devices due to field implementation

- Standardization
  - Protocols and communication
  - Cross platform and device Interoperability
  - Extendibility (Current business apps, device to device, etc)

- Cross Border Acceptance
  - Mutual recognitions
  - Global policies / framework

- Other Areas
  - Legal framework (Ariel monitoring issues, connectivity networks, etc)
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Thank You!

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