How technology is changing the face of our greatest industry - Farming

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Impact of Mechanization on our society


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- The next on the list? Number 13 was the Internet!
Technology – this will be the game changer for agriculture.

- 9 Billion people by 2050
- 70% increase in food to feed 9 Billion people
- Technology that will help make this possible:
  - smart power systems
  - precision agriculture tools
  - farm management software
  - affordable sensors
  - smart internet systems; a mesh like internet grid
  - A plan to transfer our technology to other countries
How technology changed my business - A personal example…

- While teaching at MU, over a Thanksgiving break in 1997, I started an internet business. How do I manage this when I am in Germany, England, Brazil, India, Poland, Georgia, or Costa Rica?
- Answer? Of course, I have good help but; **Electronic systems alert me via my smartphone and/or email to receive or have access to:**
  - a text memo when someone steps into the data center
  - a text message when a web or mail server faults
  - a text memo informing me when my emergency generator starts
  - A text memo informing me when my generator automatically stops
  - email when a mesh type Wi-Fi access point goes off-line
  - email when a hard drive fails in a server
  - email when a server is attacked
  - security cameras that monitor this equipment
  - the screen of a computer (console)
How could these systems change agriculture / farming?

- Remote livestock monitoring
  - Cameras in the calving barn
  - Temperature sensors alerting us
- Remote grain bin monitoring
  - Security
  - Temperature, moisture, grain quality
- Water quality of a well, pond, or tank
- Potential to disable a system that is failing or has not been serviced properly...
- Thermostats (Integrated controllers) for your home, business, farm shop, livestock facility, grain facility

These can ALL BE MONITORED WITH YOUR CELL PHONE...
Grain related monitoring systems
What other systems might we see deployed in agriculture?

- The equivalent of fitbits for animals
  - So a horse at the Kentucky Derby is able to perform better
  - So a horse at the Kentucky Derby does not have a heart attack during the race
- A wet spot in the grain bin is found before grain is spoiled
  - Alert the manager or better yet; the bin automatically responds
- A sensor in the field notes the insect, fertilizer condition, moisture condition and alerts the farm manager
  - A “rowbot” may be deployed
Similar John Deere Systems apps free on Google Play - 32

- John Deere PowerAssist™ App
  - Warranty registration & Engine information search
- John Deere Mower Plus
  - Helps track lawn care
- Mobile Version for jdparts.deere.com
- JD Link
  - Ultimate Data (if applicable), Multiple machine mapping, Directions to machines, Ping machines, View and acknowledge alerts, Engine Hours, John Deere Remote Display Access, Users can filter multiple alert categories at one time.
Other smartphone Apps...

- Case-IH – 32 apps on Google Play
- Caterpillar – 9 apps on Google Play
- AGCO – 3 apps
- Grain systems – ADM, Bin Sense, Dry grain calculator
- Tee Jet App
  - calculate pesticide volume
  - Reduce environmental risks
- Tractor roll-over detection

![Image of smartphone apps and a calculator interface]
Center Pivot Irrigation system App
USDA Spraying app

Aerial Sprays
Developed by: United States Department of Agriculture, Agricultural Research Service

Languages: English
Countries: Canada, US

Add to favorite  Free  Go to Store  Send to email

BEGIN SIMULATOR
VIEW RESULTS

Orifice: 10
Angle: 0
Pressure (psi): 45
Speed (mph): 140

Select Current Settings for Results

VIEW RESULTS
So what equipment is needed...

- Access point, Switch, cameras...

- **UniFi® AP AC LR**
  - 802.11ac Long Range Access Point
  - 2.4 GHz
  - 5 GHz
  - 450 Mbps
  - 867 Mbps

- **UniFi® Switch 8-60W**
  - Fully Managed Gigabit Switch
  - 8 GbE RJ45 PORTS
  - 4x 802.3af PoE PORTS

- **UniFi® Video Camera PRO**
  - IP Camera with Infrared & Optical Zoom
  - 1080p FULL HD
  - 30 FPS
More equipment may be needed...

Microwave link, router + internet via internet company...

**LiteBeam™ M5**
Long-Range, Lightweight airMAX® CPE
- 5 GHz
- 100+ MBPS

**UniFi® Security Gateway Pro 4**
Enterprise Gateway Router with Gigabit Ethernet
- Advanced FIREWALL
- VLAN
- VPN
- Radius SERVER
- Dual LAN & WAN
US government is committed to delivering broadband internet...

- **USDA Seeks Applications for Nearly $12 Million in Broadband Grants for Rural Communities**
- **WASHINGTON, April 18, 2016** – Agriculture Secretary Tom Vilsack announced today that USDA is soliciting applications for grants to establish broadband in unserved rural communities through its Community Connect program. Community Connect is administered by USDA’s Rural Utilities Service and helps to fund broadband deployment into rural communities where it is not economically viable for private sector providers to provide service.
Summary

- These mobile apps:
  - helping to reduce grain spoilage
  - telling us when crops need water to maximize production
  - Help control weeds populations
  - Facilitate fertilizer application etc.
  - Tirelessly monitor agricultural systems.
  - Ultimately help us feed 9 billion people around the world
In so many ways, the future is in our hands...

- Cell phones will be used
- Telco Internet / cable company internet will be used
- Mesh internet network will eventually make this a reality
- Thoughts / Questions?

- Thank you for your attention!