



Smart Technology for Agriculture & the Home

AGRABILITY WEBINAR SERIES

04/08/2020

LUKE E. CAIN, OTS

3:00PM EST

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Basic Webinar Instructions

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Basic Webinar Instructions

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4 quick survey questions + opportunity to share comments

Session recorded and archived with PowerPoint files at www.agrability.org/online-training/virtualntw

Problems: use chat window or email jonesp@purdue.edu



AgrAbility: USDA–sponsored program that assists farmers, ranchers, and other agricultural workers with disabilities.

- Partners land–grant universities with disability services organizations. Currently 20 state projects
- National AgrAbility Project: Led by Purdue’s Breaking New Ground Resource Center. Partners include:
 - Goodwill of the Finger Lakes
 - APRIL (Association of Programs for Rural Independent Living)
 - Colorado State University
 - Washington State University
- More information available at www.agrability.org



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My Background



- 2017 – Bachelor’s degree in Exercise Science
- 2020 – Occupational Therapy Doctorate
 - Residency: Advocacy – AgrAbility



The American
Occupational Therapy
Association, Inc.

U.S. Agriculture Statistics

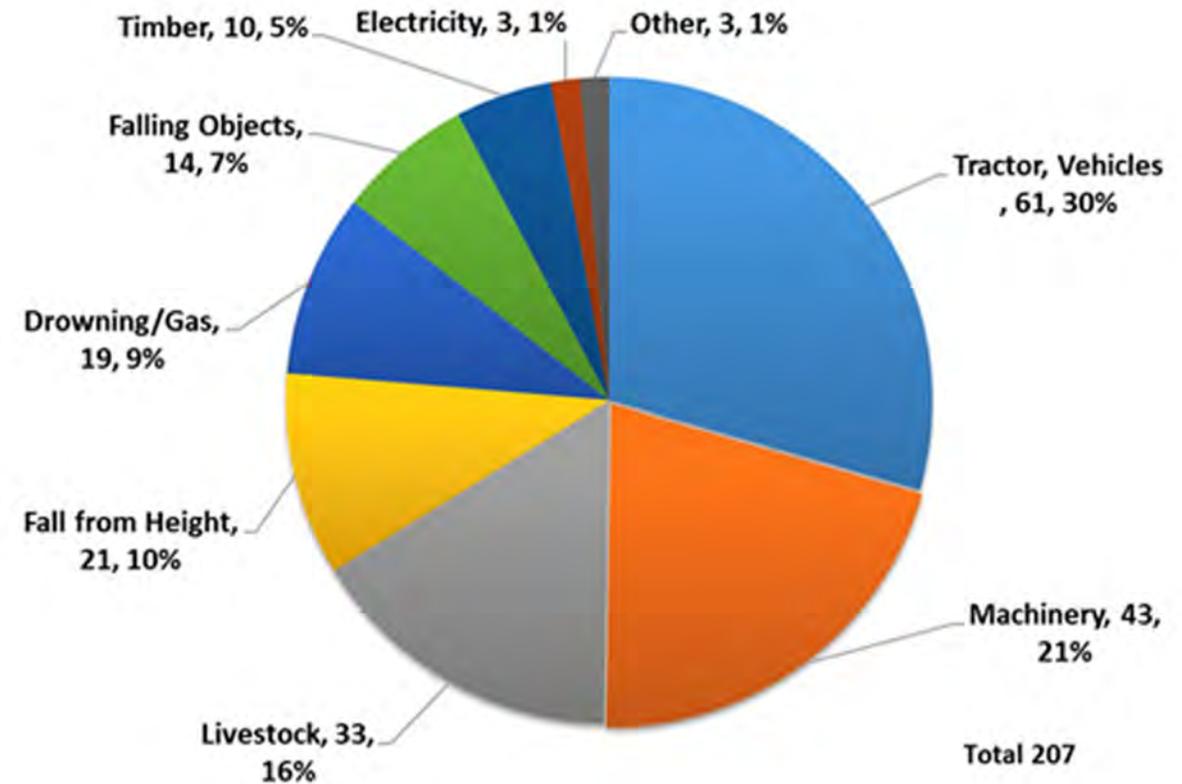
- ~21.6 million full- and part-time jobs related to the agricultural and food sectors – 11% of total U.S. employment.
- ~2.6 million (1.3% of U.S. employment) directly on farms.
- 96% of farms and ranches are family owned.
- The average age of all producers is 59.4.
- There are 321,261 young producers age 35 or less on 240,141 farms. Farms with young producers making decisions tend to be larger than average in both acres and sales.

Common Injuries & Conditions

- Arthritis
- Back pain
- Knee pain
- Amputations
- Visual / hearing impairments
- Traumatic Brain Injury (TBI)
- Spinal Cord Injury (SCI)
- Respiratory impairments
- Disabling diseases (ex. cancer, congestive heart failure)
- Eye injuries
- Shoulder injuries
- Livestock
 - Kicked, stuck, thrown from
- Fall/trip
 - Stuck by object
- Falling object, object being lifted, fan blade
- Caught in/under/between objects

Fatality Rates

- In 2017, there were 416 farmer / farm worker fatalities:
- ~20 deaths per 100,000 people
- Leading C.O.D. - Transportation incidents (roll overs)



Main causes of death in agriculture and forestry over the last 10 years 2009-2018

Disability Rates

- 12.9% of farm population has a disability.
- On average:
 - ~2/10 farmers have a disability
 - ~1/10 farmworkers have a disability
 - ~1/25 farm family children have a disability (ages 6-17)
 - ~2/25 farm family adults have a disability



Assistive Technology (AT)

...any item, piece of equipment, software program, or product system that is used to increase, maintain, or improve the functional capabilities of persons with disabilities.



Smart Technology (ST)

S.M.A.R.T. = "Self-Monitoring, Analysis and Reporting Technology"

“...became widely known as "smart" because of the notion of allowing previously inanimate objects—from cars to basketballs to clothes—to talk back to us and even guide our behavior.”

Smart Technology (ST)

3 Types:

- Smart devices (coffee maker)
- Smart connected devices (wired connection, WiFi, LTE data)
- Internet of Things (IoT) devices (smart meters, commercial security systems, smart city technologies)

Smart Statistics

- Over one-quarter (27%) of US consumers have more than three Smart Home devices
- Another 7% own two or three
- Half of all people surveyed have at least one Smart Home technology—with Millennial (25-to-34 years of age) ownership almost reaching two-thirds (64%)
- 58% say smart homes (a home in which most things are interconnected) will likely change their lives in the next few years
- 68% percent of millennials expect devices from different vendors to talk to each other (even though that's not the current reality)
- Other emerging tech that may change lives: Digital Payments (52%), with Wearables, Cloud Computing and Connected Cars all scoring between 30%–40%

Home-based / Stationary Devices

Smart Hubs & Controllers

- Amazon Echo
 - “Alexa.”
 - Hubs: visual displays, video chats, messaging and email, watch shows.
 - Rotation features
- Apple HomePod
 - “Hey, Siri.”
 - Controllers: voice activated to control hubs, thermostats, lights, TVs, create lists, etc.
- Google Nest
 - “Hey, Google.”



Smart Thermostats

- Control heating / air conditioning
- Learns your schedule
 - Save money
- Control from phones, laptops, smart hubs / controllers
 - Voice commands



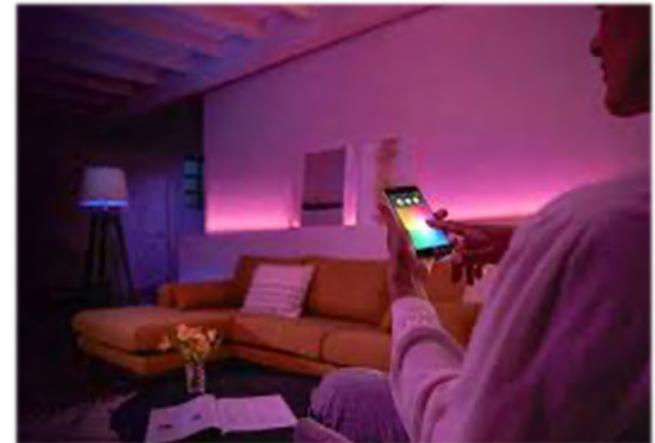
- Spinal Cord Injury (SCI)
- Stroke

Smart Lighting



- Low vision
- Adjust lighting with time of day
- Reduce / eliminate glare

- Control from phone via WiFi
 - Wall switches
- Set timers
- Dimming feature
- Voice control (when connected to smart hub)
- Color feature
- Motion sensors



Smart Televisions

- Internet access
- Applications
 - Netflix, YouTube, etc.
- Weather display
- Social media
- Games
- Video chat
 - via smart phone connection



- Voice activation – remote
- Social connection

Environmental Safety

- Dementia
- Mental Health
- Environmental modifications
- Simplicity → Safety



Smart Locks



- Hand injuries - keys
- Reduced ROM / strength
- Reduced fine motor

- Lock / unlock doors with keypad codes, laptops, or phones.

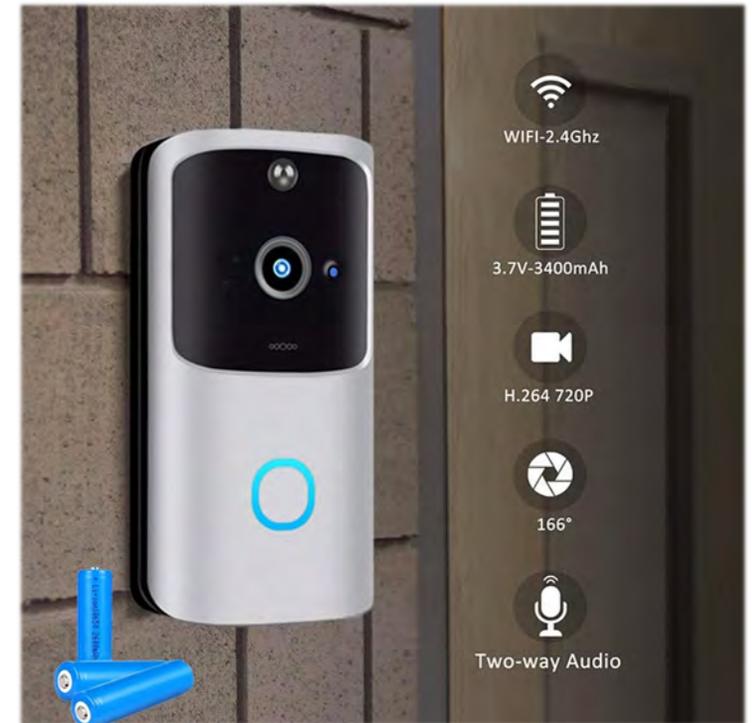


Smart Doorbell

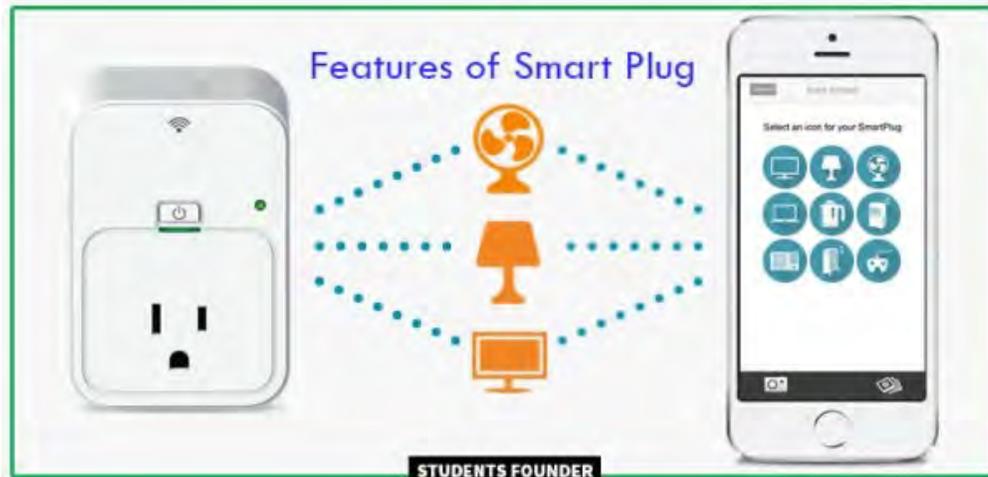


- SCI, stroke, loss of limb(s)
- Conservation of energy
- “Front door open.”

- Two-way audio
- Motion sensors
- Wide-angle lenses
- Live-view any time



Smart Plugs



- Smart hub connectivity
 - Voice control
- Control from phone / laptop via WiFi or Bluetooth
- Set timers / schedules
- Conservation of energy

Medication Technology

- PillDrill
 - Reminders, logs information, sends notifications
- ScriptTalk
 - Pharmacy program
- Be My Eyes
 - App for the blind / those with low-vision
 - Volunteers
 - 180 languages



- Low vision / hearing impaired
- Memory loss

Wearable / Portable Devices



Smart Phones



- “Computers in our pockets”
- Call / Text / Email
- Internet access
- Social media
- Television / movies
- Games
- Voice activation
- Video chat

- Social connection
- Facial recognition
- Anti-glare screen covers



* 5-click iPhone Safety Feature

Smart Watches

- Tells time
- Monitors heart rate
 - Fitbit oxygen monitoring
- Tracks activity
 - Reminders
 - Achievements
 - Social media
- GPS features
- Control music
- Voice activation
- Bluetooth / LTE data



- Low and High Tech Options Available
- Times when smart phone is unavailable
- Times of emergency

Smart Watches



- Emergency calls when cell phone is unavailable.

Philips Lifeline



- On-the-go products
- At home products
- Water proof product
- Fall detection technology

- Wearable wrist band / necklace options
 - * Strangulation risk
- Range/Distance from Base Station - 800 ft



Portable Vital Sign Products

- Body Temperature
- Blood Pressure
- Pulse (heart rate)
- Respiratory (breathing) rate
- Blood Sugar
- Oxygen levels



G95 – Bioscarf

- Built-in N95 air filter
 - “G95 technology”
- In tests, Bioscarf filtered out an average of 99.75% of all airborne particulates.
- Can help protect from pneumonia, strep, influenza, tuberculosis, pm2.5, pet dander, pollen, smoke, and many other airborne contaminants.



Devices on the Farm & IoT Devices

Drones

- Soil and Field Analysis
- Seed Planting
- Crop Spraying and Spot Spraying
- Crop Mapping and Surveying
- Irrigation Monitoring and Management
- Real-Time Livestock Monitoring





WaterBit™

- Crop Quality & Yield
- Water Management
 - Irrigation planning & execution - Leak detection
 - Verification of plan
- Labor Cost Management
 - Automation

“WaterBit’s cloud-based solution combines near real-time data on soil and crop conditions with closed-loop automation tools to plan and control irrigation. WaterBit translates technology into tangible value for growers by improving yields and crop consistency, and optimizing water and labor.”

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QUANTIFIEDAG®

- Identify Sick Animals Earlier And More Accurately
- Earlier Identification Means Quicker Treatment Interventions
- Improve Labor Efficiency And Save Time Looking For Sick Animals



QUANTIFIEDAG[®]

Lithium Battery

Lasts Longer Than The Life Of The Animal

Temperature Sensor

Reads Fluctuations In The Animal's Ear Canal Temp

Power Button

Easily Turn Tag On/Off Or Reset For Reuse

Industry Standard Pinning Technique

Allows The Tag To Be Reusable & Easy To Apply

Affordable Per Head Cost

Reusing The Tag Keeps The Price Down

Bright LED Lights

Identify The Outlier

Animal's Data

Sent To The Cloud

Impact Resistant

Polycarbonate Shell

Measures Activity

Detects Animal Movements



Upcoming Technology?

- Device can be fed to the cow and used as an in-animal monitoring device.
- Sensor monitors body-temperature and sends a signal directly to a veterinarian to alert them that a particular cow is ovulating.
- Saves time and guess work.
- This product was being tested in 2017.

Smart Farm Equipment

- Leak detection
- Fuel filters
- Oil life
- Over heating
- Smart sensors communicate with equipment dealerships
- Dealership contacts farmer / operator to notify them
- Detect potential problems and take preemptive steps to avoid further issues
 - May reduce down time
 - May be cost effective

Thank you for your interest!



National AgrAbility Project

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