RSAConference2019
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SESSION ID: **SBX1-W1**

Internet of Food: How IoT Threatens Fields, Farms and Factories

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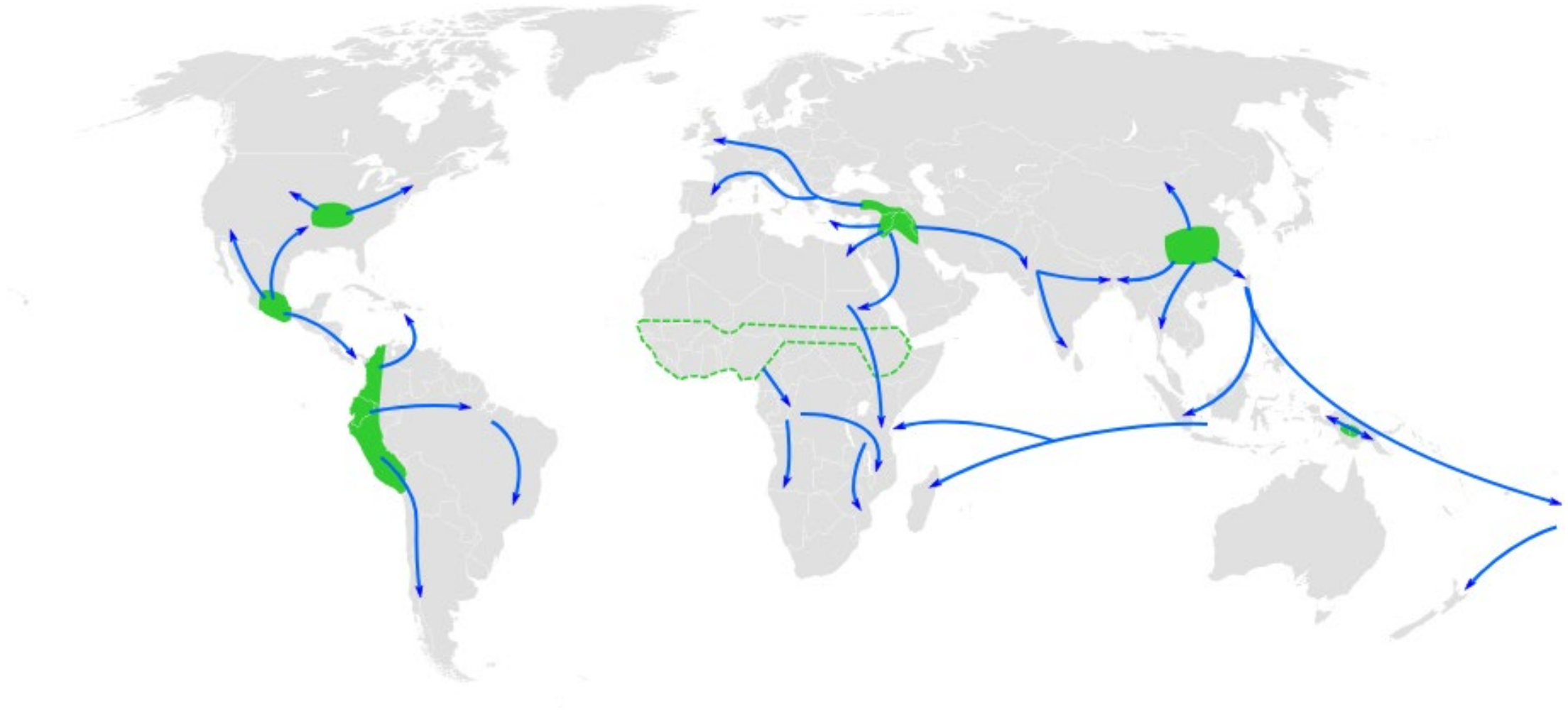
https://www.nationalgeographic.com/foodfeatures/feeding-9-billion/

Cradles of Agriculture



Humans Controlling the Environment

Humans Controlling the Environment

Humans Controlling the Environment

TREND MICRO | research

Industrialization of Food Production

- The need to feed…
  - 7.7 billion people as of 2018
  - Projected to reach 9.7 billion by 2050
- Less farmers
  - 2 out of 3 persons would be living in urban environments
- No additional farmland please
  - Agriculture and ranching are the biggest reasons for forest loss


68 - 75 Fahrenheit

Trends in Smart Agriculture

Category	Description
Precision Farming	Sensor Network, GNSS, 1km-mesh weather data, Smart Drip Irrigation
Remote Access	VNC access, Mobile Apps, Remote Support
Remote Sensing	Temperature, Humidity, Dissolved Oxygen
AI	Crop Profile, Soil Profile, Climate Profile, AI-based decision support
Automation	Automated Steering, Irrigation, Feeding, Temperature Control

Wiser spending, More yield,
Less workload/damage

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Cyber-security risks in Food Production IoT and Automation

Online Farm Management

RTK Base Stations

Exposed Systems

Physical Security

Patching and
Secure Configurations

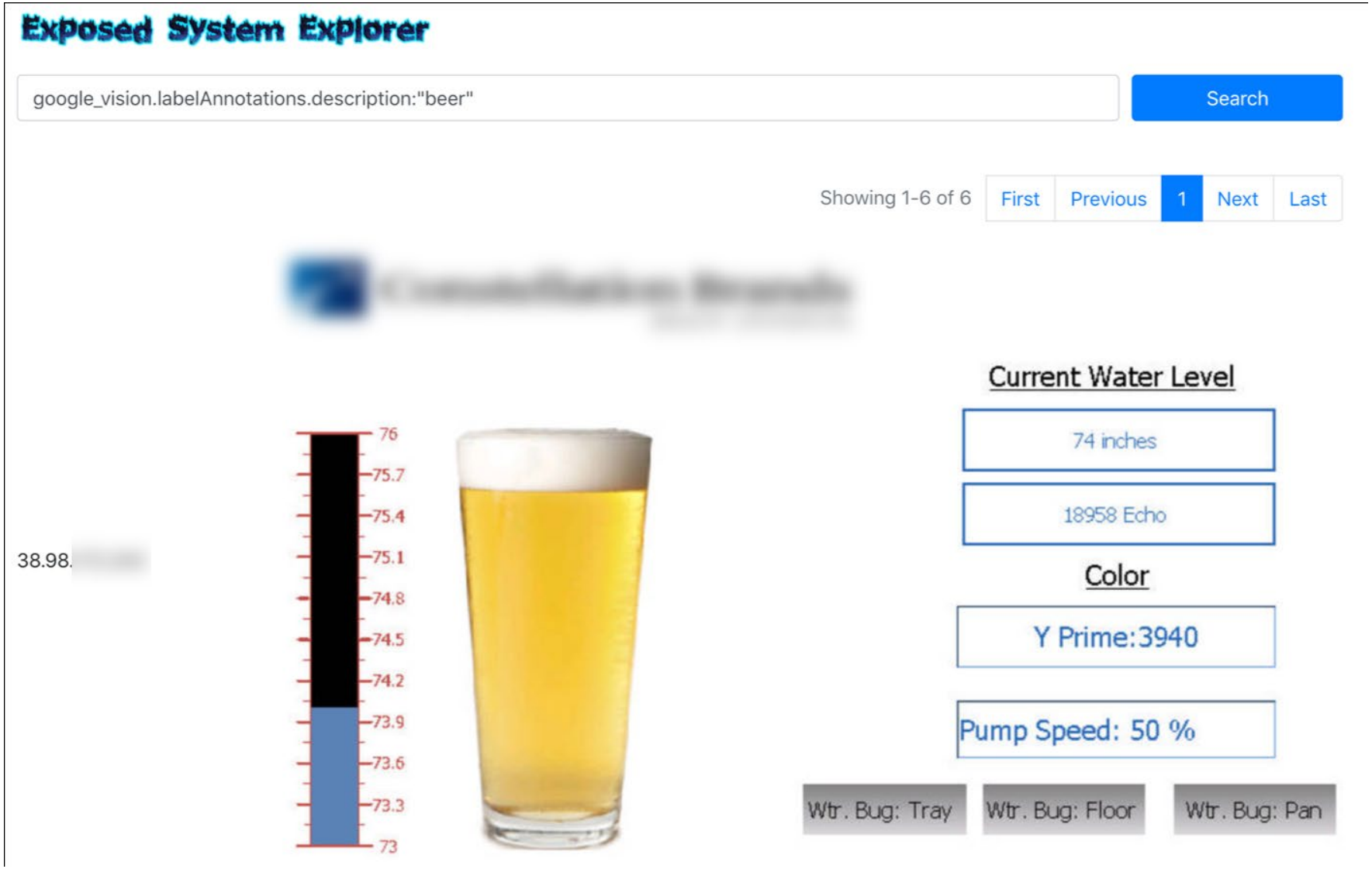
1. Exposed Systems

- Exposed VNC server to the Internet (without password)
- ***Exposed System Explorer*** - internal system with data enrichments on top of Shodan

OCR Text	Text, Language, (x,y)Location on the image.
Image Hash *	To find similar images.
Image Info	sha256, file size.
Web Detection	URL to Same / similar image.
Label Detection	Name of things in the image. (e.g. cat, dog)
Logo Detection	Name of logos in the image.

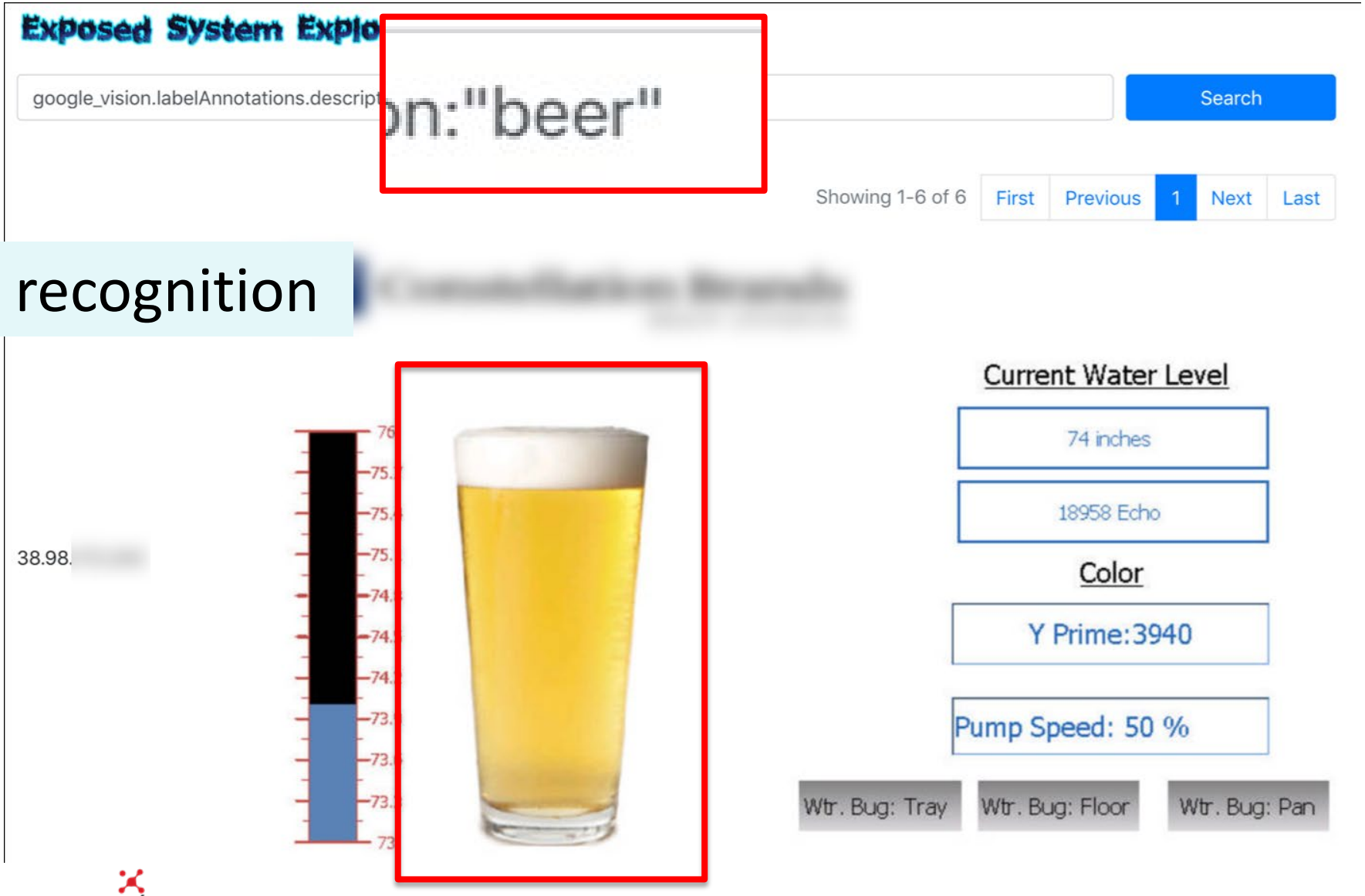
* Source: https://github.com/JohannesBuchner/imagehash

“Exposed System Explorer” - Brewery



“Exposed System Explorer” - Brewery

Image recognition



“Exposed System Explorer” - HVAC for poultry barn

Exposed System Explorer

google_vision.fullTextAnnotation.text:"poultry barn"

Search

Showing 1-1 of 1 First Previous 1 Next Last

50.67.

Poultry Barn --

2018/11/03 - 00:53:05

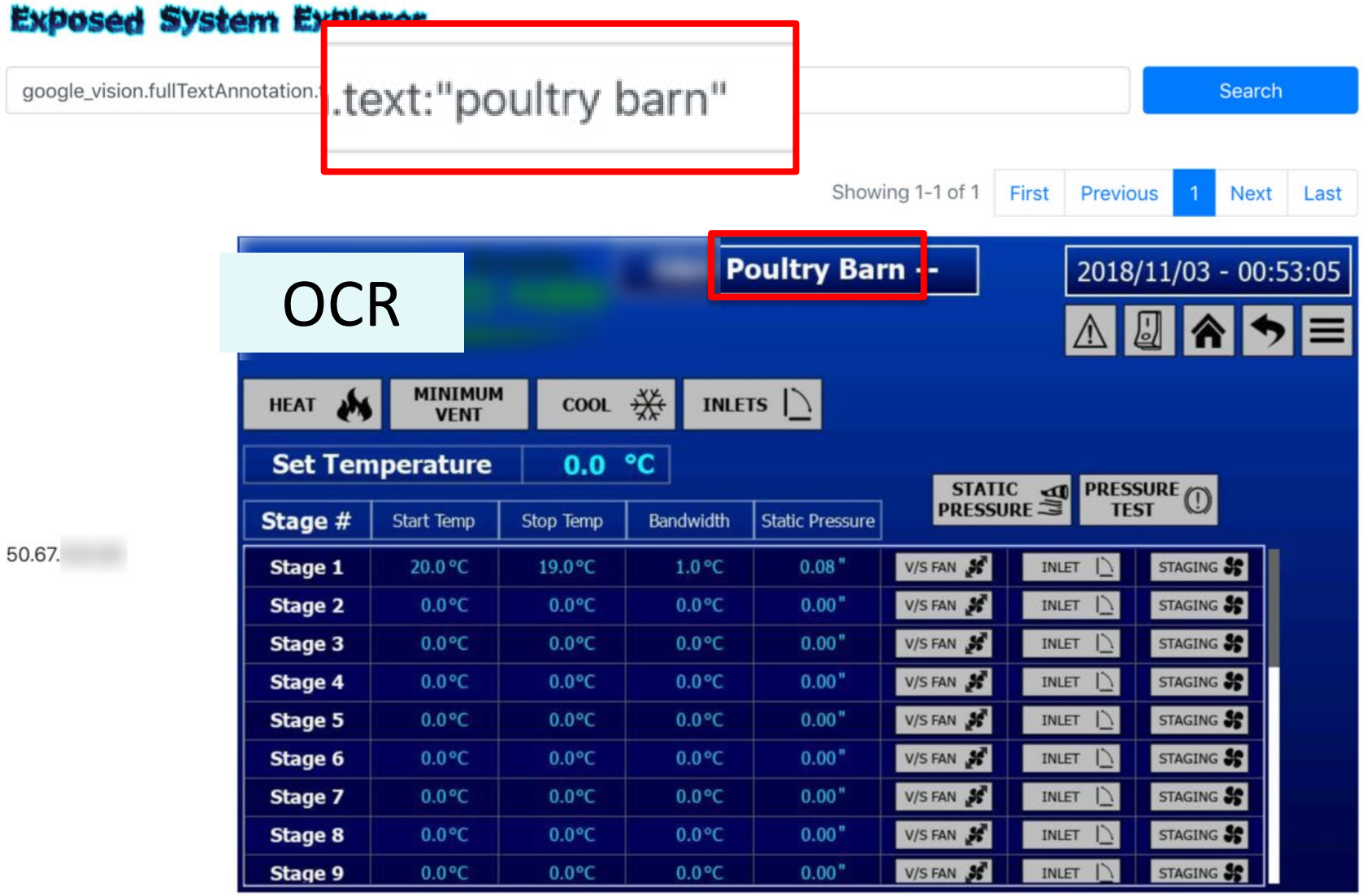
HEAT | MINIMUM VENT | COOL | INLETS

Set Temperature 0.0 °C

STATIC PRESSURE | PRESSURE TEST

Stage #	Start Temp	Stop Temp	Bandwidth	Static Pressure			
Stage 1	20.0 °C	19.0 °C	1.0 °C	0.08 "	V/S FAN	INLET	STAGING
Stage 2	0.0 °C	0.0 °C	0.0 °C	0.00 "	V/S FAN	INLET	STAGING
Stage 3	0.0 °C	0.0 °C	0.0 °C	0.00 "	V/S FAN	INLET	STAGING
Stage 4	0.0 °C	0.0 °C	0.0 °C	0.00 "	V/S FAN	INLET	STAGING
Stage 5	0.0 °C	0.0 °C	0.0 °C	0.00 "	V/S FAN	INLET	STAGING
Stage 6	0.0 °C	0.0 °C	0.0 °C	0.00 "	V/S FAN	INLET	STAGING
Stage 7	0.0 °C	0.0 °C	0.0 °C	0.00 "	V/S FAN	INLET	STAGING
Stage 8	0.0 °C	0.0 °C	0.0 °C	0.00 "	V/S FAN	INLET	STAGING
Stage 9	0.0 °C	0.0 °C	0.0 °C	0.00 "	V/S FAN	INLET	STAGING

“Exposed System Explorer” - HVAC for poultry barn



“Exposed System Explorer” - Aquaculture

Exposed System Explorer

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Search

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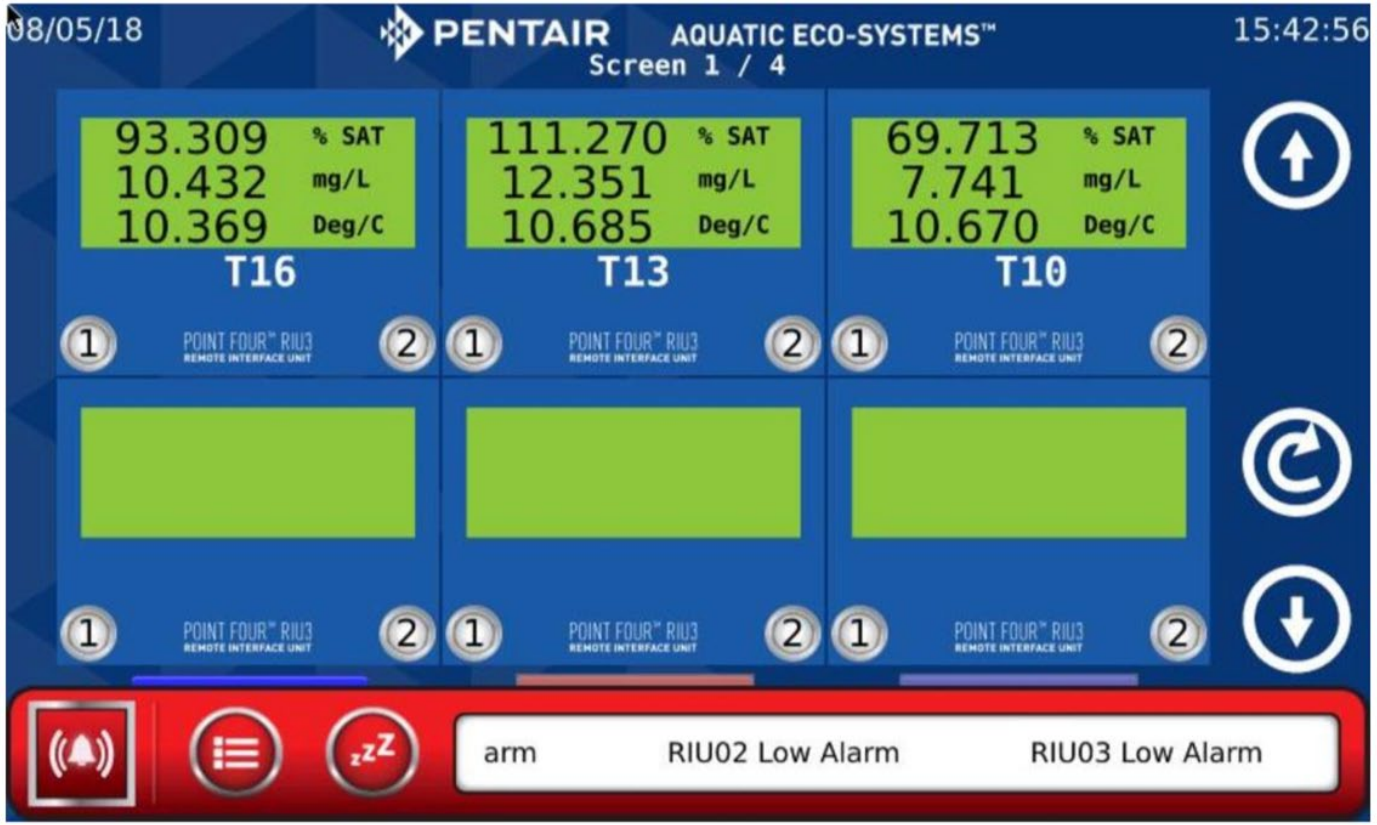
182.54.



“Exposed System Explorer” - Aquaculture

Exposed System Explorer

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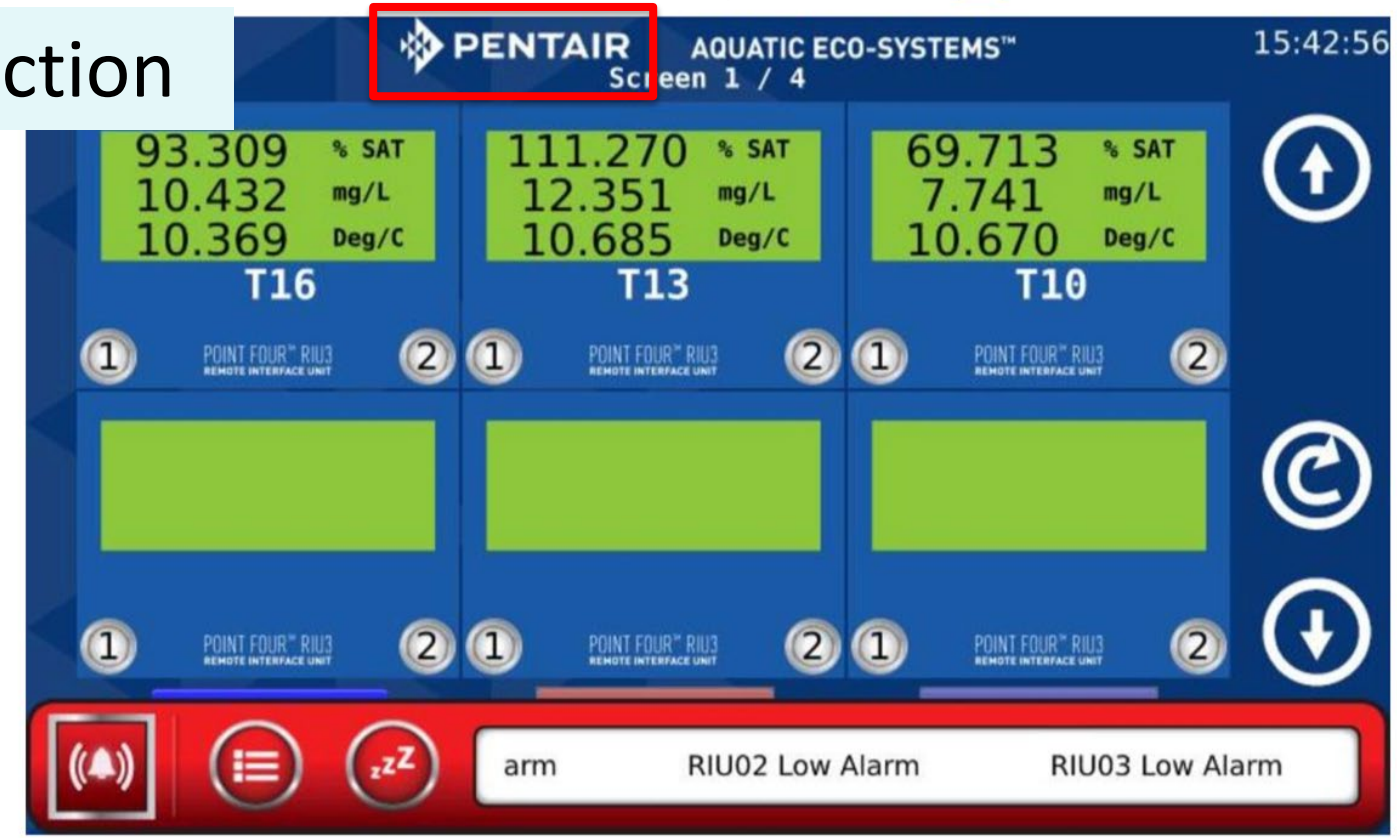
Search

Showing 1-10 of 156 First Previous 1 2 3 4 5 Next Last

Logo detection

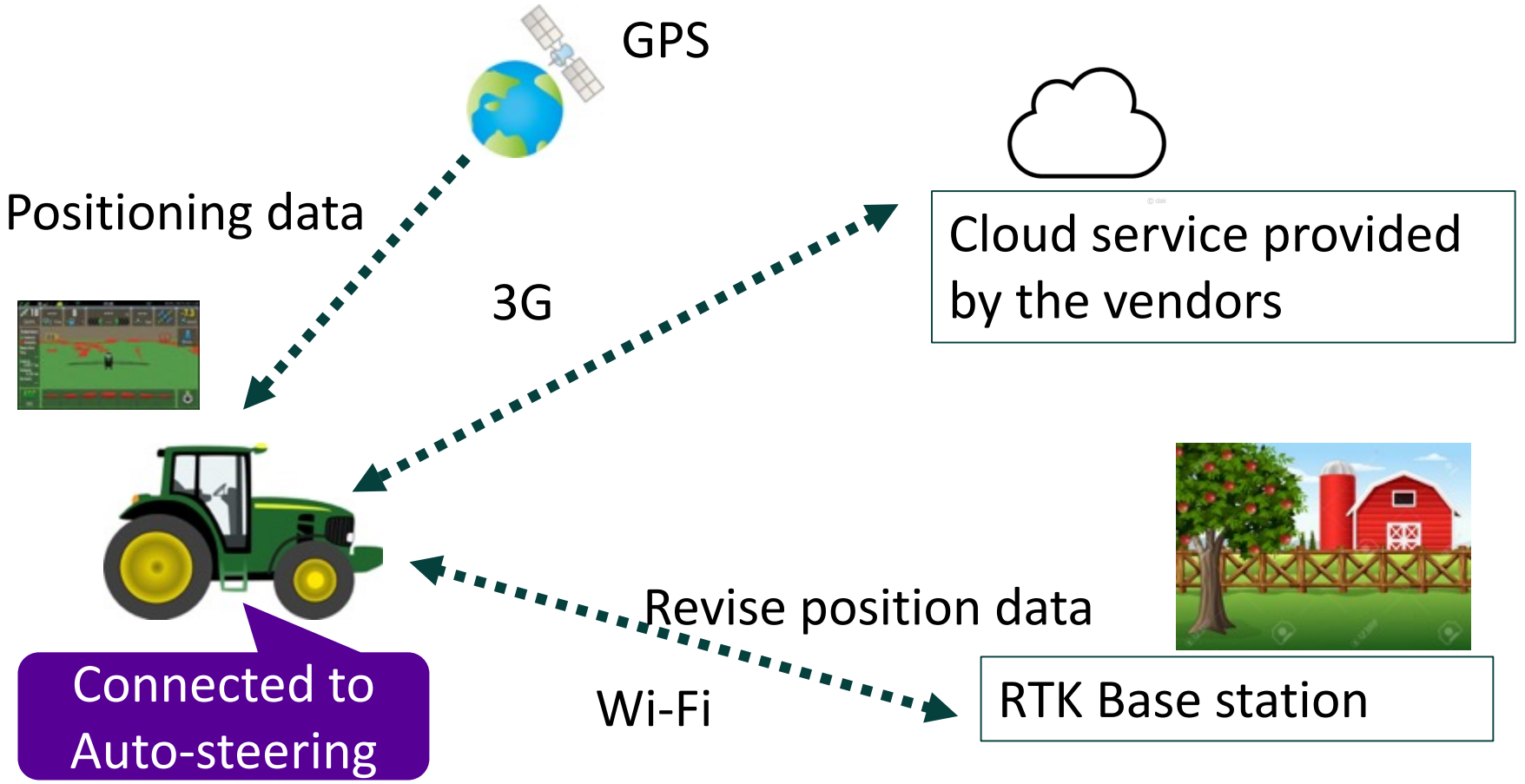
182.54.



1. Exposed Systems

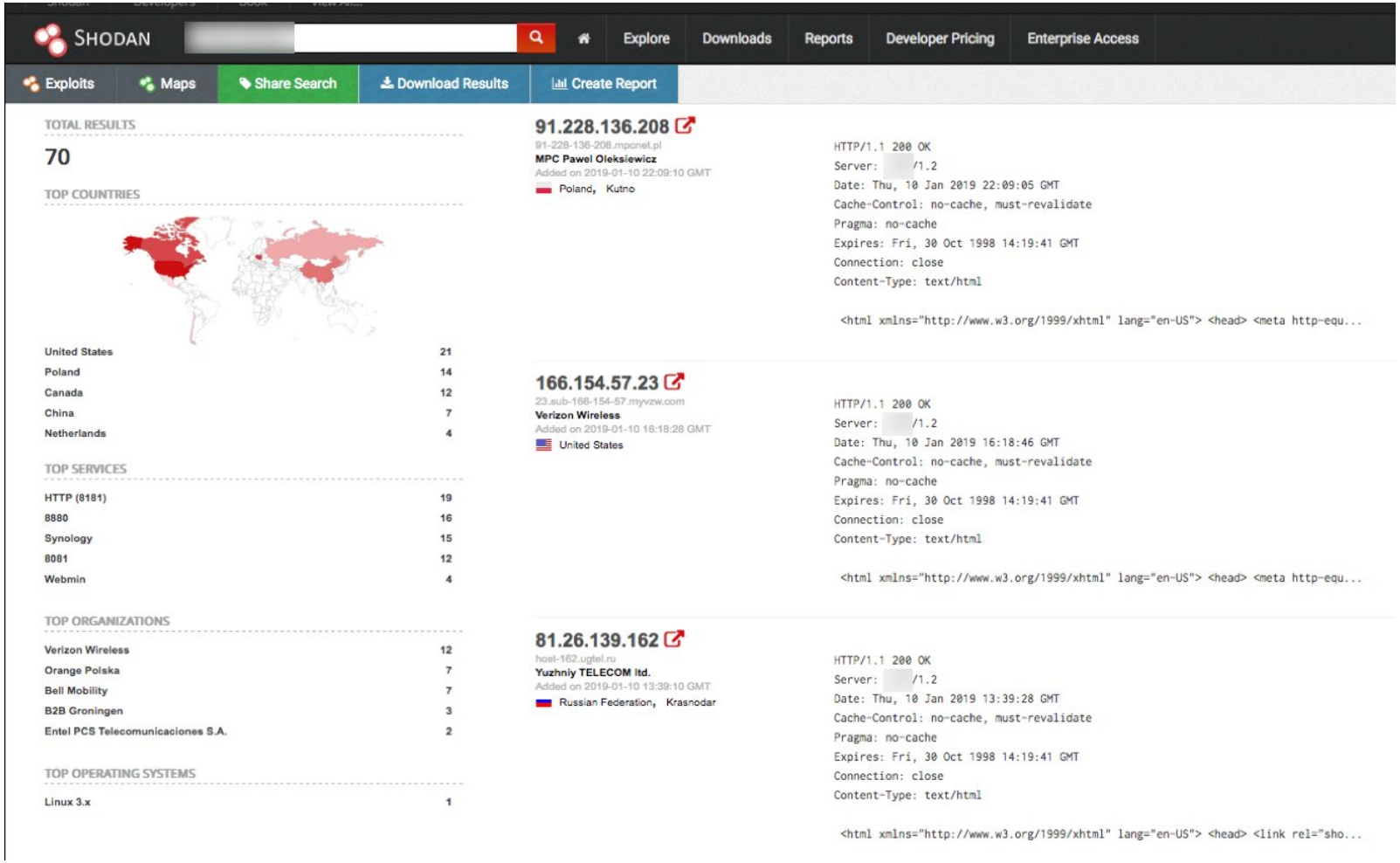
Category	Type of System, Device
Farming	Tractor, GPS Base station for tractor, Irrigation Management, Storage, Silo Management, Weather Monitoring, Farm Management,
Stock bleeding	Feeding, Waste Treatment, Ventilation Control for Poultry,
Aquaculture	Water Management, Oxygen Generator
Food processing	Sausage Maker, Refrigeration System, Brewery
Others	Biogas Plant, Biomass Plant

2. RTK Base Stations



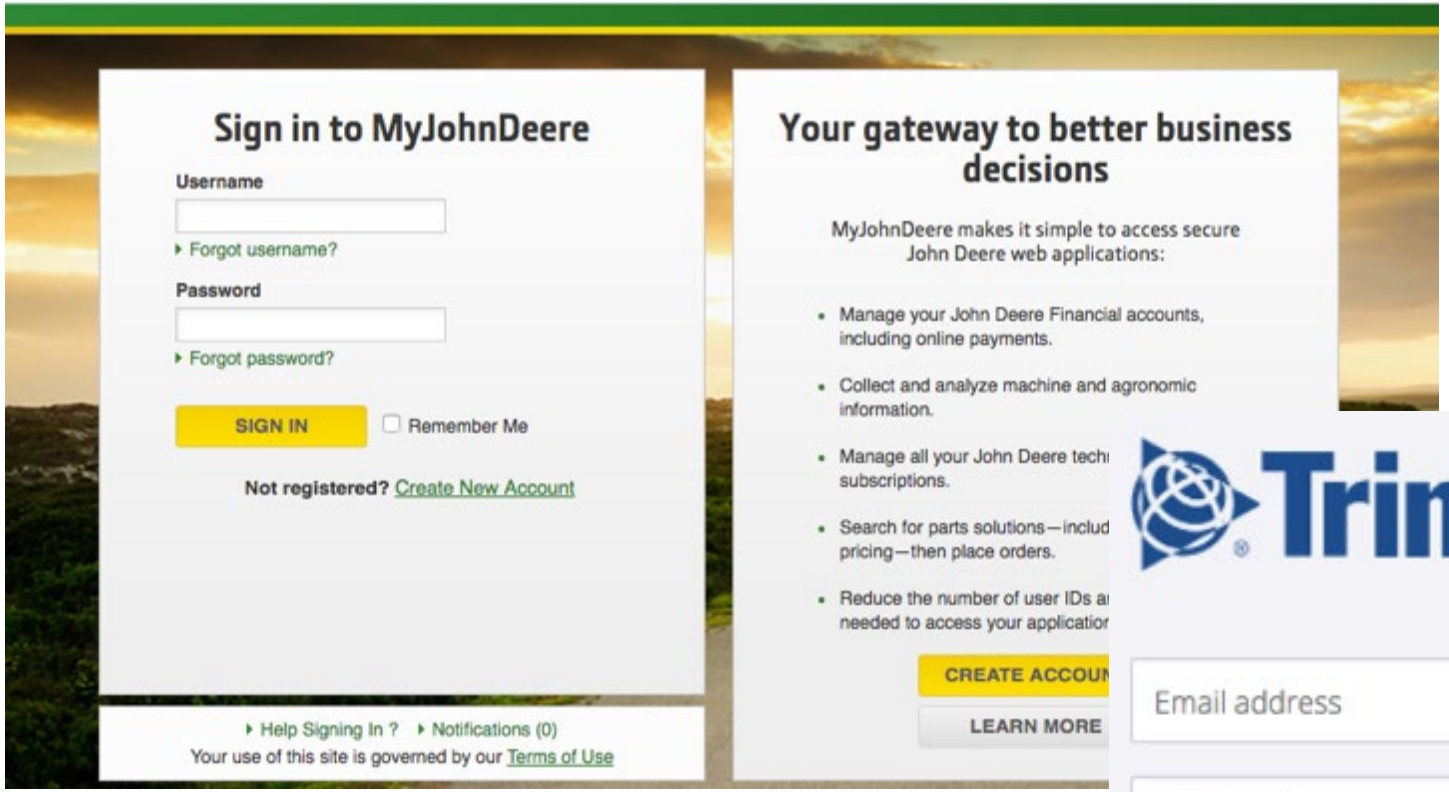
RTK: Real Time Kinematic

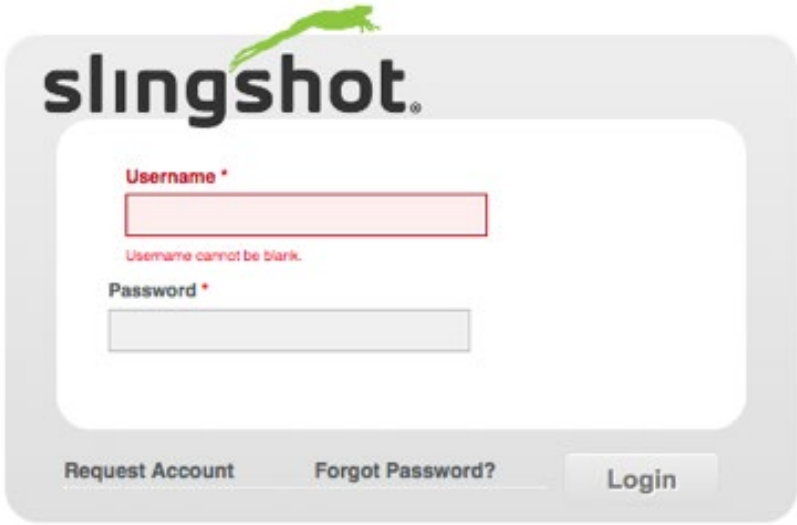
2. RTK Base Stations



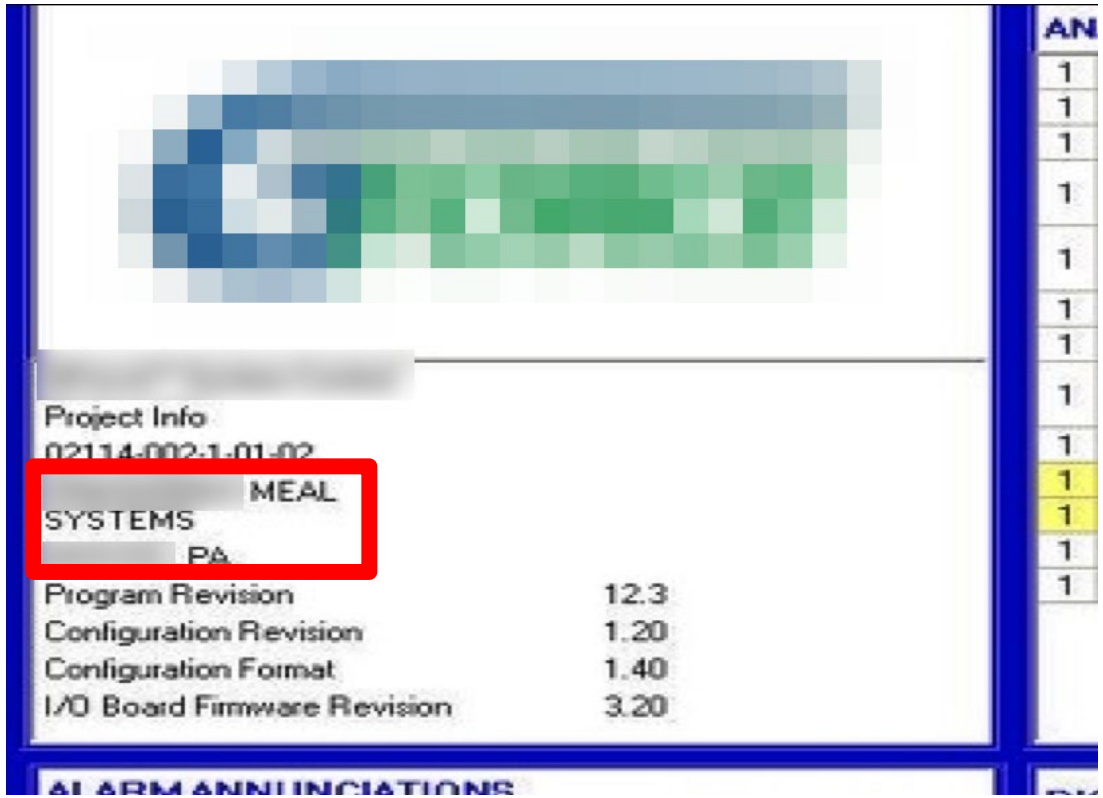
3. Online Farm Management

JOHN DEERE MyJohnDeere





4. Physical Security



Search by the name of company and address

5. Patching and Secure Configurations

Sierra Wireless Technical Bulletin: Mirai Malware

Products: Sierra Wireless LS300, GX400, GX/ES440, GX/ES450 and RV50

Date of issue: 4 October 2016

Sierra Wireless FAQ: Malware Threat

Products: AirLink® Gateways running ALEOS 4.5.2 or older using default user or viewer password

Date of issue: 11 September 2017

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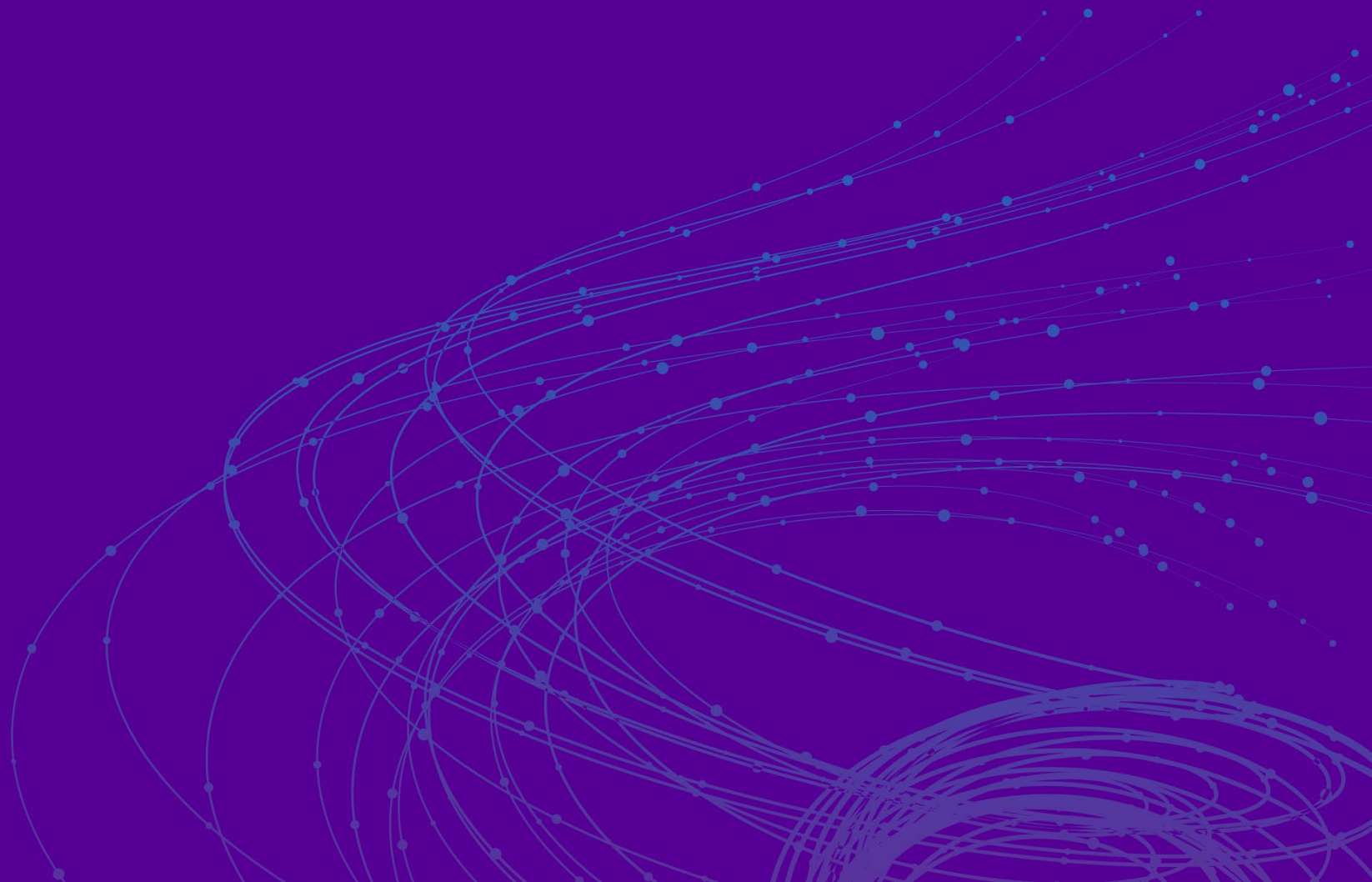
Impact



Impact: Food Safety Traceability and Recall

GAP: Good Agricultural Practices

HACCP: Hazard Analysis Critical Control Point

Goal: to make food processing safer through records of critical control points

Data integrity issues on compromise or ransomware situation

Impact: Growing and Harvesting Cycle

- Spinach: 30 days
- Chicken: 39 days
- Corn: 2 months
- Rice: 3 months
- Tilapia: 6 months
- Hog: 6 months
- Cattle: 18 months

BUSINESS INSIDER

TECH | FINANCE | POLITICS | STRATEGY | LIFE | ALL

Nobody knows why 320,000 chickens were killed i looks like ar

Janaki Jitchotvisut, First We Fea

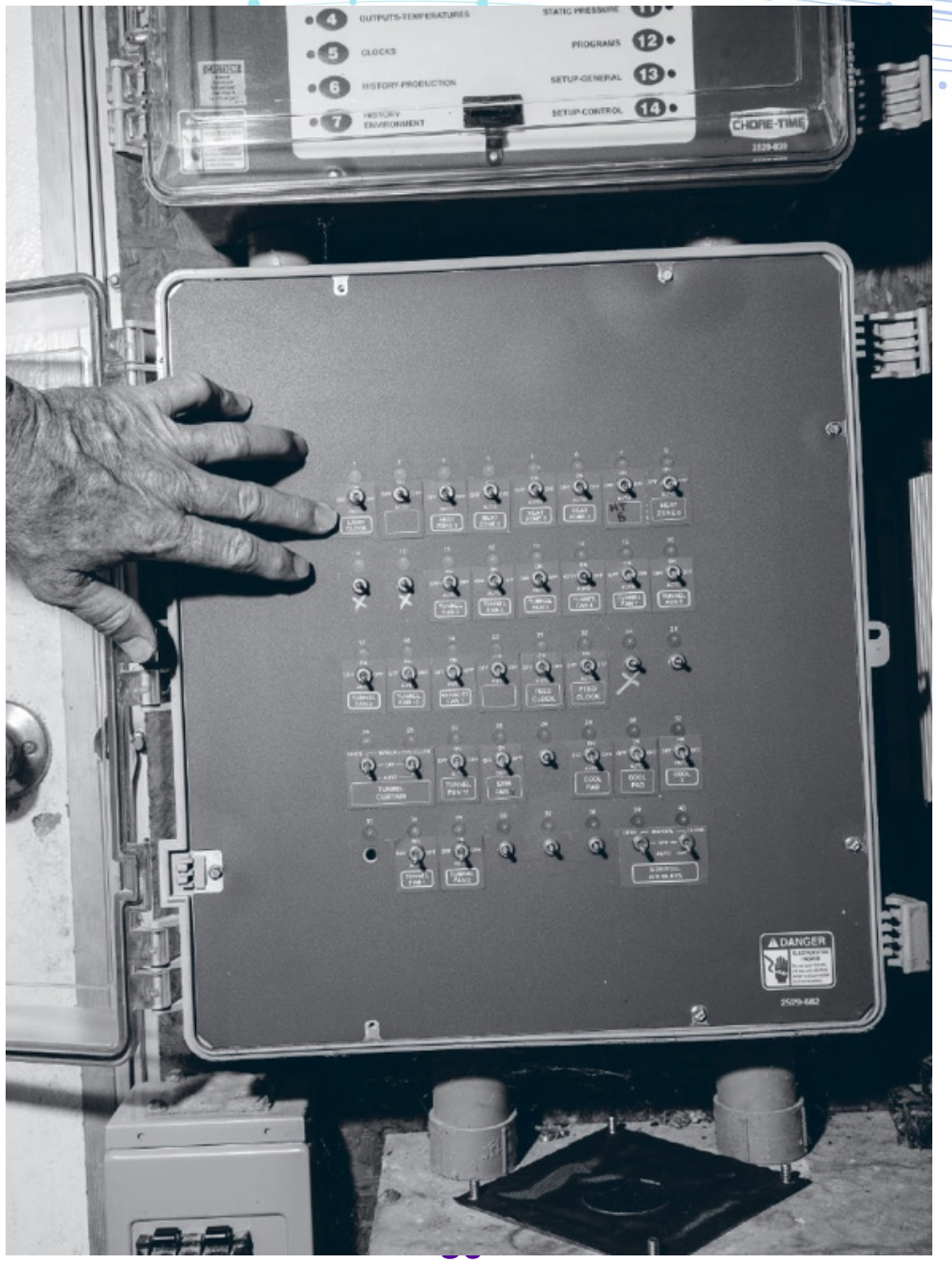
Bloomberg Businessweek

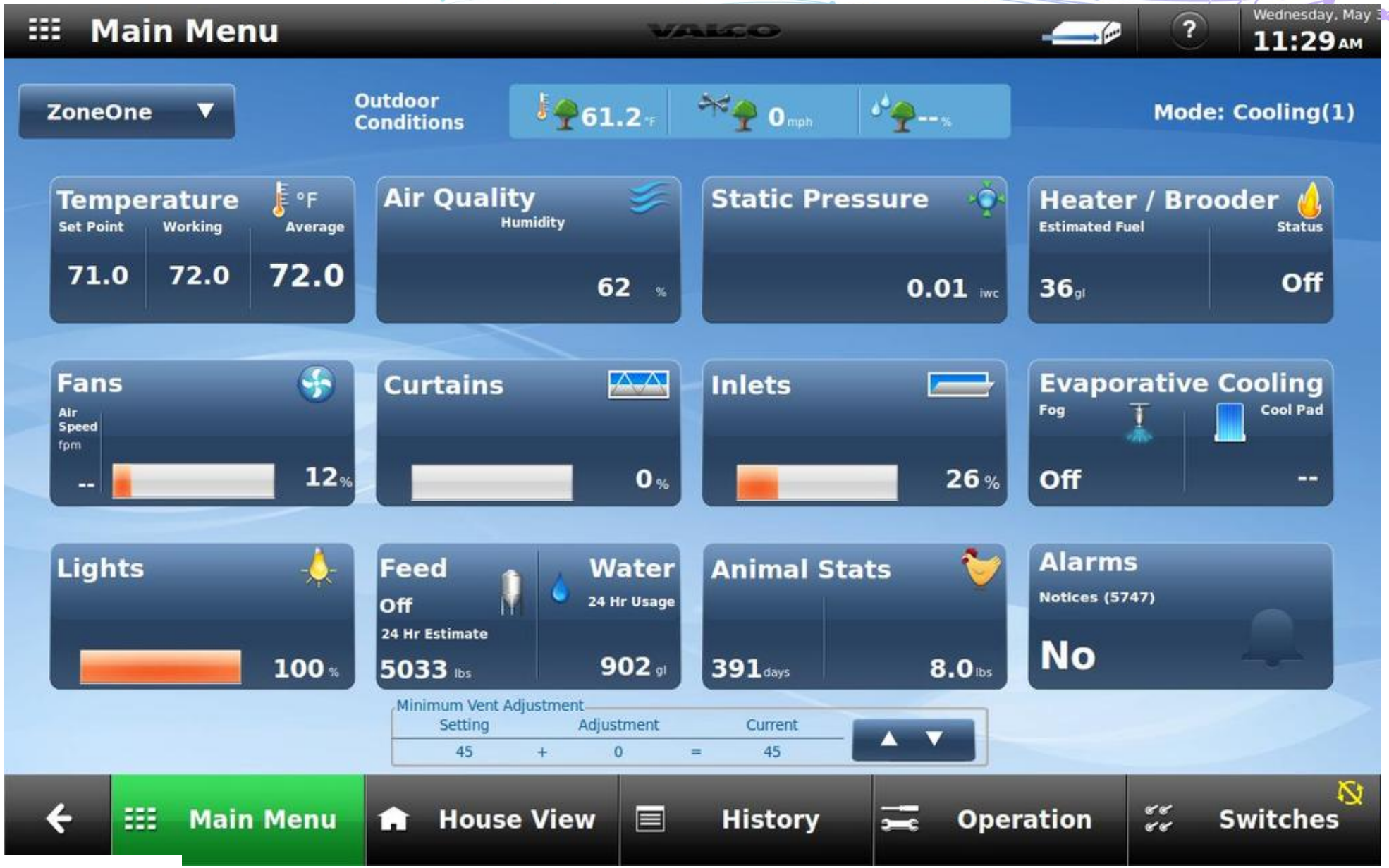
Who's Murdering Thousands of Chickens in South Carolina?

0,000 ed in South n Attacks After Plant Closing

By BEN MATHIS-LILLEY

MARCH 05, 2015 • 1:58 PM


4 OUTPUTS-TEMPERATURES
5 CLOCKS
6 HISTORY-PRODUCTION
7 HISTORY-ENVIRONMENT
STATIC PRESSURE
PROGRAMS
SETUP-GENERAL
SETUP-CONTROL
CHORE-TIME
DANGER


Main Menu
VALCO
Wednesday, May 3
11:29 AM
ZoneOne
Outdoor Conditions
61.2 °F
0 mph
-- %
Mode: Cooling(1)
Temperature
°F
Set Point
Working
Average
71.0
72.0
72.0
Air Quality
Humidity
62 %
Static Pressure
0.01 iwc
Heater / Brooder
Estimated Fuel
Status
36 gl
Off
Fans
Air Speed
fpm
--
12 %
Curtains
0 %
Inlets
26 %
Evaporative Cooling
Fog
Cool Pad
Off
--
Lights
100 %
Feed
Off
24 Hr Estimate
5033 lbs
Water
24 Hr Usage
902 gl
Animal Stats
391 days
8.0 lbs
Alarms
Notices (5747)
No
Minimum Vent Adjustment
Setting
Adjustment
Current
45
+
0
=
45
Main Menu
House View
History
Operation
Switches

What to do?

- Audit IoT devices and identify underlying OS, applications, services and opened ports. Look for common vulnerabilities and poor security configurations.
- User Education: we are asking farmers to operate technologies they may not be familiar with, or understand the risk implications.
- IT best practices apply:
  - Secure configurations
  - Threat of phishing
  - Patching and device management

Conclusion

- IoT in farming and food production is a national and global concern.
- A successful attack results in tangible losses – lost growing cycle, financial loss, environmental concerns.
  - Exposed Internet Connected Systems
  - Internet Connected Positioning Receivers and Base Stations
  - Online Farm and Data Management
  - Pinpointing the Position of Farms and Facilities for Physical Access
  - Unpatched Common Operation Systems and Applications
- Treat IoT systems as if they are IT systems

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Thank you!

Questions?

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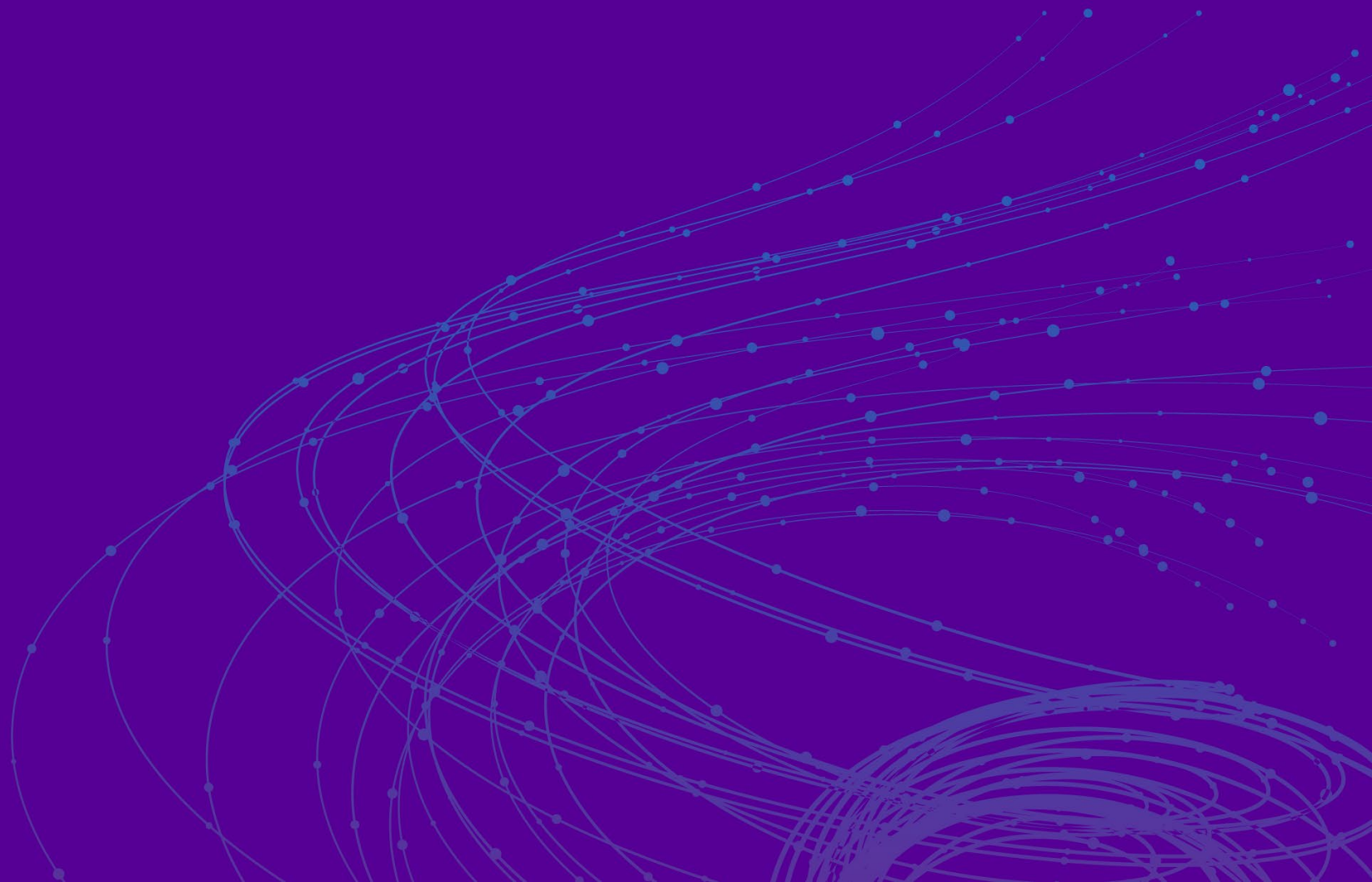

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