Automated systems for the horticulture industry of 2050

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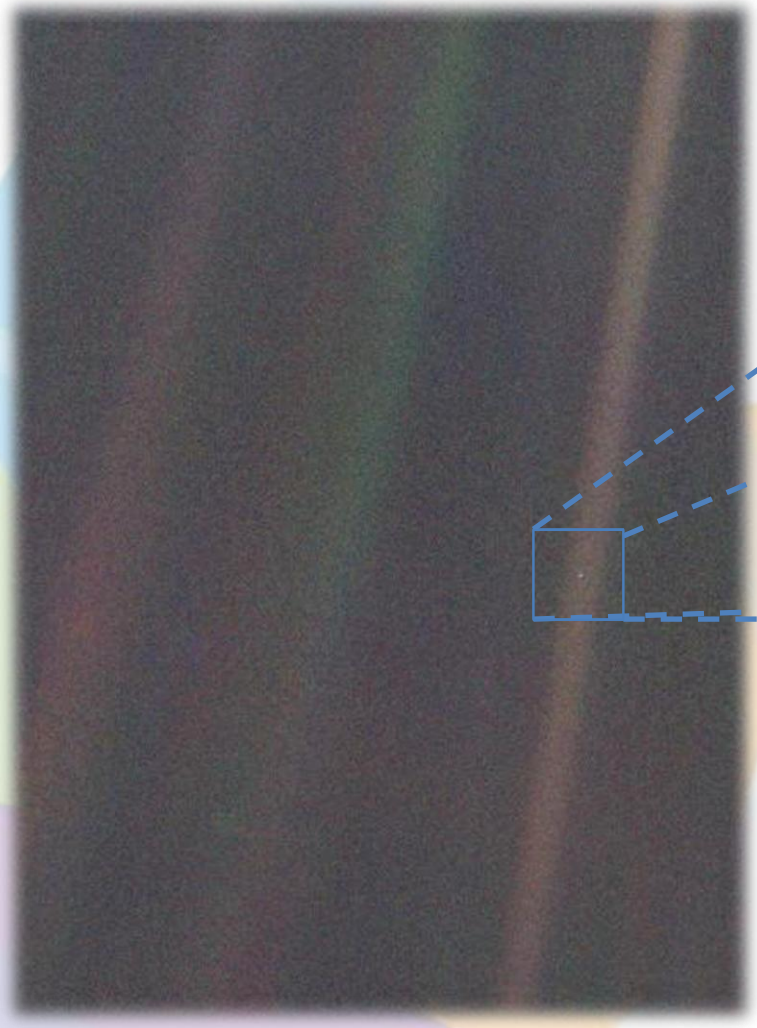
The Primary Industries Climate Challenges Centre is a joint venture between the University of Melbourne and the Victorian Department of Environment and Primary Industries

THE UNIVERSITY OF MELBOURNE

State Government Victoria Department of Environment and Primary Industries

“The Pale Blue Dot” (Carl Sagan)

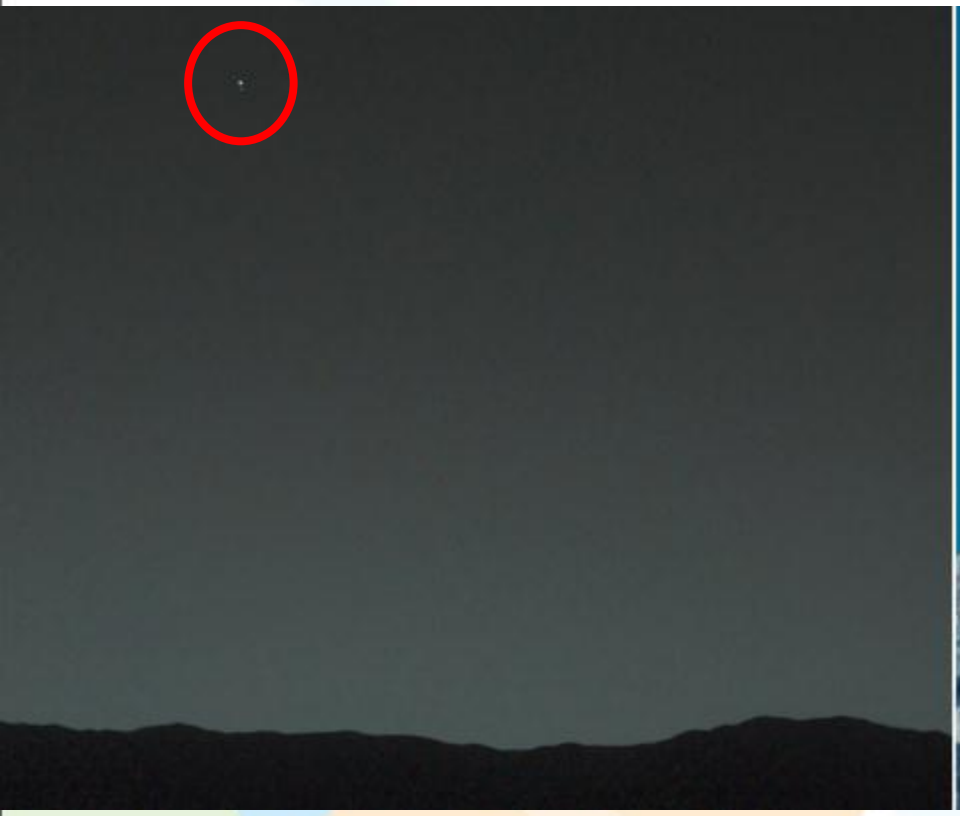
THE CONTEXT:



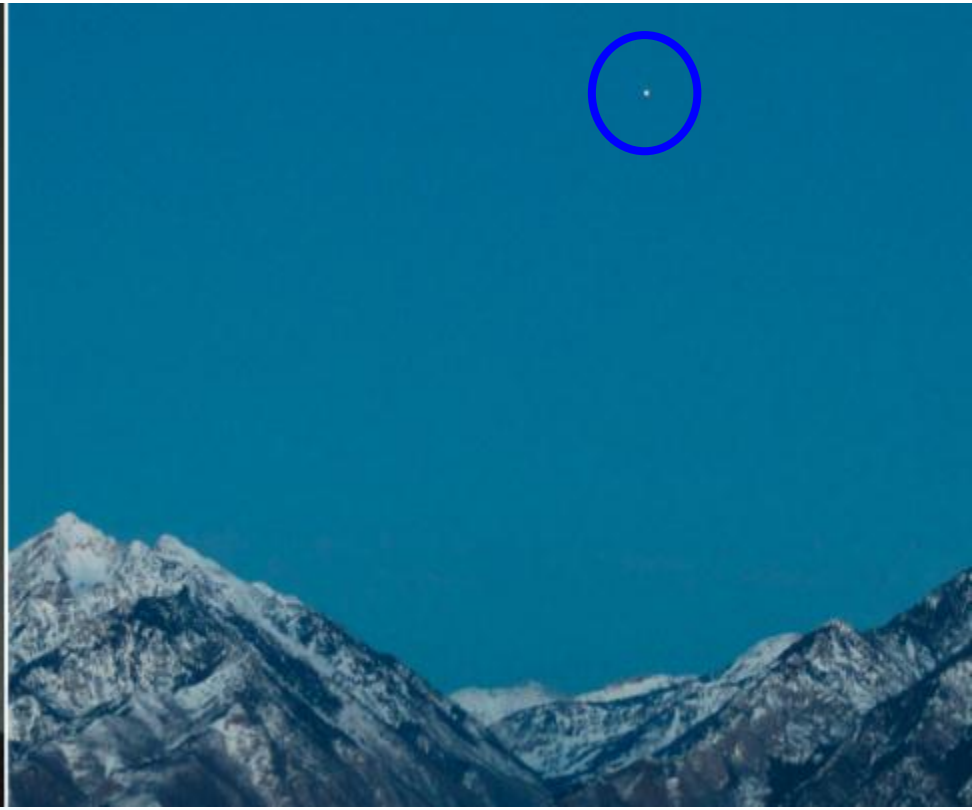
Earth at 6.5 Mill. Kms

Voyager 1: Feb 14th 1990
Launched: Sept. 5th 1977
Credit: NASA

Earth from Mars and Mars from Earth



Picture: Curiosity rover
NASA/ JPL – Caltech/MSSS/TAMU



Mars from Salt Lake city (USA)
Bill Dunford. Via ridingwithrobots.org

To consider:

Potential impacts of space exploration on Horticulture

Earth from Mars and Mars from Earth

Picture: Curiosity rover
NASA/ JPL – Caltech/MSSS/TAMU

Mars from Salt Lake city (USA)
Bill Dunford. Via ridingwithrobots.org

“Space Cherry” Tree Blossoms 6 years Early Following trip Aboard the ISS

Silent Running (1972)

Could Nasa start FARMING in space? Agency plans to grow vegetables 230 miles above Earth by the end of this year

- **Nasa plans to grow six romaine lettuce plants under pink LED lamps on the International Space Station within the next three months**
- **If successful, a scaled-up version of its space farm could deliver a lasting supply of food to astronauts on deep space missions**
- **This could cut cost of sending food from Earth - currently at £14,000 per kg**

By ELLIE ZOLFAGHARIFARD

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At nearly £14,000 to send a kilogram of food into space, cosmic cuisine doesn't come cheap.

But by December this year, Nasa plans to have grown its own food in space for the first time.

As well as cutting costs, Nasa is hoping its space farm will be scaled up to deliver a lasting supply of food for astronauts on deep space missions.

By December, Nasa plans to have grown its own food in space for the first time. In preparation for the project, the space agency grew plants under red and blue lights to better understand growth patterns

The Vineyard of The Future Initiative

www.vineyardofthefuture.wordpress.com

Biological sensors as part of the Network

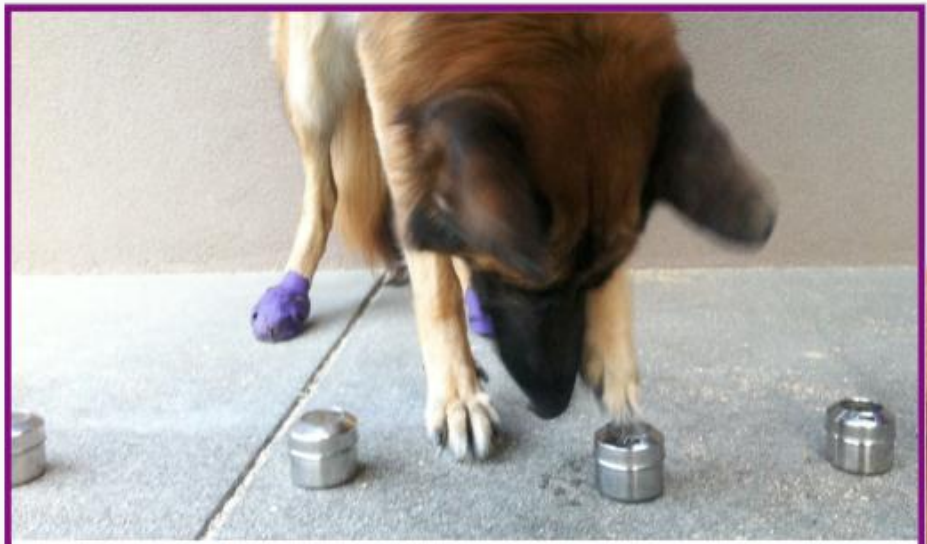


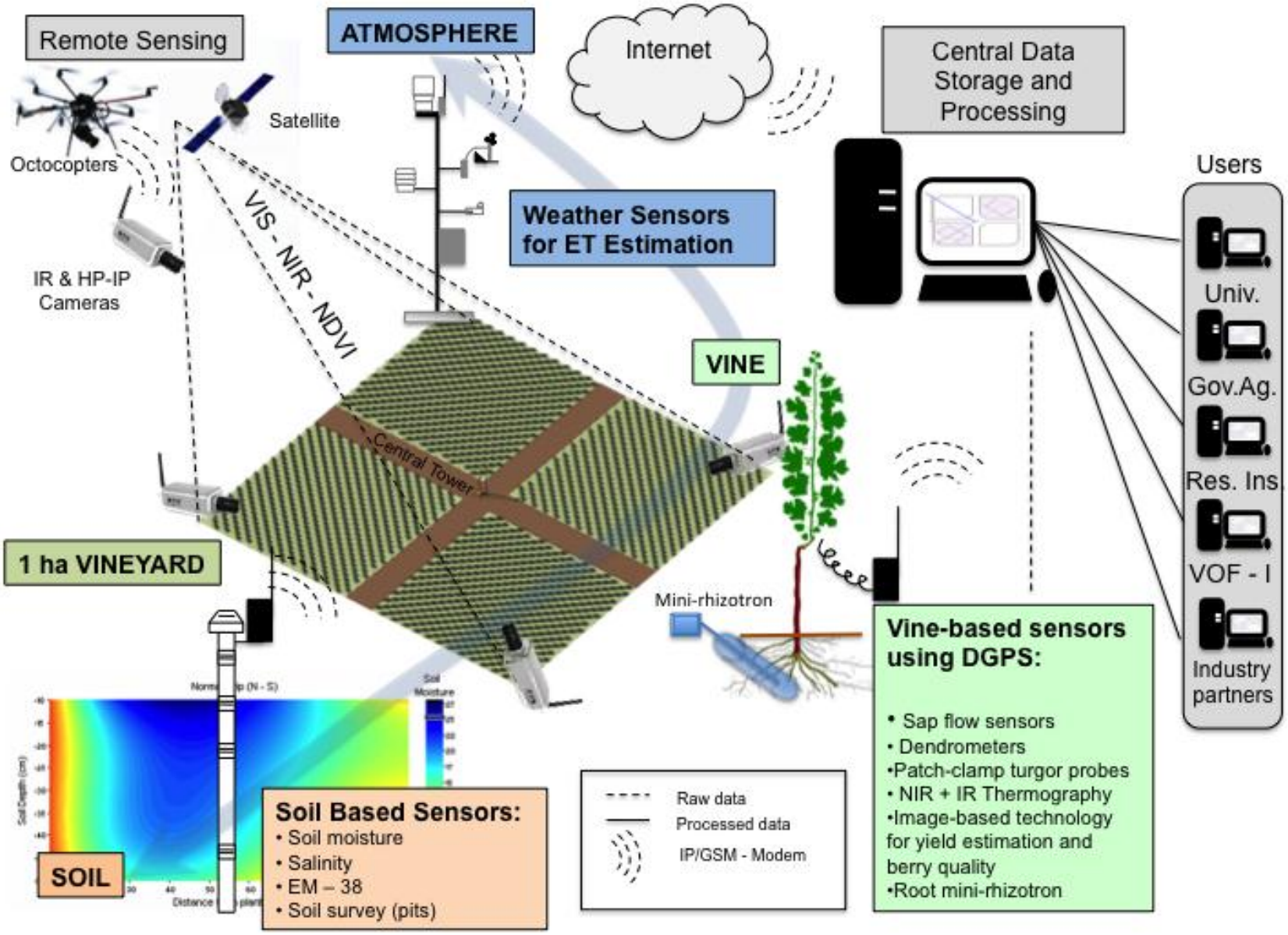
Figure 1: The dog moves along a line of containers and correctly indicates with a focused stare and a touch with the paw.

Figure 2: Scent containers used for proofing and threshold testing. Containers hold the target scent as well as a number of decoy scents that the dog must ignore such as grape vine material, ethanol, oak, food, wine and cotton tips.

Dog in the picture: Luther, trained by Sonja Needs.

System Integration: Capture – Analysis - Delivery

Vineyard of the Future



System Architecture

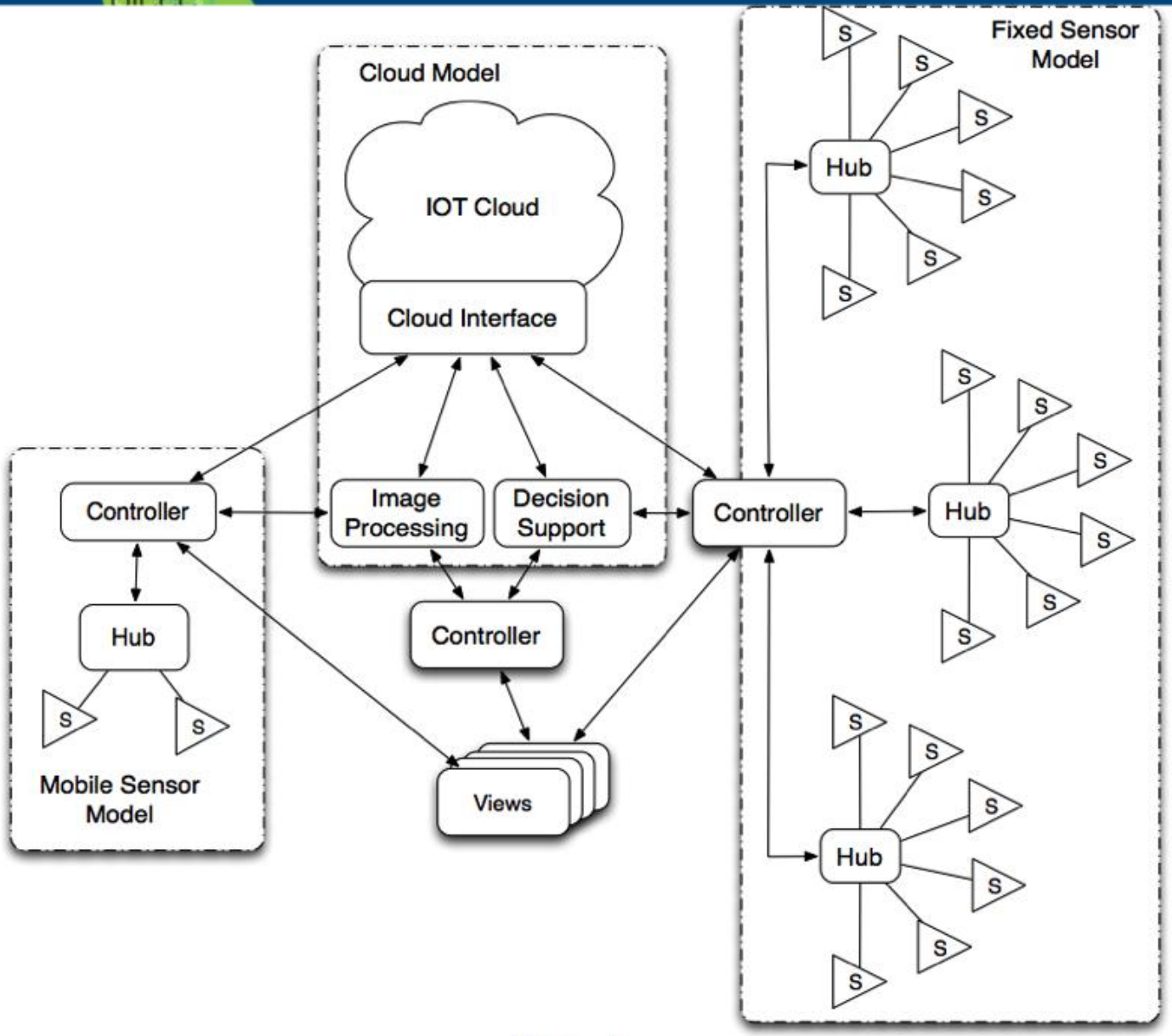


Figure 1

Satellite, drone (UAV and UTV) and ground sensors.

Integrated in a management decision system tool.

Management Applications:

- Water
- Nutrient
- Pest and disease
- Prunning
- Harvest time
- Harvest

System Architecture

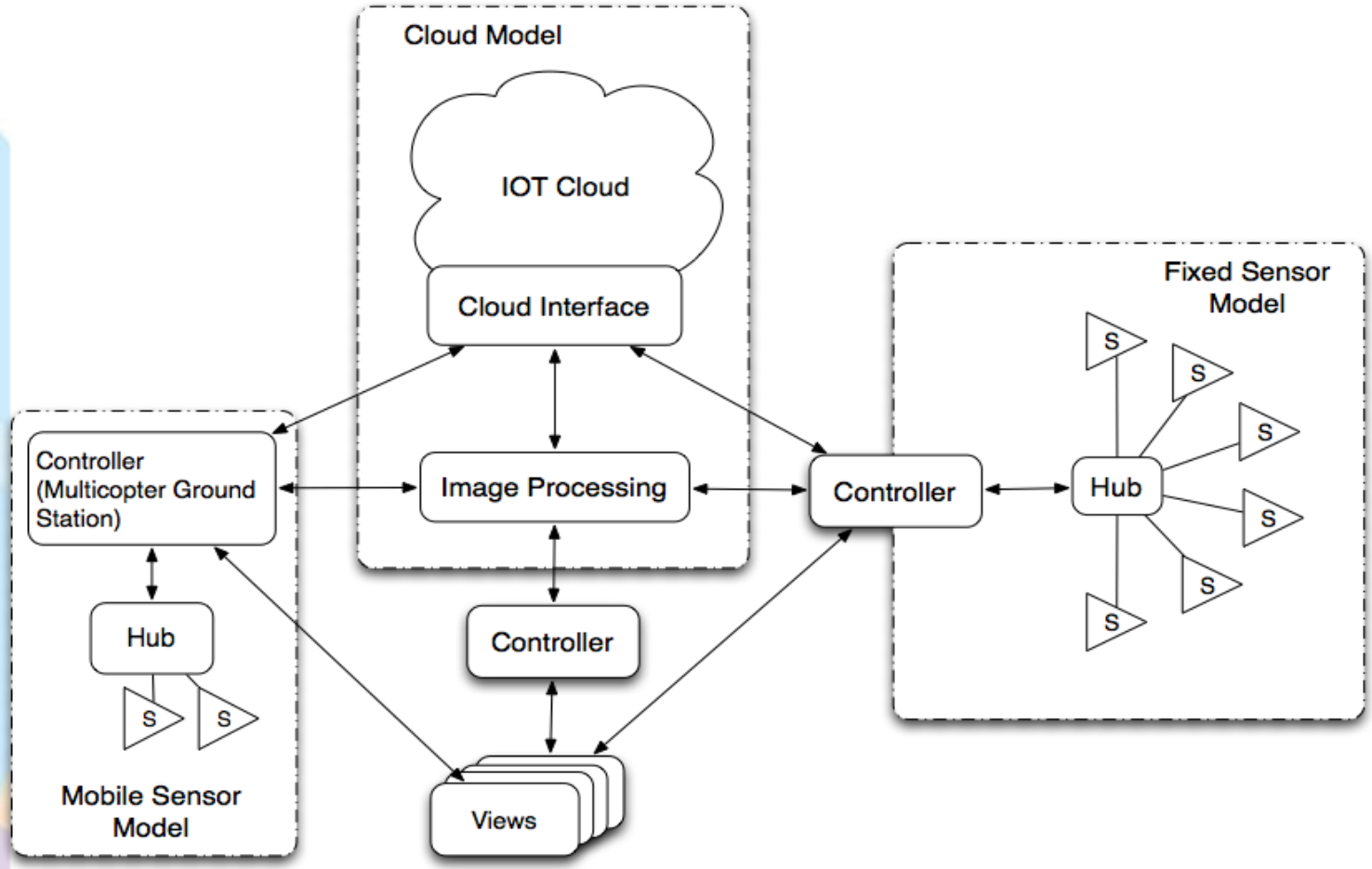


Figure 2

System Architecture

Facebook's WiFi drones to begin testing next year

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Sep 23, 2014

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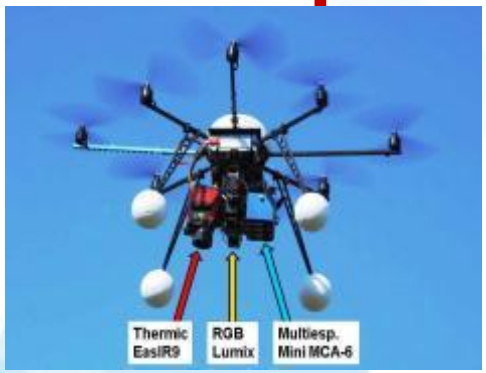
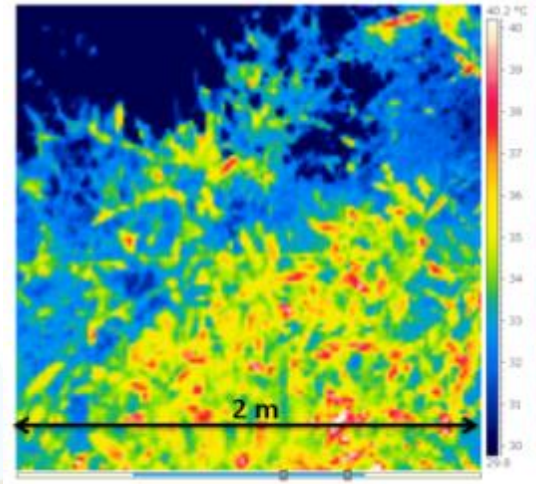
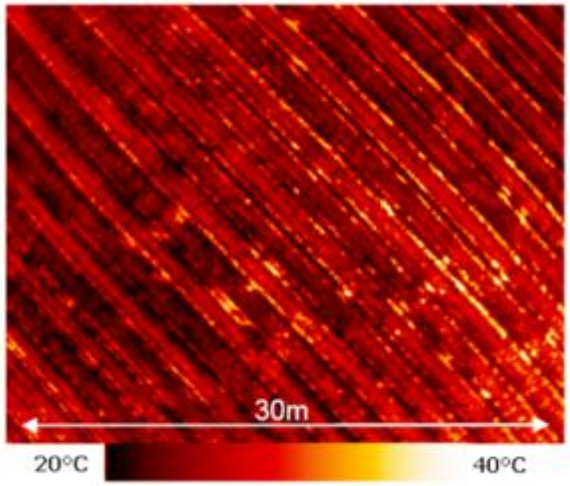
The Vision: Hardware

Multicopters



- Infrared Thermography
- Multi – Hyper Spectral
- Visible (RGB)
- Lidar
- COSMOS

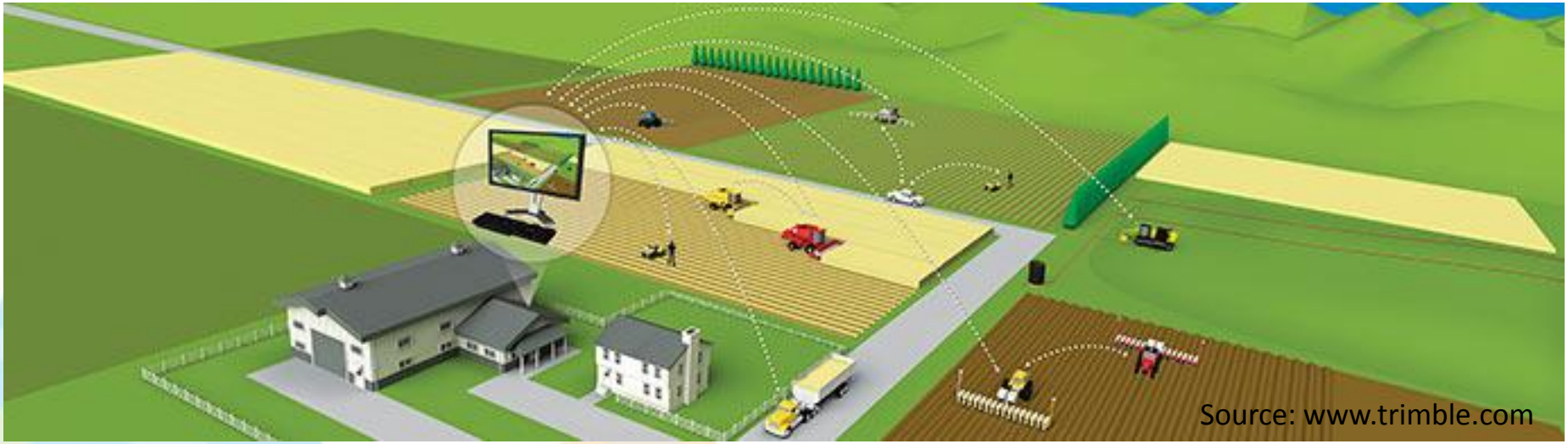




Robotics

Source: Wikipedia

The Vision: The Connected Farm



Research Focus:

- Automated Surveillance
- Informatics / Big Data (IOT)
- Machine Intelligence / Adaptive Control
- Augmented Reality
- Automation and Control / Robotics

Ongoing Research:

- Smart Sprays
- Robotic Pruning
- Robotic harvest
- Crop Watch
- Field Maps
- Fertiliser and Water
- Big Data (IOT)

www.piccc.org.au

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