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Abu Dhabi, 20 Dicembre 2020

La ringrazio molto per aver preso parte al webinar AGRI-TECH AS A KEY FOR FOOD SECURITY tenutosi lo scorso 9 dicembre nel quadro dell'iniziativa "InnovItaly UAE".

Anche grazie al suo qualificato contributo, il pubblico emiratino che ha assistito all'incontro ha potuto disporre di informazioni approfondite sulle direttrici della ricerca e dell'innovazione italiane in questo settore, anche nella prospettiva di eventuali collaborazioni bilaterali.

Mi auguro quindi che vi siano presto ulteriori occasioni di interazione tra i due ecosistemi dell'innovazione in questo ambito.

Molto cordialmente, e on i mifliori enfluri di Brune Fette,

Nicola Leffer

**ROBOTICS IN AGRICULTURE:** THE NEW FRONTIER FOR **SUSTAINABILITY** AND **RESILIENCE?** 

Prof. Marco Vieri



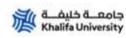
















# **CURRENT CHALLENGES**

- There is a need for sustainable intensification of agriculture worldwide, with a lower impact on the resources available to us
- 2. In particular for the Middle East where the quantity of arable land and water is extremely low
- **3. Mitigate** these agricultural limitations is a challenge to ensure greater **food availability**
- 4. Increase the **resilience** to **pandemics** has become a must-have after the Covid19 outbreak
- **5. Smart Farming** could be a valuable tool in this context to improve production sustainability.



# AGRIFOOD SUPPLY CHAIN TRANSFORMATION

### **PRODUCTION**



- Field and machine sensors
- Aerial Drones
- Satellite imagery
- DDS
- Data on production process
- New SmartFarmingApproach

## **TRANSFORMATION**



- Quality check sensors
- Big Data Analytics
- Systems for dematerialization
- Integrated traceability

#### **DISTRIBUTION**



- Systems for logistics optimization
- Ecommerce and Food Delivery
- Blockchain

### **CONSUMPTION**



- Smart labels
- Sensors for waste reduction
- Meal kits
- Big Data Analytics

## UNIVERSITY OF FLORENCE



Over 50.000 students, 1.550 researchers and professors, 4.240 workers, 10 Schools

The Department of Agricultural, Food Environment and Forestry of the University of Florence (www.dagri.unifi.it ) is part of the School of Agriculture and encloses more than 150 structured researchers, besides technicians, PhDs, found researchers

The Biosystem Engineering Division of DAGRI (www.agrismartlab.unifi.it) has participated in numerous projects related to precision agriculture and digitalization of the sector on a regional and European scale

Since 1924 Farm Machinery development in both national and international contest

close cooperation over several decades with the Ministerial Oversease Institute of Agriculuture in Florence

# Development of regional digital platforms for Precision Agriculture:

- Georeferenced plot analytical accounting
- Traceability
- Wine quality
- Biodiversity footprint





Adoption and diffusion of innovation and Knowledge in agriculture :

- Moodle and MOOC courses





## UNIVERSITY OF FLORENCE



Since 1995 Development of technologies for suistainable management in Precision Agriculture:

- VRT,ITC, telemetry, GIS
- Proximal and remote sensing (UAV satellite)
- Fleet control, **Robot**



SMASH project EU (Smart Machine for Agricultural Solutions Hightech)



THE RHEA project EU (Robot Fleets for Highly Effective Agriculture and Forestry Management)

# Over recent years experience of Agrismart Lab in Agricultural robot

- 1. SMASH project
- 2. RHEA project



# **AITRONIK**



Aitronik is an Italian company that designs software for **Autonomous Ground, Aerial, and Marine Vehicles**. We are located in Pisa, the Italian cradle of Robotics.

In 2007 we **pioneered technologies for self-driving cars** by participating at the DARPA Urban Challenge with the Ohio State University. We have developed and integrated software into Autonomous cars, off-road vehicles, fixed-wing aircraft, helicopters, multi-rotors, robotic lawn-mowers, underwater vehicles, and boats, for industrial partners.

We raise the bar of industrial research by participating in projects funded on a regional and European scale.

Aitronik is member of the Italian Association for Artificial Intelligence (AIXIA) and HIPEAC, the European network for researchers in Computing Systems.







Ground Marine/submarines Aerial



# **EXAMPLE OF COLLABORATION PROJECT: COMP4DRONES**



Keywords: **Safe software and hardware** drone architectures, **Robotic cooperation** 

**51 European partners**, 5 use cases

Budget: ~28.4M€

Target: Safe drone architectures for transportation, inspection, logistic, **precision agriculture**, parcel

delivery

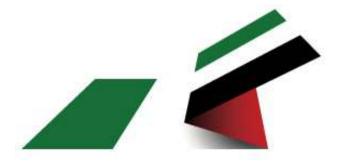
Italian use case: tight integration of aerial and ground robots for Precision Agriculture

<u>AITRONIK</u> is responsible:

- to integrate Sensor Fusion, Autonomous Guidance, Navigation, Control, Perception, Al components, into the ground rover
- 2. to develop and integrate the **cooperation** with the aerial drone

# **COLLABORATION SCENARIO**

- 1. UAE is quickly growing and eager of solutions, many desert lands can be converted into fertile soil
- 2. UAE even more resilient with massive and differentiated production of food
- **3.** Our italian high technology pole has competencies and structures to cooperate to develop appropriate Hight tech & Digital innovations for the SmartAgriculture, .
- 4. Through the Embassy of Italy in UAE, the University of Khalifa, and Dubai Future Foundation, the following collaboration scenarios che be setup:
  - a. Industrial & Research partnership (joint projects, joint ventures, etc.)
  - b. Investments into start-up capital stock
  - C. Students exchange programs for universities / research centers



# **NUVIBOT EXPERIENCE**

## HTF&DIG INNOVATION PARTHNERSHIP POLE IN TUSCANY

Agricultural autonomous robot for Viticulture and

- 1. Name ete automatic farms in floricultures, nursery, and vineyards
- 2. Autonomously guided robot for automatic spraying and weeding
- 3. 50-60% water and fungicide saving
- 4. 24/7 work, automatic battery charge
- 5. Increase of food quality and environmental protection
- 6. Social innovation



# **NUVIBOT (PARTNERS)**

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**Project Coordinator** 

Unique expertise in Autonomous Vehicles technologies



Scientific Coordinator

Worldwide known for Machinery in Agriculture



Università di Pisa

**RFID** techs for Navigation

Internationally renowned for research in radio communications



Use case provider

Prize for Best Wine in the World in 2019



Internationally known for nursery



Machine Manufacturer

Market Leader in machines for nursery

