

# News from EurAgEng

Winter 2016



EurAgEng

## Aarhus University, Denmark hosted CIGR AgEng 2016

Over 570 agricultural engineers from more than 50 countries worldwide gathered at Aarhus University in Denmark between 26th and 30th June 2016 to exchange research results and information on Automation, Environment and Food Safety.

A large circus tent was erected on the campus for attendees to network during coffee and lunch breaks when they were treated to Danish smorgasbord and pastries! Papers were presented in special parallel conferences and seminars as well as the main sessions on topics ranging from structures, plant technologies, post-harvest technologies, energy to information technologies and controlled traffic farming.

The conference was hosted by the University of Aarhus partnered by the International Commission of Agricultural and Biosystems Engineering (CIGR), the European Society of Agricultural Engineers (EurAgEng) and the Nordic Association of Agricultural Scientists and organised by the Conference President, Morten dam Rasmussen from Aarhus University.



Networking in the Circus tent



Award of Merit winner, Dr Paul Miller seen here in the spray droplet test-lab

The Conference Dinner, held in the circus tent, with entertainment from traditional Danish musicians and dancers, brought a busy day with many prize winners to a very sociable end.

Amongst the EurAgEng winners was **Dr Paul Miller** from the UK who was given the prestigious **Award of Merit - Scientific Understanding**. Once again this Award has been given to an engineer who is incredibly enthusiastic about his work and an inspiration to all. He is recognised as the leading international authority in the field of chemical application and spraying technology and is the author of many refereed scientific and conference papers that have helped others understand the science involved.

The **Francis Sevila Young**

**Professional Award**, named in honour of the first EurAgEng President, and **supported by Sepp Knüsel Landmaschinen**, was given to **Professor Álvaro Ramírez Gómez** from the Technical University of Madrid. His CV reads more like someone of twice his age with many achievements, publications and research projects to his name both within the Spanish community and the international community. His expertise lies in understanding the handling of bulk solids including the mechanics of granular materials, the behaviour of storage structures such as silos and dust explosions.

**The Innovation and Development Award**, for a presentation on an innovative development with a commercial partner, went to the paper 'Real time back projection onto pre-recorded DHM surface of UAV

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*EurAgEng is the European Network for  
Engineering and Systems in the Rural Sector*

recorded images with RTK GPS and IMU' by the Danish team of Morten S. Laursen, Rene Larsen, Kjeld Jensen and Rasmus N. Jørgensen and the **Young Engineers Best Paper Award** went to the Spanish team of Elena Sanchis, Salvador Calvet, Elena Galán, Agustín del Prado and Fernando Estellés Barber from the Universitat Politècnica de València and the Basque Centre For Climate Change, with their paper entitled 'Meta-analysis of environmental effects on gaseous emissions from dairy cattle houses'.

Adam Dubowski from PIMR, Poland, Hannu Haapala from Finland, Morten dam Rasmussen from Aarhus University and Steve Parkin, Managing Editor of *Biosystems Engineering*, the official journal of EurAgEng, were all commended for the work they do for EurAgEng with the EurAgEng Recognition Award.

Three teams of authors collected an **Outstanding Paper Award** from the editors of *Biosystems Engineering*. They were chosen by the Editorial Board, from a shortlist of 10 papers, submitted to Biosystems Engineering over the last two years. They were:

- Eliyahu (Efim) Kelman and Raphael Linker with their paper, 'Vision-based localisation of mature apples in tree images using convexity';
- Stefan Paulus, Henrik Schumann, Heiner Kuhlmann, Jens Léon on 'High-precision laser scanning system for capturing 3D plant architecture and analysing growth of cereal plants'; and



**Technical field trip - Controlled Traffic Farming (CTF) on large scale vegetable production**

- Manuel Pérez-Ruiz, David C. Slaughter, Fadi A. Fathallah, Chris J. Gliever, Brandon J. Miller with their paper 'Co-robotic intra-row weed control system'.

Sincere thanks from EurAgEng members and others attending the conference, go to the organising team who worked extremely hard to achieve a conference packed with information.

EurAgEng has future conferences in Paris, immediately before SIMA, on Saturday 25 February 2017; Hannover at Land.Technik-AgEng 2017 and AgEng2018 in Wageningen, The Netherlands while CIGR host the 21st World Congress in Antalya, Turkey in 2018.

## Club of Bologna

[www.clubofbologna.org](http://www.clubofbologna.org)

The Club of Bologna, was founded in 1989, and since then, with active sponsorship of the Italian agricultural machinery trade association UNACOMA, has met regularly with experts in mechanisation from around the world to discuss the state of agricultural machinery development, trade and use around the world.

Many EurAgEng members have been, and are, active members of the Club (to which members are invited) and have prepared a variety of papers and presentations (available for download).

To mark the 25th anniversary members got together to produce a special volume on the 'Evolution and

Prospects of the Mechanization in the World'. This is also available as a download and after a short history of the Club, there is a part devoted to the role of the tractor in the development of agricultural mechanization.

Following chapters describe agricultural mechanization in Europe, USA, Latin America, China, Asia and Africa.

This has been a successful climax to Luigi Bodria's spell as President and he has handed over to Paolo Balsari. EurAgEng wishes Paolo a successful spell as President.

For agricultural engineers currently completing their PhDs there is the



Giuseppe Pellizzi Prize - 'International Best PhD on Agricultural Mechanization' which is worth investigating. And good luck.





# Smart AKIS will advertise your agricultural technology product for free!

The Smart AKIS network ([www.smart-akis.com](http://www.smart-akis.com)) has just moved into the next phase and is collecting a database, from all around Europe, of available Smart Farming solutions. The goal of the Network is to map and disseminate relevant existing research results, projects and commercial products that fall within 'Smart Farming Technologies'.

Thus, if you are a provider of Smart Farming solutions, either an established multinational company, an SME, a start-up or a spin-off, or a research group with promising new technologies applicable to the Smart Agriculture field, you can fill in the survey for your proposal to be included and showcased on the Smart AKIS 'Inventory of Smart Farming solutions'.

This call will remain open all through the Smart AKIS project, and a first version of the online Inventory will be available in 2017 at [www.smart-akis.com](http://www.smart-akis.com)

An open call for providers of Smart Farming solutions, research projects and results is made to voluntarily feed the Inventory, through completing the online survey [www.smart-akis.com/index.php/mapping-of-smart-farming-solutions](http://www.smart-akis.com/index.php/mapping-of-smart-farming-solutions)

EurAgEng is involved as one of the 13 partners in this European funded network project and believes that at this time of rapidly developing technologies for agriculture that such a network is an important aspect:

- farmers need to know what is available in order to try it and buy it;
- researchers and developers need to be in the network to see how their technology meets the farmers' needs; and
- new research results need to be shown to those organisations and suppliers that will help complete development and commercialisation!

Smart AKIS is now Mapping SFTs onto the needs and requirements of farmers in Europe. Smart AKIS will add these SFTs to the Inventory and bring them to the attention of farmers through a series of networking workshops in seven countries as well as through the partners providing extension and advice to farmers and other users. The Inventory will also be available widely (advisers, funders, distributors, etc.) through the dedicated website.

## Why should you take part in the mapping?

**Tech suppliers:** established companies, SMEs, start-ups and spin-offs. You can freely advertise your products and solutions to an EU wide audience of farmers, as the Smart Farming Platform will show links to your website, products and to promotional materials.

## Researchers

You can freely disseminate and transfer your research results, projects and papers in Smart Farming if you want them to be adopted and tested by practitioners.

All taking part in the Mapping will be placed in the best position to take part on the Innovation

Workshops to be held with farmers, where you will be able to showcase your solutions and results and to collaborate on market uptake or innovation projects.

Technologies are needed to be entered

now and, with others being added in the coming weeks, the website will be ready for farmers and their advisers to use from early next year.

The Smart AKIS inventory will be a truly valuable resource to everyone interested in Smart Farming, as it can be used to learn about SFTs in all stages of development: from current research up to commercial availability.

Don't delay, register today for this free promotion of your commercial or research technology. Thank you for submitting your Smart Farming Technologies and I look forward to seeing very many technologies on the website.



## Subscribe to Smart AKIS Newsletter on:

[www.smart-akis.com/index.php/news](http://www.smart-akis.com/index.php/news)

Twitter - @smart\_akis

Facebook - @SmartFarmingNetwork

David Tinker [secgen@eurageng.eu](mailto:secgen@eurageng.eu)

## SMART AKIS PARTNERS:



# In the future, will farming be fully automated?

## The BBC, autonomous tractors and more

Engineers involved in agriculture, farmers and equipment suppliers have known for very many years that tractors can be fitted with auto-steering systems (and many more aids to performance and precision farming).

However the 'rest-of-the-world' are surprised by how much technology has been helping develop smart farming and what has been happening in agriculture; whether robotic tractors, robotic

milkers, using satellites, and now drones (UAVs), for "mapping" fields, and very much more.

Now the wider population is becoming interested, and astonished, at what our profession is developing and the BBC among many others is finding it newsworthy. The following was published by the BBC on 25 November but note the remark at the very end. The public has concerns about so much robotic automation! [tinyurl.com/hxx6ktv](http://tinyurl.com/hxx6ktv)

By **PADRAIG BELTON**, BBC Technology of Business reporter

In the not-too-distant future, our fields could be tilled, sown, tended and harvested entirely by fleets of co-operating autonomous machines by land and air.

And they'll be working both day and night.

Driverless tractors that can follow pre-programmed routes are already being deployed at large farms around the world.

Drones are buzzing over fields assessing crop health and soil conditions. Ground sensors are monitoring the amount of water and nutrients in the soil, triggering irrigation and fertiliser applications.

And in Japan, the world's first entirely automated lettuce farm is due for launch next year.

The future of farming is automated.

## Food shortages, big business

The World Bank says we'll need to produce 50% more food by 2050 if the global population continues to rise at its current pace.

But the effects of climate change could see crop yields falling by more than a quarter.

So autonomous tractors, ground-based sensors, flying drones and enclosed hydroponic farms could all help farmers produce more food, more sustainably at lower cost.

No wonder the agricultural robotics sector is growing so fast.

One report, by US firm WinterGreen Research, forecasts that the market will grow from \$817m (£655m) in 2013 to \$16.3bn (£13bn) by 2020.

But investment bank Goldman Sachs is far more bullish, predicting a \$240bn market over the next five years.

Manufacturers including John Deere, CNH Industrial and AGCO are all

fighting to corner the market in driverless tractors.

As well as big kit, small kit is giving farmers up-to-the-second data on the state of their fields and produce - what Dr Roland Leidenfrost of Deepfield Robotics calls the "internet of plants and fields".

Bosch start-up Deepfield, based in Germany, is working to automate the growing and testing of seed crops, tracking the susceptibility to weeds and drought of different genetic varieties.

Meanwhile, engineers in Shropshire, England, are trying to show it is now possible to farm a field without a human setting foot in it at all.

The Hands Free Hectare project will use flying drones and automated tractors in the coming year to grow and harvest a cereal crop.

Engineers from Harper Adams University - together with a North Yorkshire farming technology company called Precision Decisions - are testing prototype machines now, and aim to plant their crop in March for harvest in September.

## Precision pruning

It's hard to imagine the most traditional of agricultural sectors - wine making - as needing more than natural sunshine and soil. But





even here automation is encroaching.

Wine makers have used drones to inspect their vineyards for several years, with high-definition cameras and sensors assessing crop and soil health.

But in France's Burgundy region, a shortage of farm labour has led inventor Christophe Millot to develop a vine-pruning robot called Wall-Ye.

The latest generation of this trundling four-wheeled robot can make a cut every five seconds. It has six cameras - some with infrared sensors - and two arms, and is controlled by a tablet computer inside.

The machine learns as it goes and can trim the grass around each vine. An onboard solar-powered battery gives 10-12 hours of charge, so with a change of battery, it can work day and night.

Visual recognition is the biggest challenge, says Mr Millot - knowing where to make the cut. This is actually easier at night, because the robot's lights can illuminate the plant, but not its background.

Next year, he plans to go to California - another major wine-producing area - to market his range of winery robots there.

## Robo lettuce

But some people think farming land is old hat.

Japanese firm Spread's automated vegetable factory in Kyoto, due to launch next year, could produce 30,000 lettuces a day, the company says.

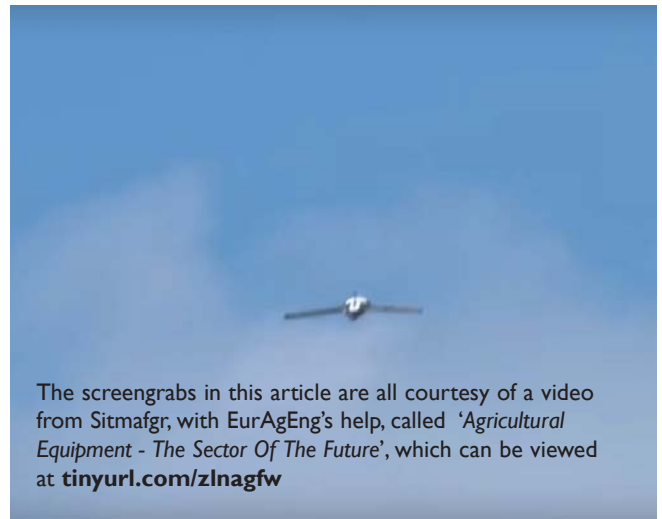
It stretches up, instead of across undulating fields, because "in countries like Japan, where land is actually a very scarce resource, it makes more sense to stack your production, just like a skyscraper," says JJ Price, Spread's global marketing manager.

Everything after seeding will be done by machines - watering, trimming, harvesting - on shelves stacked from floor to ceiling. It's a bit like the solitary drone farmers in the 1972 film *Silent Running*.

Automation has reduced labour costs by 50%, says Mr Price. And LED lighting developed specifically for plant cultivation reduces energy costs by 30%.

"It doesn't matter what the weather or climate is outside," he says.

And growing vegetables in vertical farms means you can recycle 98% of the water, says Mr Price, and produce food much closer to where people consume it, cutting down on transport costs and emissions.



The screengrabs in this article are all courtesy of a video from Sitmafr, with EurAgEng's help, called 'Agricultural Equipment - The Sector Of The Future', which can be viewed at [tinyurl.com/zlnagfw](http://tinyurl.com/zlnagfw)

## Drone monitors

Back outside, drones are monitoring crop growth rates, spotting disease, and even spraying crops with pesticides and herbicides.

Now researchers are also trying to make them co-operate and work in swarms.

If they are mapping weeds in a field, say, "the drones will recruit each other to converge on those areas where the weed presence is higher," says Dr Vito Trianni of the Institute of Cognitive Sciences and Technologies in Rome.

Although GPS signals are generally strong in agricultural areas, one challenge for drones and other farmland robots is coping with patchy internet and mobile connectivity.

So Dr Trianni's team is using ultra-wide-band radio for his drones to communicate without relying on rural 3G or 4G mobile connections.

Of course, automation might promise more efficient food production, but it also threatens agricultural jobs.

From 1950 to 2010, according to the International Labour Organization (ILO), agricultural labourers as a percentage of the workforce declined from 81% to 48.2% in developing countries, and from 35% to 4.2% in developed ones.

Robots will surely accelerate this decline.

Engineers in Shropshire are trying to show it is possible to farm a field without a human setting foot in it

# Field Robot Event (FRE)

www.fieldrobot.com



A competitor at the FRE 2016 coping with mud as well as the competition's tasks

Started in 2003 at Wageningen in 2016 it was held during June, at Gut Mariaburghausen in Haßfurt, Germany. This was the same site as the DLG-Feldtage.

Although it seems a long time to the 2017 event it will be time now to encourage the student teams to design the next winning Field Robot. It is also worth considering if, like EurAgEng and many others, your company or organisation can help sponsor this worthwhile event and encourage the upcoming generation of agricultural and biosystems engineers with multi-disciplinary skills in ICT and Robotics.

Please encourage your local team or support the FRE organisation and check out the FRE Program Booklet 2016 v5 for details of the Robot designs, teams and tasks.

FRE 2016 Overall Ranking

Team	Task 1 Points	Task 2 Points	Task 3 Points	Task 4 Points	Total Points	Rank
Agrifac Bullseye	15	19	20	26	80	6
Agronaut	28	30	18	0	76	7
Banat	0	0	23	0	23	15
Beteigeuze/Kamaro Engineering e.V.	14	17	26	25	82	5
Cornstar	22	22	0	0	44	12
DTUni-Corn	23	24	25	23	95	4
Eric	25	22	28	30	105	2
FloriBot	0	0	0	0	0	17
Helios/ FREDT	24	26	0	22	72	8
Innok TX	21	0	0	0	21	16
Plants with Benefits	16	17	22	0	55	10
Soifakischtle	17	18	0	0	35	14
TALOS	20	23	24	0	67	9
The Great Cornholio	26	26	30	24	106	1
Zephyr	30	28	19	28	105	3
ZukBot	19	22	0	0	41	13
Fredl	18	15	22	0	55	10

## SIMA, Paris

### The Innovations

The SIMA Show in Paris runs from 26 Feb-2 Mar and includes the Innovation prize winners. The full list is at <https://en.simaonline.com/content/location/241909> from page 21 but it is notable that Trelleborg and Michelin took the Gold Awards while Case IH and New Holland, JCB Agri and John Deere along with Rousseau took the Silver Awards.

Another 14 Innovations were given Special Mentions.



### The Conference

The day before SIMA starts, Saturday 25 February at the exhibition site there will be the 1st AXEMA-EurAgEng Conference on 'Intensive and environmentally friendly agriculture: an opportunity for innovation in machinery and systems'.

This conference will create an opportunity for exchanges between R&D players from industry and those from academic and research sectors including non-agriculture specialists. There will be time included for networking and the conference language will be English.

Full details including the provisional program are available at [www.eurageng.eu](http://www.eurageng.eu) and [www.axema.fr/Evenements](http://www.axema.fr/Evenements).

Registration will soon open and be linked from these sites.



# EVENTS

## EURAGENG EVENTS

### FEBRUARY 2017

- 25 'Intensive and environmentally friendly agriculture: an opportunity for innovation in machinery and systems' Pre-SIMA one day conference organised by AXEMA, Sitmafr and EurAgEng

Parc des Expositions de Villepinte, Paris

[www.eurageng.eu/sites/eurageng.eu/files/docs/AXM\\_Conf%C3%A9rence%20Announcement\\_2016-09-28.pdf](http://www.eurageng.eu/sites/eurageng.eu/files/docs/AXM_Conf%C3%A9rence%20Announcement_2016-09-28.pdf)

### NOVEMBER 2017

- 10-11 Land.Technik AgEng 2017  
Hannover Germany

### JULY 2018

- 8-11 AgEng 2018 Wageningen  
[www.ageng2018.nl](http://www.ageng2018.nl)

### NOVEMBER 2019

- Land.Technik AgEng 2019  
Hannover Germany

### JUNE / JULY 2020

- AgEng 2020 Évora

## SPONSORED EVENTS

### FEBRUARY 2017

- 7-9 10th Symposium - Fruit, Nut and Vegetable Production Engineering - FRUTIC

Berlin, Germany

[www.frutic.atb-potsdam.de/en/frutic/welcome.html](http://www.frutic.atb-potsdam.de/en/frutic/welcome.html)

- 12-17 52nd Croatian and 12th International Symposium on Agriculture

Dubrovnik, Croatia

[http://sa.pfos.hr/index\\_en.html](http://sa.pfos.hr/index_en.html)

- 21-24 45th Actual Tasks on Agricultural Engineering

Opatija, Croatia

<http://atae.agr.hr/>

- 23-25 ICORES 2017 6th International Conference on Operations research and Enterprise Systems  
Porto, Portugal

<http://www.icores.org/>

### JUNE 2017

- 13-15 Ciosta 2017 XXXVII CIOSTA & CIGR Section V Conference  
Palermo, Italy

<http://www.ciosta2017.org/>

### JULY 2017

- 5-8 AIIA Biosystems Engineering addressing the Human Challenges of the 21st Century

Bari, Italy

[www.cicsud.it/Public/Congressi/File/3announ.pdf](http://www.cicsud.it/Public/Congressi/File/3announ.pdf)

### NOVEMBER 2017

- 22-24 9th International Scientific Symposium "Farm Machinery and Processes Management in Sustainable Agriculture"

Lublin, Poland

<http://kemiz.up.lublin.pl/>

## OTHER EVENTS

### FEBRUARY 2017

- 21-22 4th International Engine Congress

Baden-Baden, Germany

[www.vdi-wissensforum.de/en/event/nutzfahrzeugmotoren-spezial/](http://www.vdi-wissensforum.de/en/event/nutzfahrzeugmotoren-spezial/)

### MARCH 2017

- 28-29 VDI Smart Farming  
Dusseldorf, Germany

[www.vdi-wissensforum.de/fileadmin/resources/programme/12KO100017.pdf?utm\\_source=PM2&utm\\_campaign=16P12EM2&utm\\_medium=email&utm\\_content=12KO100017](http://www.vdi-wissensforum.de/fileadmin/resources/programme/12KO100017.pdf?utm_source=PM2&utm_campaign=16P12EM2&utm_medium=email&utm_content=12KO100017)

### MAY 2017

- 9-10 Global Forum for Innovations in Agriculture

Utrecht, The Netherlands

[www.gfiaeurope.com](http://www.gfiaeurope.com)

- 11-13 Biosystems Engineering 2017  
Tartu Estonia

<http://bse.emu.ee/>

### JULY 2017

- 16-20 11th European Conference on Precision Agriculture

Edinburgh, UK

<https://ecpa.delegate-everything.co.uk/>

### SEPTEMBER 2017

- 18-20 13th Conference: Construction, Engineering and Environment in Livestock Farming 2017

Stuttgart, Germany

[www.btu-tagung.de/de/](http://www.btu-tagung.de/de/)

- 21-24 HAICTA 2017  
Chania, Crete

<http://2017.haicta.gr/>

Submission of abstracts 13th March 2017

### OCTOBER 2017

- 16-18 7th Asian-Australasian Conference on Precision Agriculture (7ACPA), the 1st Asian-Australasian Conference on Precision Pasture and Livestock Farming (IACPLF), and Digital-Farmer 2017 (DF2017)

Hamilton New Zealand

<https://forumpoint2.eventsair.com/>

[QuickEventWebsitePortal/7acpa2017/info/](http://QuickEventWebsitePortal/7acpa2017/info/)

### APRIL 2018

- 21-22 XIX World Congress of CIGR

Antalya Turkey

[www.cigr2018.org](http://www.cigr2018.org)

View all forthcoming events online, visit: [www.eurageng.eu/events](http://www.eurageng.eu/events)



# Finally . . .

Hopefully this Newsletter has kept you interested but we are not receiving articles from members.

We are always looking for items that describe unusual projects, equipment, test facilities and more. It is costly to collate, print and post the Newsletter to our members and we will discuss this at the next executive meeting in March. Should we just share information via the (new) website and social media? Please let us know if you have strong feelings one way or the other so members' views can be taken into consideration. Thank you.

It is coming up to Christmas and many engineers will be looking forward to an excuse to have an interesting toy!

These youngsters here at the EIMA show in Bologna perhaps show that John Deere could have successful business selling tractor simulators!



While farmers in the USA have the chance of getting something even bigger in the shape of this TRIBINE (below)

You can check out the videos of the TRIBINE at <http://tribine.com/video/>

Whatever 'toy' you may receive EurAgEng President Claus Sørensen and the Secretariat wish you all the best for Christmas and interesting and profitable projects for 2017.



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European Society of Agricultural Engineers  
The Bullock Building,  
University Way  
Cranfield,  
Bedford, MK43 0GH, UK

Tel: +44 (0)1234 750876  
Fax: +44 (0)1234 751319  
Web: [www.eurageng.eu](http://www.eurageng.eu)  
Email: [newsletter@eurageng.eu](mailto:newsletter@eurageng.eu)

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