Farmertronics

a next step in farming

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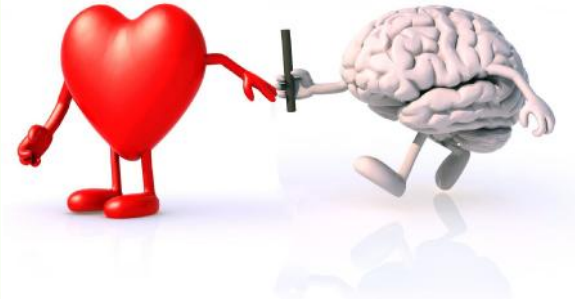
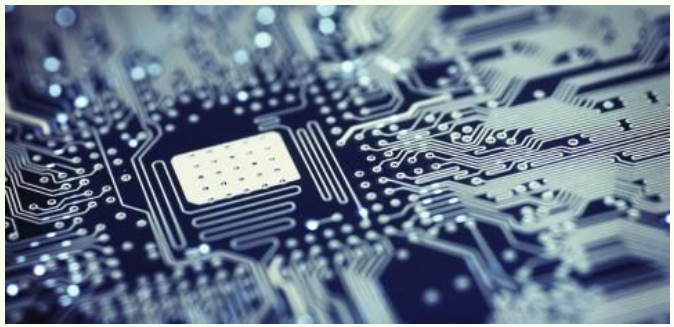
Biography Thieu Berkers

1988 – 1998
Manager hard- and software engineering semiconductor back end equipment (ASM-Fico / Solid System Integrators)
1999 – 2002
Mechanical equipment engineer semiconductor front end equipment (Reticle Handler project - ASML)
2002 – 2007
Teacher physics
2007 – 2014
Software equipment engineer semiconductor front end equipment (Litho Computing Platform - ASML)

I did see all the high peaks and deep valleys….it was time for a change and I switched from my head to my heart…



With the founding of Farmertronics I returned to my roots



Passion #1

Technology

Passion #2

Farming

I used the standard tractor as a baseline and starting point

My conclusion; the standard tractor is outdated in a number of ways:

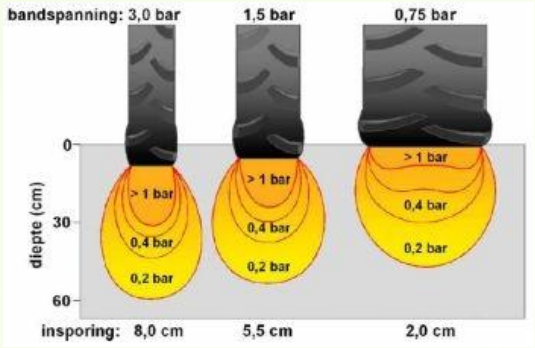
- heavy weight resulting in soil compaction
- a huge investment is required for the farmer
- dependant on limited fossil fuels
- emission of green house gases and fine dust
- propulsion requires a lot of mechnical rotating and moving parts
- steering isn't ideal for unmanned operations
- no need for a cabin with unmanned operations
- not really maneuverable

Soil compaction is a serious issue caused by heavy machinery

The university of Wageningen compared soil compaction between 1980 and 2010

Soil compaction is resulting in less yield up to 50%

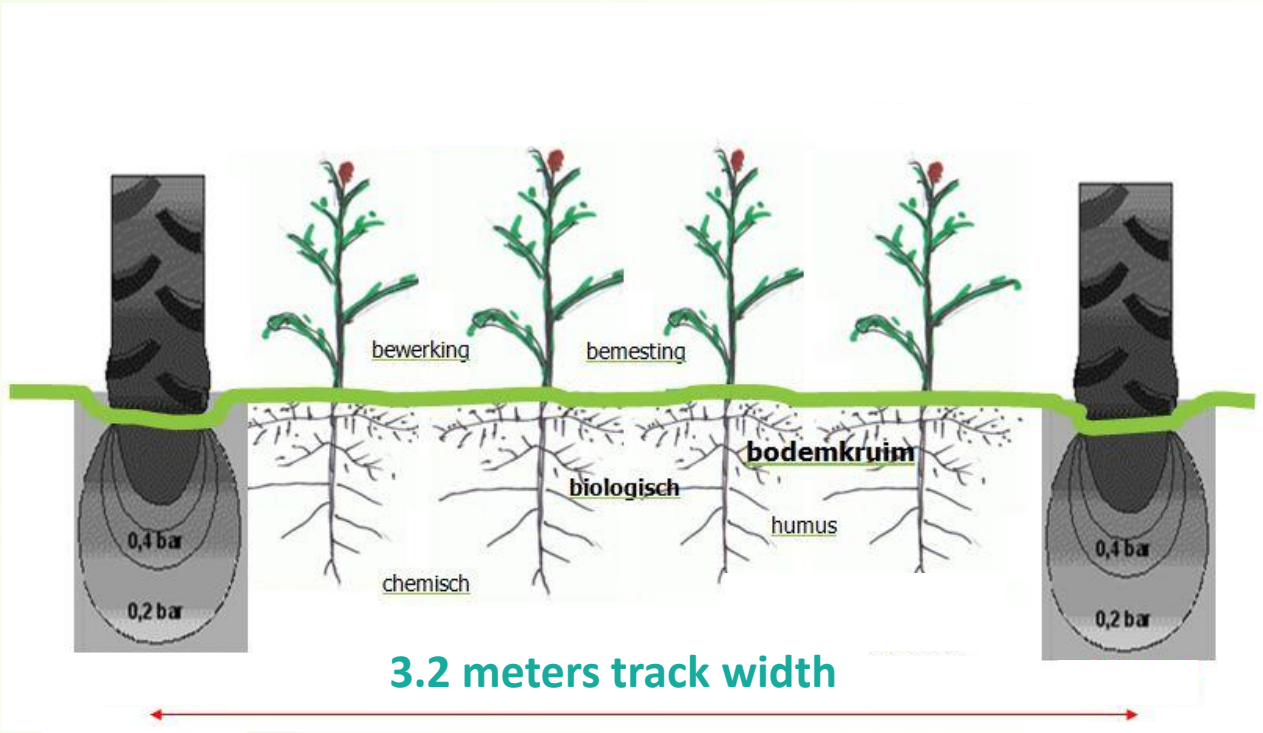
Identified workarounds to reduce soil compaction



Using wider tires with less tire pressure

Using a tracklaying tractor

Controlled Traffic Farming (CTF)



By applying Controlled Traffic Farming the farmer loses a part of his land as the lanes can't be used anymore for growing but overall the yield is still higher compared to non-Controlled Traffic Farming.

The MultiToolTrac is the first Dutch CTF electric tractor

A group of 7 Dutch farmers developed this completely redesigned tractor:

- **4 electric hub motors are driving this tractor**
- **a diesel generator fills the battery pack during operation**
- **multiple tools can be attached to this tractor**
- **variable track width up to 3.25 meters for Controlled Traffic Farming**
- **Sales price: 350.000 euro**

The eTrac-20 will be the first Dutch full electric tractor

- light weight (< 1.000 kilogram) to prevent soil compaction
- no usage of limited fossil fuels
- no emission of green house gases or fine dust
- propulsion accomplished by just a few rotating parts
- maximum high torque during acceleration
- scalable concept
- steering done by torque vectoring like any other robot
- no expensive cabin required
- really manoeverable as a trike
- prepared to apply a hydrogen fuel cell for range extension
- sales price 80.000 euro

Cost of ownership of the eTrac-20

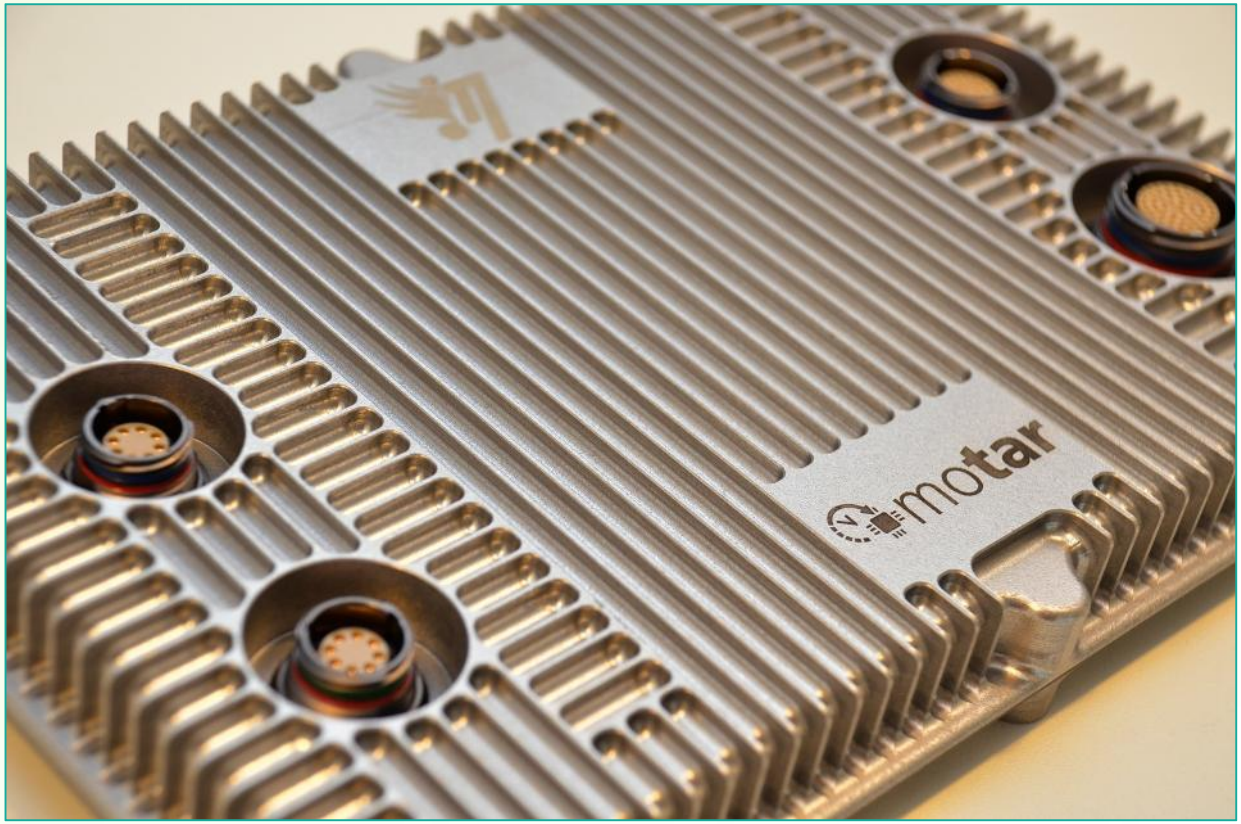
The Cost of ownership of the eTrac-20 is really low:

- **nearly no personal costs** due to the unmanned character of the vehicle
- **less costs for fuel** as in the future hydrogen will be produced locally at the farm from solar and wind energy
- **much more yield** by preventing soil compaction due to the light weight design
- **less usage of seed and means for crop protection** as the eTrac-20 is prepared for precision farming
- **less maintenance costs** as there are nearly no moving or rotating mechanical parts.

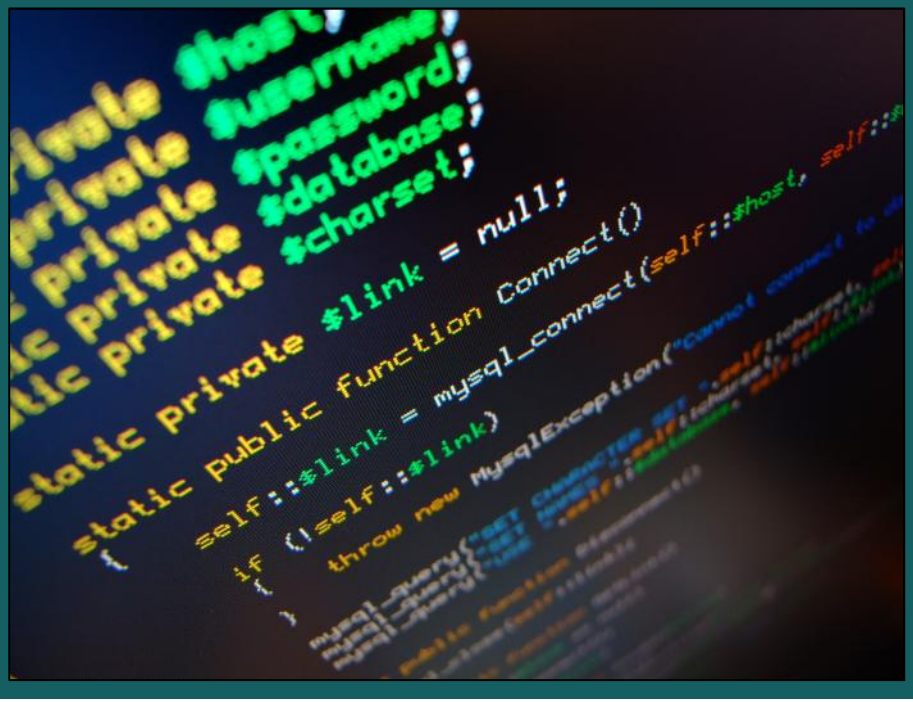
After the proof of concept phase more functionality will be added

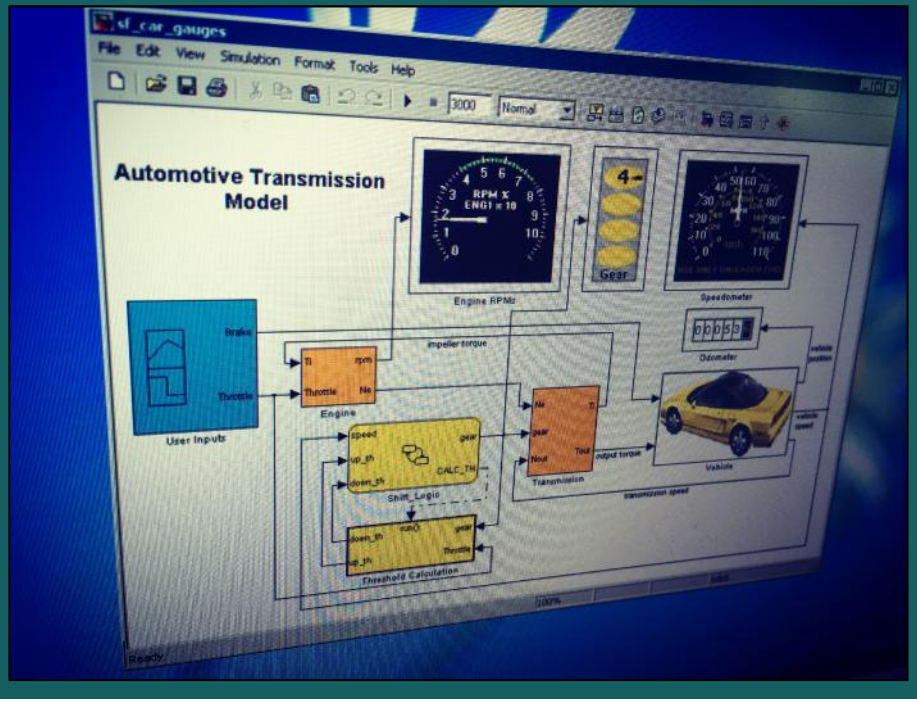
First proof of concept: manual operation with a radio joy stick and completely electrically driven from a 30 kWh battery pack
Proto type #1: GPS-RTK unmanned functionality will be added
Proto type #2: Hydrogen fuel cell and tanks will be added for range extension

The ICT Motar platform to steer the eTrac-20

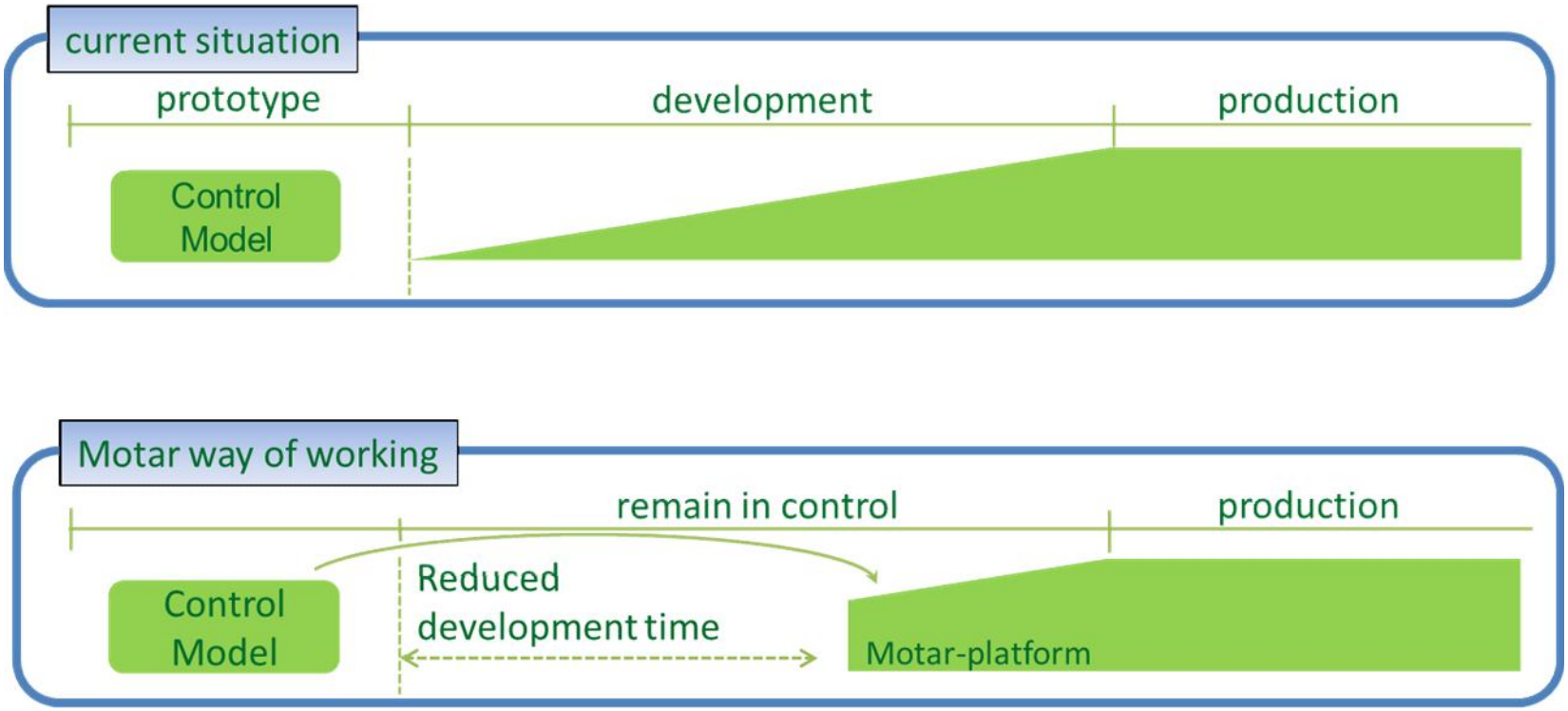


From Coding to Modeling

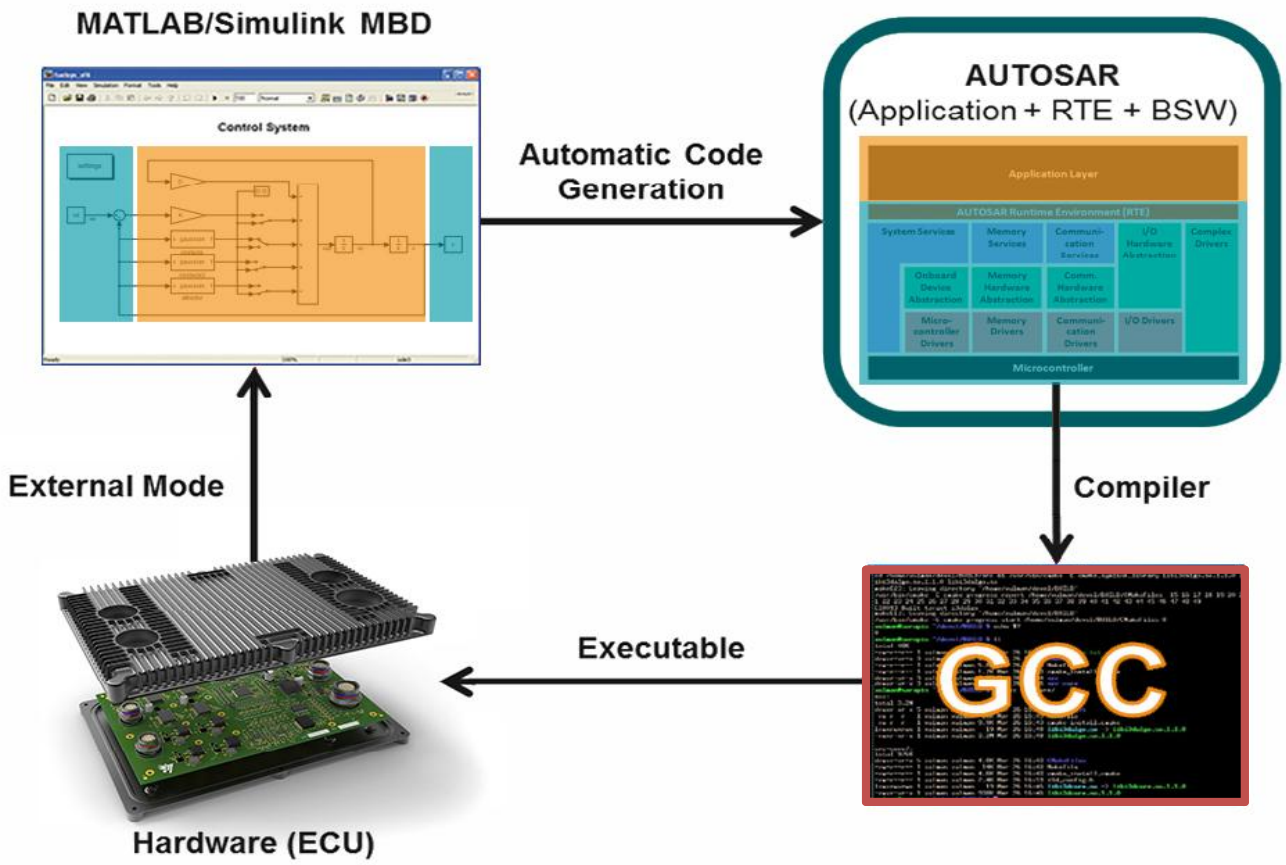




A new development approach to decrease the TTM



Motar workflow



Motar-toolbox

Farmertronics

Visit us at stand 48

The eTrac-20 is designed to attach light weight tooling

Crop sensors

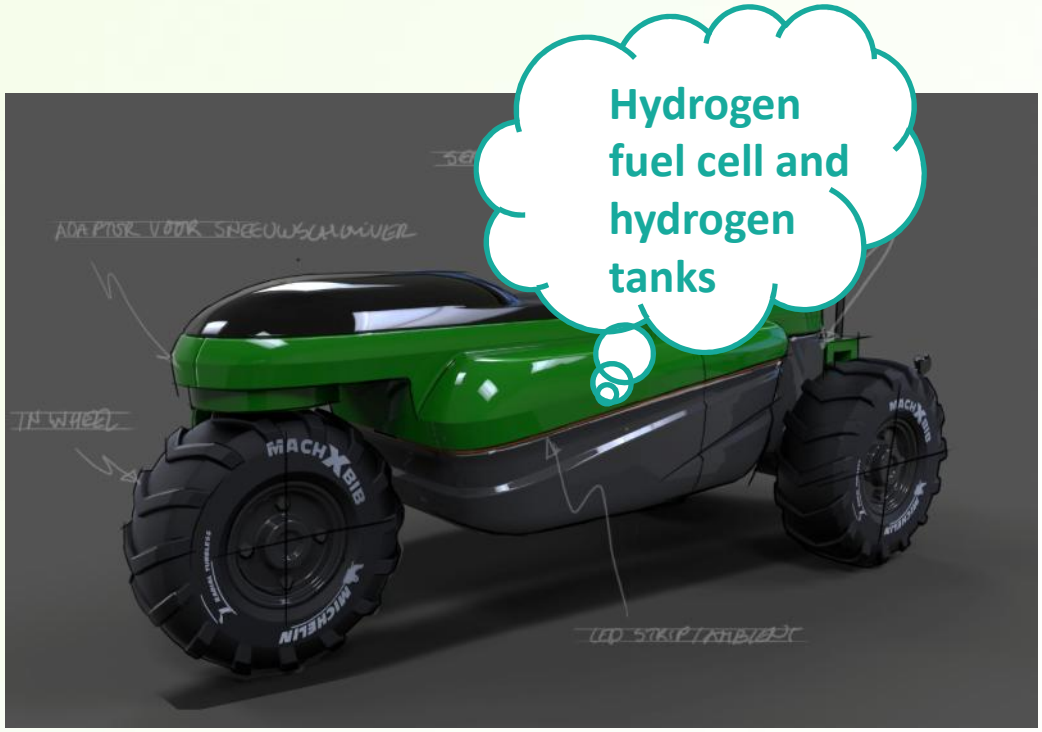
Fertiliser sprayer

Light weight mower

Prototype #1: GPS-RTK unmanned functionality will be added

The eTrac-20 is prepared for GPS-RTK for unmanned navigation with an accuracy of 2 centimeters for precision farming applications.

Prototype #2: Hydrogen fuel cell and tanks will be added

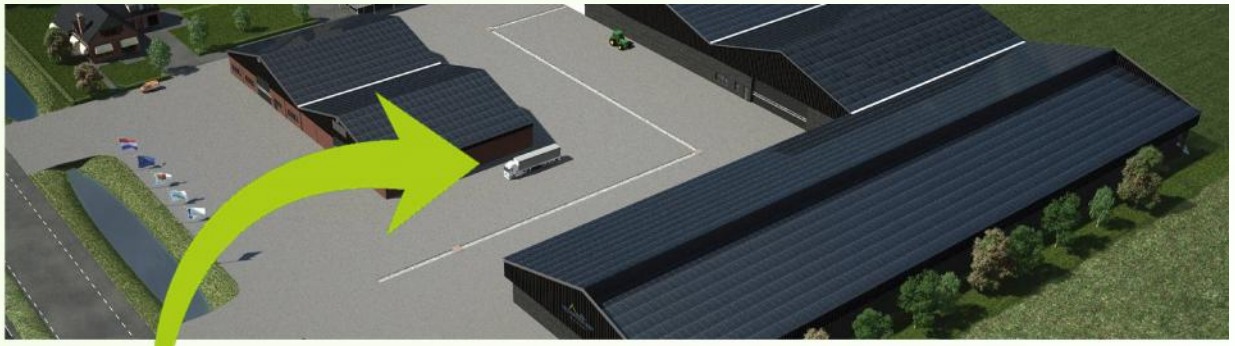


The eTrac-20 is prepared to run on hydrogen. A hydrogen fuel cell and hydrogen tanks will be added with prototype #2 for range extension.

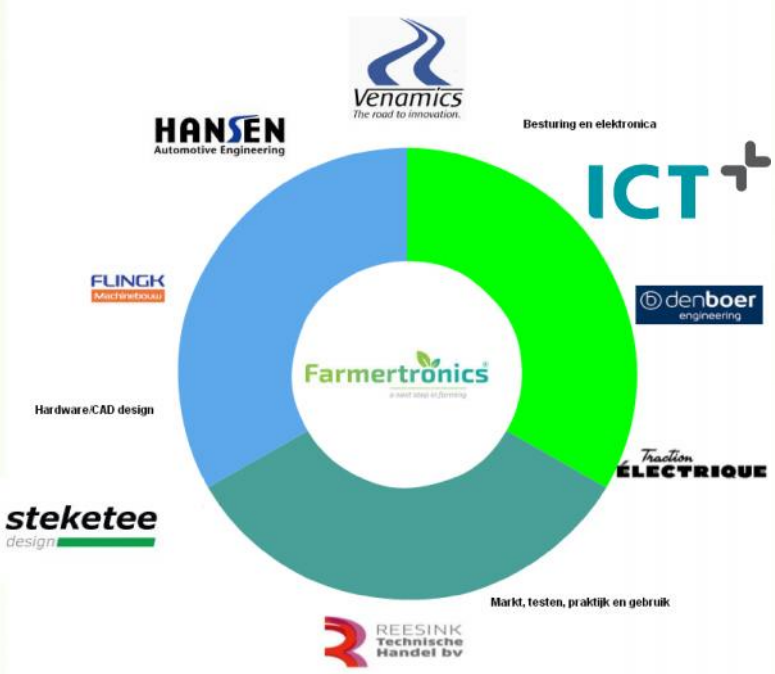
Business case #1: Unmanned spraying at night

As the eTrac-20 is making nearly no noise spraying or any other operation can be completed at night time.

Business case #2: The All Electric Farm is planned in Utrecht for 2017



The Farmertronics Engineering team



Please join us!

By becoming a shareholder you will contribute to the worldwide success of this ambitious project: Farmertronics.com/crowdfunding

Questions?

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