MARS
Mobile Agricultural Robot Swarms

Deliverable D2: Storyboard (Due Date: 31.10.2015)

Dissemination Level: RESTRICTED

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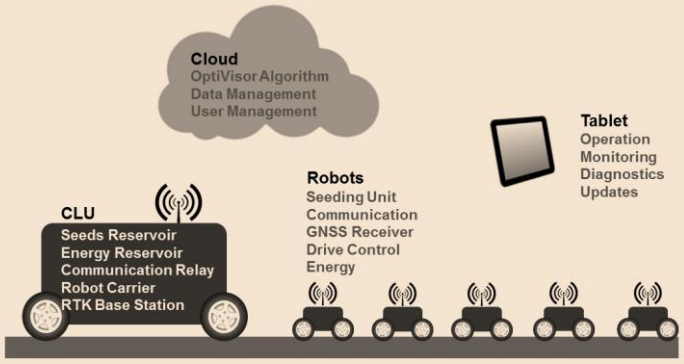


Concept

See Deliverable D1

Cloud
OptiVisor Algorithm
Task Planning
Data Management

Tablet
Operation
Monitoring
Diagnostics
Updates

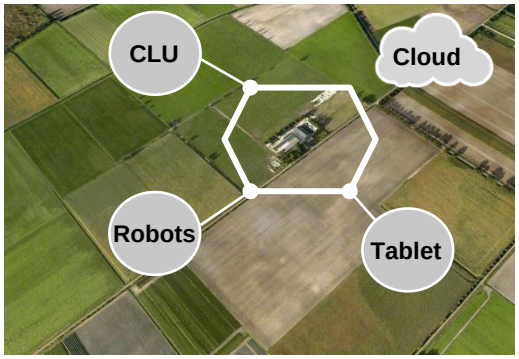
Robots
Seeding Unit
Communication
GNSS Receiver
Drive Control
Energy

CLU
Seeds Reservoir
Energy Reservoir
Communication Relay
Robot Carrier
RTK Base Station

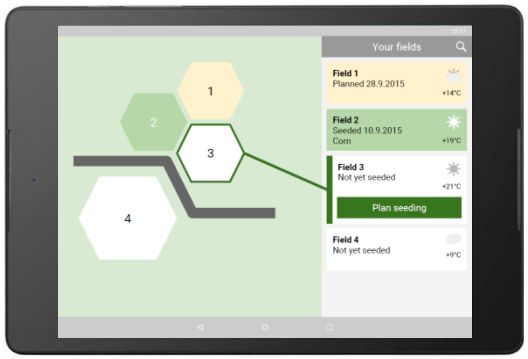
Story 1

Normal Course of Action

Planning

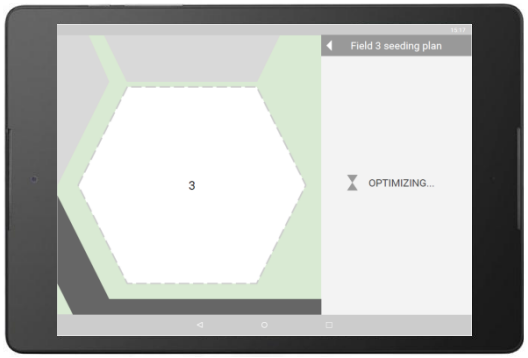


1) The first step is to plan the seeding task. To initiate the planning, the farmer connects to the Cloud-server via a mobile device.

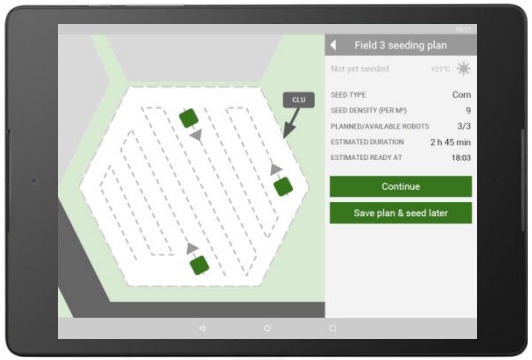


2) After the log-in the MARS App provides an overview of available fields. The farmer selects the desired seeding area.

3) Several parameters can be adjusted like seed density and number of robots. All of those are easy obtainable.



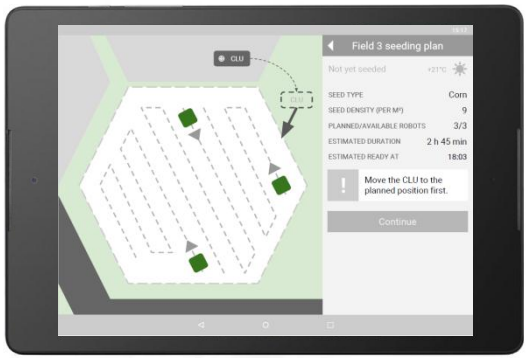
4) The data of the selected field (e.g. field boundaries) and the input parameters are sent to the OptiVisor via the Cloud, which is then performing the overall path planning.



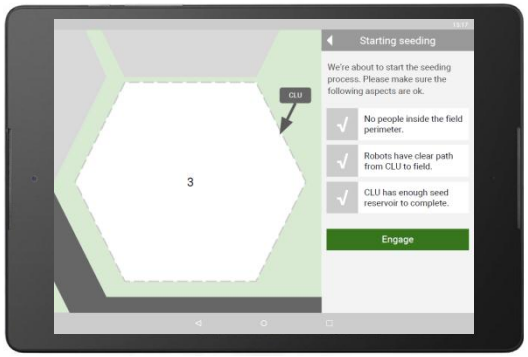
5) The result of the calculations carried out by OptiVisor is visualized. The farmer can continue or save the plan to start the task later.

6) After planning is finished the farmer can transport the CLU to the selected field and place the CLU according to the planned position.

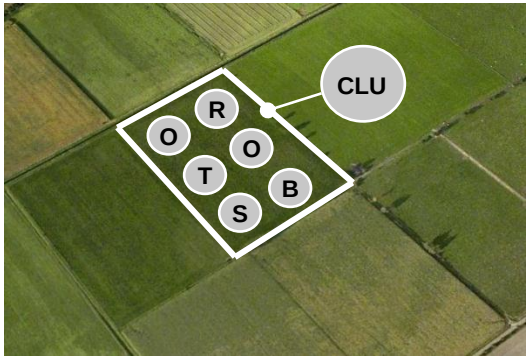
Working



7) Before starting the task the CLU has to be positioned according to the previously determined coordinates. The actual and desired CLU position is vissualized.



8) After pressing the „Engage“ button the task is started. Aso a short checklist for general safety requirements is presented.



9) The robots perform the seeding task autonomously and without requiring user interaction.

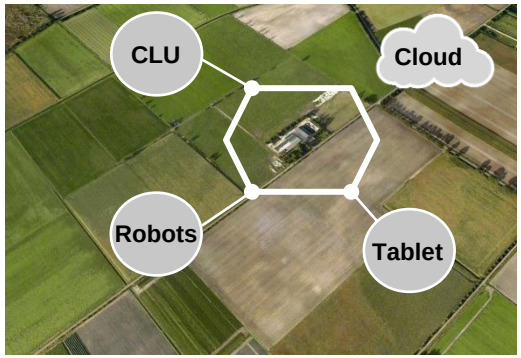
10) While the robots are seeding the user can watch the current status of the overall system from any location.

11) By selecting the different system components a more detailed view is prompted. Here the status of the CLU is shown.

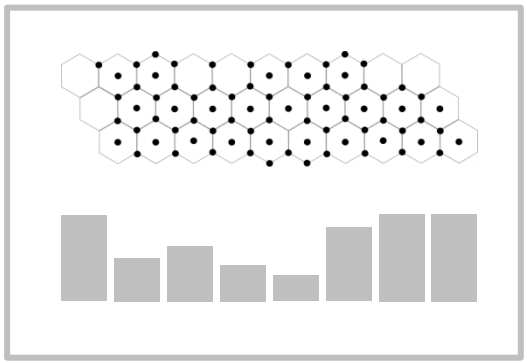
12) Also the status of each robot is monitored and visualized. The user can stop the robots individually or send them back to the CLU if needed.

Finishing

13) After the task has been completed all robots return to the CLU automatically. The operator can bring the CLU back to the farm.



14) The seed and energy reservoir of the CLU can be restored at the farm. Also maintainance can be carried out if necessary. The system is ready for its next job.



15) The seed positions and other relevant data were saved to the cloud during or after the seeding operation. This data is used for subsequent tasks (e.g. crop care) and documentation.

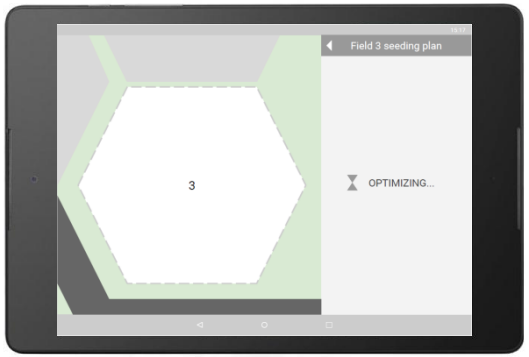
Story 2

Robot Blocked

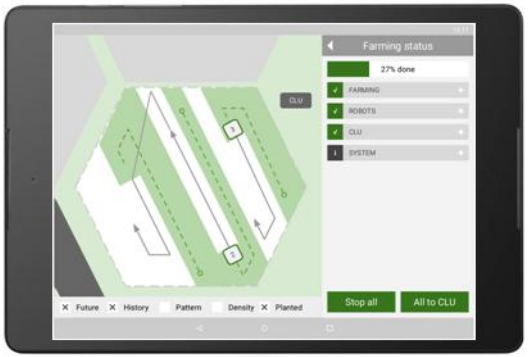
- Robot failure
- Robot got stuck (mud, unknown obstacle, ...)

Blocked

1) Detection and reporting that a robot is blocked. The specific type of error is visualized on the tablet. Robot is deactived and considered as obstacle.



2) Automatic replanning is initiated to adjust robot task assignments. It is based on the current state of the robots and the seeding task.



3) The OptiVisor coordinates the switch over to the updated/new plan. The updated situation is visualized on the tablet.

Constraints

- Automatic unloading of the robots from the CLU, seed reloading and battery recharging of robots at the CLU are not part of MARS
- Examples of typical fields (can contain obstacles like power poles):