RasterMaster 2.0 – Redesigning the RasterMaster for usage with vulnerable objects

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This thesis´ aim is to improve the mower by RasterMaster, such that it can be used in additional settings, namely cutting around vulnerable objects such as young trees, than the ones it is currently limited to. This was done via research on the current design (and its limitations), the market and potential solutions to enhance the usability of the mower by addition of needed systems and sensors.

Currently the mower is being used by farmers, gardeners and municipalities in order to cut the grass under fences and around poles effectively. RasterMaster is based and manufactured in the Netherlands and has an award winning and unique design which allows cutting 360° around the fence poles in one go, saving the user half of the mowing time, when s/he would have to drive back on the other side of the fence, in order to cut the rest. The mower is lowered by a hydraulic arm, but the three blades pairs are powered via a belt system, and the turning of the mower is forced by the poles themselves.

Phase 1
The mower cut out is aligned with the pole and driven towards it

Phase 2
As soon as contact is made with the pole, the plate starts turning, due to the withstand force of the pole.

Phase 3
As soon as contact is made with the pole, the plate starts turning, due to the withstand force of the pole.

Phase 4
The plate turns completely around the pole, cutting all the grass around it.

Phase 5
This movement is finished as soon as the plate loses the contact to the pole. Now the plate starts turning back into the initial position.

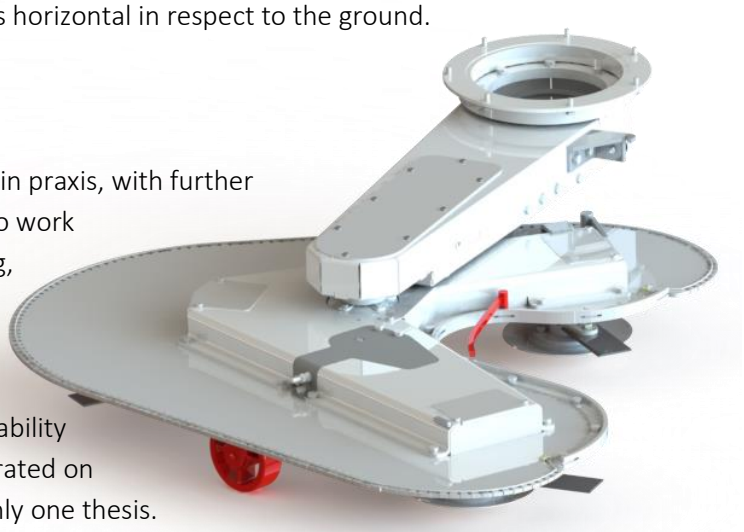
Phase 6
Now the plate is back to its default position and the procedure can be done all over again.

The research question is *"How to extend the usability of the mower in areas with vulnerable objects?"* This is due to the fact that the current solution becomes tricky when the poles which initiate and force the turn of the plate are actually vulnerable objects that may not get harmed or don't even have the needed withstand strength. Therefore, the usage of additional detection and powering systems need to be added, in order to add the functionality to the mower of detecting incoming objects and automatically turning around them, without any harmful contact.

The thesis resulted into using an angle sensor that detects an incoming object, sending that information to a computing unit which utilizes a hydraulic system, which moves and rotates the mower such that the objects don't get hurt in the process.

All in all, it can be concluded that the changes researched in this thesis, will add value to the mower, expand the customer range, and justifying the additional costs to the current mower.
These changes concern both the technology and safety of the mower:

1. The addition of a detection system before the vulnerable object reaches the plate and blades of the mower.
2. A hydraulic driven system, that when triggered by the detection sensor, turns the plate around its axis and bends the arm back, so the mowing process can be executed without harming the vulnerable objects. As addition will be also a wheel installed, which supports the additional weight and ensures, that the plate stays horizontal in respect to the ground.



Surely, in theory everything will work, however in praxis, with further testing, certain things might need adjustment to work properly, or to simply ensure a faultless working, such as the durability of the new additions.
Additional research needs to be made regarding the hydraulic system, but also into further aspects of the mower, since the upgradability of this tool is high and can still be further elaborated on but would go beyond the scope and range of only one thesis.