Storyline: Strawberry Stacker

blogpost-style , **resources**

rishi #1 September 13, 2021, 12:55pm

The Background

Strawberry harvesting on a commercial scale requires skilled labour. The harvester has to quickly scan the ripe strawberries on a plant and then deftly proceed to pick them, packing the berries in boxes happens at the same time. You can see this process in action in the two videos below:

0:00 / 0:44

0:00 / 1:11

But did you notice that while the workers are performing the skilled work of picking since they are paid by the box) they also have to pick the box and run back to a truck to deposit it. This is not good for the overall efficiency of the farm operation and is also toil for the workers, surely there could be a better way.

A Mid-tech Solution

There exists a mid-tech solution but with questionable scalability, carts. Take a look at the approach this Californian startup is taking.

You can find an article describing this approach **here**.

Some inferences

- Scalability of the cart is an issue because you need one for each row, roughly speaking.
- Storage and maintenance both during and apart from the harvest season is an issue, even if they are normal non-smart carts.
- Below is a view of how a typical strawberry operation looks like, consider how many carts this will necessitate, even simple low-tech carts soon become a cost and logistics challenge.

Source, **Archived link**

Exploring further solutions

There are quite a few other solutions to consider that already address this problem. Do check out the following three notable ones:

1. **A machine-aided harvesting tactic, essentially a huge cart!**
2. **An automated harvesting, but not sorting and packaging solution.**
3. **An automated harvesting solution, uncertain/unknown sorting and packaging features. YouTube video link.**

Numbers 2. and 3. aim for fully automated solutions, while no. 1 and the earlier cart start with the low-hanging fruit (there's a pun there!), to reduce or outright eliminate the lower-skilled part of the work, this seems to be the sensible short-term thing to do to obtain maximum productivity while the fully automated solutions catch up and become competitive on a overall cost and productivity level. Let's select this approach and follow along in its line of thought.

Designing our intervention

Can we improve upon the selected approach?

- Two clear areas are the capital outlay and the running costs. For instance, the huge cart cost a whopping $125,000 back in 2004 and incurred about $200 a day in operations and maintenance costs.
- A sound approach is repurposing existing tools and implements if possible.
- Perhaps sprayer arms, or harvester heads could be repurposed but they are *really* not designed for the job and unsuitable for load bearing.
- We are seeing that multicopters are increasingly being used on farms to perform spraying operations, some organic farms even employ them to **spray/deposit beneficial bugs**!

DJI Agras spraying Source: **sprayers101.com**, **Archive link to image**

- But since spraying and harvesting don’t coincide, they are lying dormant during harvest season.
- Multicopters are sufficiently general purpose, they are essentially payload carrying devices. A flying platform for the payload of choice.
- Maybe we could use these dormant assets, modifying the platform to serve a different purpose!?
- Thus, the pickers could leave the large strawberry boxes in the row itself (as is common for heavier items like vegetables, lettuce for instance) and the multicopter will pick them up and stack them in pallets appropriately.

Ah! That’s cool, so now what?

This is the idea of this theme, and you are going to be the ones developing the solution! But first, in the first month or so, you will be taken through a ramp-up phase, learning and competing in tasks that introduce the fundamental technologies involved.

These tasks are designed to be fun and engaging for all skill levels so that you successfully get a grip of the systems involved, and can then move onto having much more fun and be much more engaged and productive!

You then will learn and implement the typical software stacks used to control flying vehicles and plan missions for them. Finally, we will move towards our application area and you will control a team of multicopters and achieve the task of picking strawberry boxes from the field and stacking them onto a transport trailer. These tasks will take place in a simulated environment that will allow you to prototype your application quickly and smoothly.

Read the Theme Introduction article next after finishing this article.

Are you intrigued?

Are you excited about building a solution!?

- Yes!

- Neutral, but hoping it’s a fun and productive time
- Neutral
- No, not really

0 voters

In closing

The toil you saw earlier is the case through not only agriculture, but in warehouses, packaging plants, factories and numerous other places; let us develop robots centered on reducing toil of our fellow humans, and making all of us, more healthy and prosperous in the process. We have designed this theme and our interactions such that at the end of this, if you put in the time and effort, you’ll be better suited to develop solutions!

10 Likes

Task 0: Instructions

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