For the second half of my 4th and final year as a

Mechanical Engineering student, we were required

to complete a Group Industrial Project (team of 4)

with the aim of completing research in a field that

is relevant to the working world. We were assigned

a task within the food industry, in particularly

toying with the idea of digital twins. A concept that

has been kept fairly novel to the agricultural

industry specifically. We wanted to complete an

engineering project that could preserve pre-existing

farmland, as an alternative for farms where the sole

future course of action is hydroponics.

We chose to assign our scope to the world of

viticulture, an economic industry that relies on

utilising farmland that has been in (process) for

decades and is threatened by the future of climate

change.

We present our idea: A comprehensive design that

can sense, process and actuate on all parameters

that are required to for a crop to be in ideal health.

My area of focus was on sensing the various

parameters, conceptualising the full comprehensive

product and developing the actuation system for

sunlight and heat.

In the gallery, you can see CAD renders of a prototype

for the actuation system, following the suit of a

parasol. The design consists of dimensions that have

been carefully chosen through mathematics, models

and finite element analysis. The particular inclusion

of a worm gear-rack system to act as a linear

actuator allowed the use of already supplied motors,

as well as a broadly distributed load scenario on the

teeth of the rack, as opposed to a system that

includes an intermediary gear, such as a spur gear.

Following tests of the working prototype, in

combination with modelled dimension choices, a

full product ready for industry will be developed

virtually.

Skills used:

Arduino

Electronics Engineering

Matlab Modelling

Applied Solid Mechanics

Fusion 360

Rapid prototyping

Laser cutting

3D Printing