Project Proposal

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INTRODUCTION

Several species of birds damage ripening fruits and are the cause of large financial losses of orchards, agriculture and horticulture. Also dairy farmers experience nuisance of birds as they eat the corn from the cattle feed and leave germs in droppings. Many farmers who grow organically have an intensive approach to bird damage and, hence, a lot of investments are involved to reduce the nuisance.

Fruit orchard

The orchard 'Hoeve de Heivelden', Boekel, The Netherlands, consists of xx hectares of different fruit trees. The types of fruit-trees are listed in table 1.

Cherry trees	xx hectares
apple x trees	xx hectares
apple y trees	xx hectares
pear trees	xx hectares

At the Hoeve de Heivelden, Cherries bear the largest damage, as the trees are already under pressure from the Suzuki's promalactis moth and damage from rain (osmosis). Most cherry-orchard have nowadays put-up physical barriers. Focus should therefore be on apple and pear.

Damage from birds can be prevented by:

- Physical barriers with nets
- Chemical repellents
- Automated laser beams
- Deterrent sounds of birds in distress or from predators
- Deterrent sounds from gas-cannons.
- Kites in form of predator bird
- Nesting of predator birds

The Hoeve de Heivelden orchard is cultivating fruit from trees following regulations for biological farming. Control of birds, insects and snails is therefore partly dependent on the natural predation from other specific bird species. Bird control should not deter predatory and aquatic birds. Secondly, yields of organic gardening are low and costs should therefore be kept to a minimum.

Dairy farm

[input details on dairy farm].

Goal

The goal of ‘Intelligent Biological Bird Control is to introduce a low-cost repellent method that can keep away bird-species selectively. The main bird species that need to be recognised automatically are listed in table 2.

This is a draft table.

Name	Latin name	Repel	Note
Lijster-soorten	Turdus *species*	No	
Spreeuw	*Sturnus vulgaris*	Yes	
Houtduif	*Columba palumbus*	Yes	
Eenden	*Anatidae* species	No	

Hypothesis

Current applied methods are setting-up ‘predator-kites’ and creating a habitat for the nesting of predatory birds. Deterrent sounds of certain bird species in distress is expecting to show promising results (link to study?). In order to prevent that birds adapt to automated sounds, the idea occurred to play distress sound only at moments when the specific species is present in the orchard. A machine learning algorithm can trained to recognise bird-species either by camera or from their sounds. A Raspberry Pi computer with an independent power-source can be equipped with image or sound recognition software and placed at different sections of the orchard.

It needs to be investigated if:

- the system is effective in significantly reducing bird-damage
- the system is cost-effective compared to other methods

Project Outline

Week	
36	Market research and interviewing stakeholders.
37	
38	
39	Set-up Raspberry pi computer with independent power-source, microphone and speakers.
40	
41	
42	Collect and identify bird-sounds for machine-learning algorithm
43	
44	
45	
46	Test and measure the concept
47	
48	
49	
50	Analysis and Report
51	

BUDGET

Description	Quantity	Unit Price	Cost
Raspberry-pi	1	€50	€50
Hardware/cables	1	€80	€80
Amplified Speaker	1	€50	€50
Microphone	1	€40	€40
Battery	2	€100	€200
Inverter	1	€100	€100
Charger	1	€20	€20
Software	1	€0	€0
Total			**€540**

READING

https://www.macrovet.nl/birdgard-pro.html

https://www.growingproduce.com/fruits/high-tech-solution-for-bird-control/

https://www.birdgard.com/

https://www.birddeter.com.au/products/index.html

https://www.birdcontrolgroup.com/

https://www.instructables.com/id/Raspberry-Pi-Doves-Repellent/

https://www.vogelgeluid.nl/