Vineyard Robotics MQP

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Abstract

- Wachusett Vineyards in Hubbardston, MA faces challenges keeping pests out of their crops
- System provides a safe way of deterring birds by identifying them and playing predatory audios

Background

- Wachusett Vineyards in Hubbardston, MA faces challenges keeping pests out of their crops
- Pests such as birds, deer, and insects can reduce crop yields in vineyards by 45% [1]
- Methods such as netting can be expensive to implement

System Concept

- The system records a live stream of the vineyard and implements a motion detection library
- If motion is detected, a notification is sent to the application and is recorded on the event log
- After motion is detected, an audio response is triggered

VIDEO ACQUISITION — CAMERA

MOTION DETECTION — CAMERA & RASPI

NOTIFICATIONS — APPLICATION

EVENT LOG — APPLICATION

AUDIO RESPONSE — RASPBERRY PI

System Implementation

- Initial Solidworks plan using 3D printed base
- Camera implements Motion Library to identify birds
- Movement triggers one of four predatory hawk audios
- Events are recorded on application and in database

Raspberry Pi High Quality Camera with 6mm wide angle lens

Raspberry Pi 4
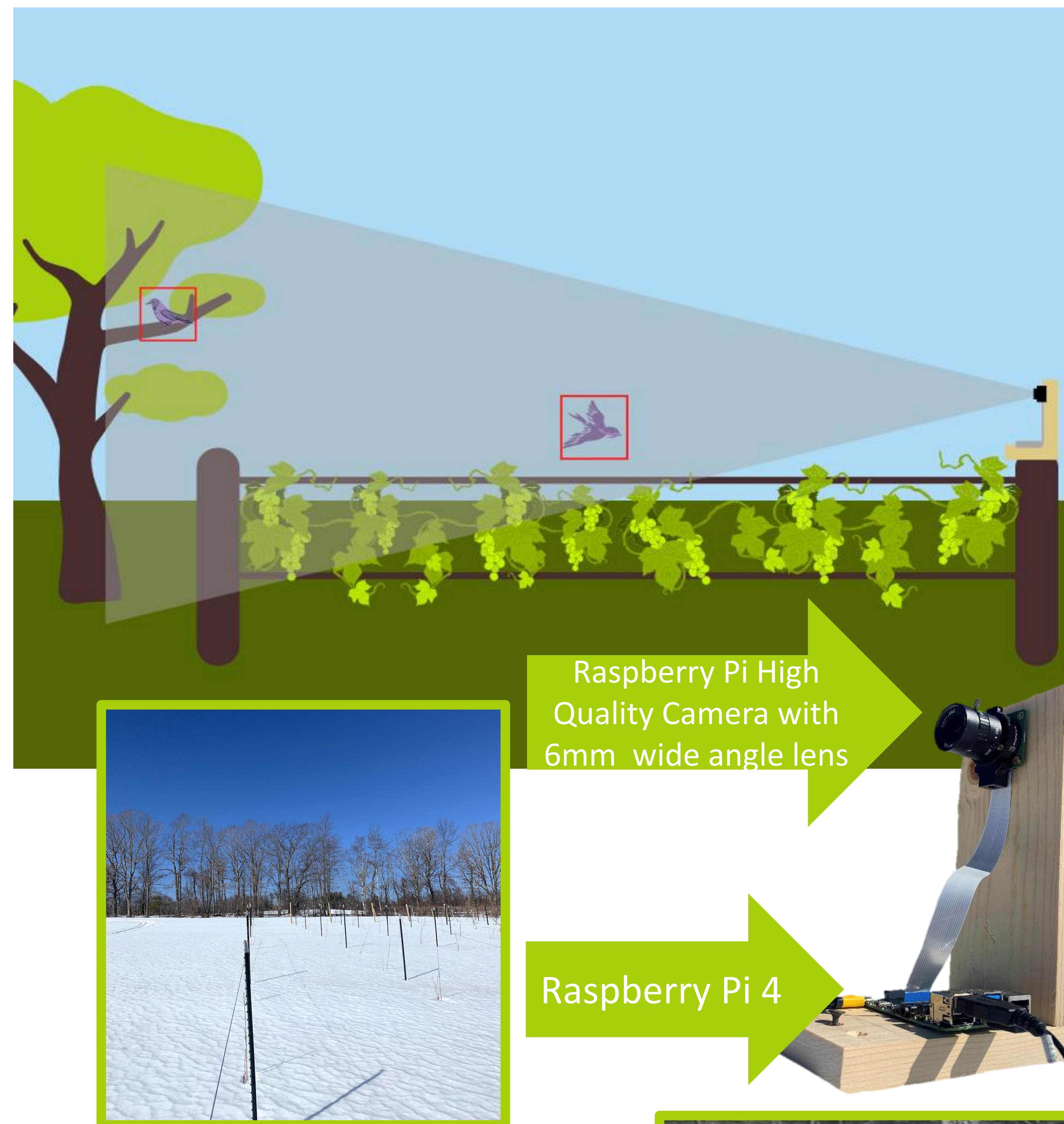
Motion Detection

- System implements "Motion Project" library to detect birds
- Inputs such as threshold and framerates were adjusted in testing to improve accuracy
- Testing was conducted at the vineyard and in local wooded areas

Computer App

- Main page allows for livestream of the vineyard
- Settings page allows users to manually play audios in the field and can adjust the pitch and speed
- The event log captures images of each "motion event" which is accessible on a database

Conclusion

- System can be secured on vineyard posts
- Motion library identifies bird movement
- Motion events trigger various hawk audios
- Computer application allows for monitoring and controlling the system

Acknowledgements

References

[1] J.P. Tracey and G. Saunders, "Damage to the Wine and Grape Industry," *Report to the Bureau of Rural Sciences, Department of Agriculture, Fisheries, and Forestry*, 2003.

Credits

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2. https://wineindustryadvisor.com/2020/07/13/repel-pest-birds-from-your-vineyards-with-amazing-results
3. http://wineguy.nz/index.php/glossary-articles-hidden/164-bird-damage-in-the-vineyard