

EE/CprE/SE 491 WEEKLY REPORT 3

-2/24/26-2/31/26

Group number: sddec26-03

Project title: Squirrely Bird Feeders - Using AI to outsmart the Squirrels

Client &/Advisor: Randall Geiger

Team Members:

- Wyatt Sinclair
 - Jack Morrison
 - Miles Nichols
 - Kenny Tran
 - Benjamin Bartels
 - Nolan Hoenert
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- **Weekly Summary:** We reached a conclusion on many design options via majority-vote polls: Our solution is a prebuilt unit inside a provided bird feeder with a gate on a track as the deterrent. We will use only one camera inside the feeder, activated by an IR sensor to detect motion. Squirrel/bird identification will use computer vision paired up with a machine learning algorithm. For now, the machine learning will only be trained on squirrels or generic birds. Species detection will be handled by an external application or a more powerful model in the cloud. We are leaning toward WiFi if it meets the required specs for our application (research to be done). Pictures of birds will be sent to an app or texted to the user. The system should run on battery power at the feeder and on wall power for the base station.

 - **Past week's accomplishments**
 - Jack Morrison: Sketched out some designs for a squirrel deterrent and multiple possible gate style designs. Also working on sketching a block diagram to go with the others.
 - Wyatt Sinclair: Continued researching computer vision approaches for detecting squirrels versus birds. Began preparing datasets and setting up the machine learning environment to support training and testing of the detection model in VSCode .
 - Nolan Hoenert: Researched if there were any other bird feeders using AI to deter squirrels. Found that they only used AI to detect bird species and not to deter squirrels.

- Benjamin Bartels: Conducted a group poll so we had consensus on the major design decisions going forward. Researched different designs of bird feeders and deduced which design would be best suited to accommodate our design outlook without sacrificing too much space in the feeder.
- Kenny Tran: Patent search for prior art (requested by advisor). Work with Jack on the block diagram as part of some project planning.
- Miles Nichols: Worked on the design document and research for the flow of our product, running its execution sequence.

○ **Pending issues:**

Wyatt Sinclair: N/A

Jack Morrison: N/A

Nolan Hoenert: N/A

Miles Nichols: N/A

Kenny Tran: N/A

Benjamin Bartels: N/A

○ **Individual contributions:**

<u>NAME</u>	<u>Individual Contributions</u> <i>(Quick list of contributions. This should be short.)</i>	<u>Hours this week</u>	<u>HOURS cumulative</u>
Jack Morrison	Worked on sketching out a few physical deterrent designs, door styles, and a block diagram.	6	18
Miles Nichols	Worked on the design document and research for the flow of our product running its execution sequence. Specifically how the delay of a portion of the sequence will affect the efficiency of the gate stopping the squirrel from eating.	6	18
Wyatt Sinclair	Set up a machine learning environment, prepared initial bird vs squirrel datasets, and researched computer vision models for detection from Kaggle.	6	18
Nolan Hoenert	Researched different bird feeder styles	6	18

Kenny Tran	Patent search, prior art, block diagram, planning	6	18
Ben Bartels	Group design consensus, Bird feeder design research, started on parts research	6	18

○ **Comments and extended discussion**

[Squirrely Bird Feeder Design Sets - Google Docs](#)

○ **Plans for the upcoming week** *(Please describe duties for the upcoming week for each member. What is(are) the task(s)? Who will contribute to it? Be as concise as possible.)*

- Jack Morrison: Formalize sketches into diagrams using Lucid, Figma, draw.io, or Mermaid charts, also begin planning our app design.
 - Miles Nichols: Use our decision about our product to start looking into specific hardware and software to use. Ensure compatibility and integrity with integrating parts.
 - Nolan Hoerner: Work on designing a block diagram, and look into what cameras would work the best for the project.
 - Kenny Tran: Continue patent search (USPTO instead of Google Patents) to understand prior art. Potentially find college of business students to do a market analysis for us.
 - Benjamin Bartels: Researching the best way to have the gate slide up and down, along with what the best parts for the sliding mechanism would be. And starting to design the 3D model for the bird feeder.
- Wyatt Sinclair - Continue developing the machine learning detection pipeline by preparing labeled training datasets for bird and squirrel classification. Begin testing lightweight models suitable for deployment (YOLO or MobileNet-based classifiers) and evaluate their inference performance for real-time detection.

○ **Summary of weekly advisor meeting:**

We first discussed similar products already on the market and also looked into similar patents to our project. We also talked about whether to offload all ML/AI detection from the Raspberry Pi. We then discussed cellular vs. Wi-Fi for offloading images from the Raspberry Pi. For the upcoming meeting, we talked about trying to put together a block diagram of the system.