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# **Product Design Specification for**

## **Stevie Nicks and the Xaybanha Zhous Practicum**

### **Summary**

We designed a smart bird feeder to determine the species of a single bird by distinguishing the sounds of birds at different frequencies in conjunction with the weight of the bird. After judging the bird's species, the device releases the same frequency of sound to teach the bird to chirp to release food. When the bird leaves, the sensor switches off the food storage. And when the device determines the bird's species, it automatically uploads the bird's information, which allows people to better count the species of nearby birds and protect them.

The device will be made available to bird conservation organizations as well as to ordinary families. This will help people better study birds and protect them. This device can be used to study bird species in different regions and to make targeted conservation measures. And provide more food sources for birds during disaster season. This device will make the protection of birds more convenient. And the installation and placement of the device is very easy to operate. People only need to install the device at the target location to be observed and connect it to a wireless network device. The method of installing the device is simple and convenient for everyone to operate. This equipment will make it easier to protect birds. And the device provides more opportunities for close encounters with birds to study birds. If the survival of birds is threatened, people can also implement special protection measures. This device provides more opportunities for human beings to live in harmony with birds.

## Market Analysis

Our Smart Bird Feeder will be targeted toward the backyard bird enthusiast. Any person wanting to carefully craft their home birdwatching experience by attracting specific bird species would be interested in owning one of the feeders. In addition to the bird watcher, people who have a desire to ensure that no crows or squirrels have access to food would be likely to buy one.

There are a few smart bird feeders in development, but none of them seem to dispense food based upon the species of bird trying to access food. That is the main difference between our smart bird feeder and the others. The other bird feeders are mostly just for remote viewing (i.e. they have a camera on them), or the compilation of regional statistical data on bird activity.

A price of \$80 for the bird feeder appears to be reasonable. Unintelligent bird feeders sell on Amazon for a price anywhere between \$10 and \$135. Adding in species targeting functionality and inherent squirrel-proofness would allow the feeder to be sold for a price above the median value of unintelligent models. Because there don't appear to be any commercially available smart bird feeders in existence at the moment, it is somewhat difficult to narrow in on a competitive price.

## Requirements

Must automatically dispense bird feed when a bird is "detected"

Must be able to "feed" only small birds

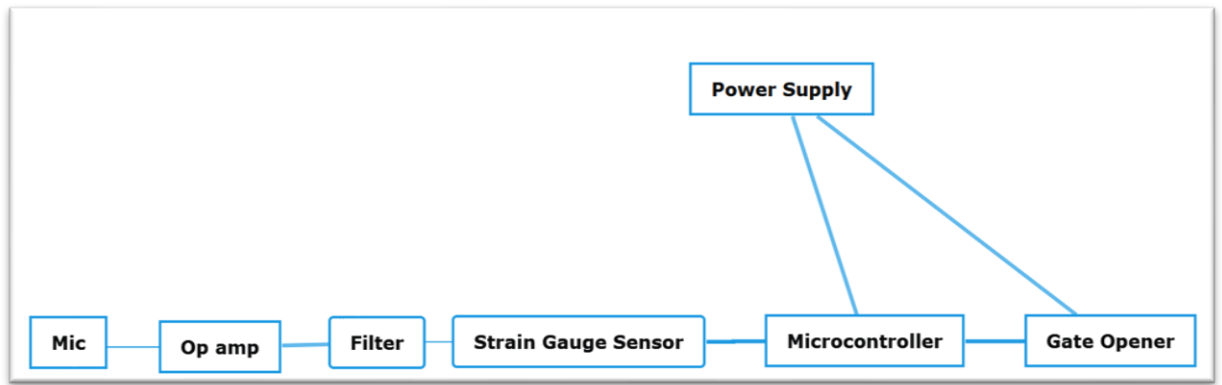
Should be powered by a battery

Should have a battery life of at least a week in continuous use

May switch to a low-power setting when not intended to operate

May teach the birds to tweet at the smart bird feeder

## System Architecture



## Design Specification

- Sensor - Strain gauge and microphone
- Processor - ATtiny13V (0 - 4MHz, Input voltage: 1.8V - 5.5V)
- Actuator - servo (to open gate to release seeds)
- Power - 7.4V Lipo battery
- Mechanical Design - perch on hinge
- Firmware - Arduino bootloader
- Arduino IDE using the Processing language