# Title : Automatic Outdoor Dog Feeder

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# Problem

An automatic dog feeder can relieve a dog parent of the habitual task of refilling their pets' bowls. Due to work, travel, and other essential tasks that result in lengthy absences, it can be difficult to keep track of and complete on a regular schedule. Most dogs cannot be self-governed when it comes to how much food they eat and it results in gorging sickness, canine obesity, and sometimes death. An automatic dog feeder prevents these situations and ensures that the dog only gets the amount of nutrition they need throughout the day. The market for indoor automatic dog feeders is saturated with hundreds of brands and models; However, the choices for an automatic dog feeder for larger outdoor/part-time outdoor dogs are limited.

# Solution

An improved automatic dog feeder will be effective for outdoor pets in which it operates from a battery, powered by solar energy to maintain its functionality throughout long periods of time. Our dog feeder will distribute an accurate amount of food depending upon the pet's weight, breed, and suggested meals per day according to the owner's input. In addition, a scale will be implemented to manage how much the dog eats in each meal, which then contributes to the amount of food given in the following dispenses. With this, the owner can manage the dog's health, monitoring how much is eaten a day. RFID tags will also be implemented to assure that only the specified pet is approaching the feeder and prevents stealing. In all, this solution should eliminate concerns from pet owners as they can continue their responsibilities and travel while taking care of their pets at home.

#Solution Components

Subsystem 1

Power system:  
- Lead Acid batteries will be within a sealed compartment on the feeder. Rust resistant compartment to prevent gassing to erode the sheet metal that will be the structural material for the feeder   
  
- LM7805 Voltage Regulator - step down the voltage from the battery for use by microcontroller  
  
- Solar- Battery Managing: MPPT Solar Panel Controller Charging Module for 12V Lead Acid Battery Charger 3A

- 12 V Servo motor for dynamic loads

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Subsystem 2

Security system: The RFID tags will be attached to a feeder and the matching component to the pet’s collar to identify the correct animal approaching the feeder. When the dog approaches the feeder, the feeder will distribute the food according to the weight on the scale below the bowl.

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Subsystem 3

Measurement system

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# Criterion For Success  
  
Describe high-level goals that your project needs to achieve to be effective. These goals need to be clearly testable and not subjective.

Accurately measures the amount of food left in dog bowl. Expels additional food according to upper bound of how much a dog should eat in a day. Should expel food 3 times a day.

Opens the dog feeder bowl when dog with RFID tag approaches feeder close. Closes when tag is farther away to prevent stolen food.

Properly distributes the food according to user input: pounds of dog and meals per day

## **PECIFICATIONS OF DESIGN**

* Scheduled feeding times and amount. (3)
* Active weighing to monitor pet's eating habits; While also not allowing continued dispensing resulting in overfill.
* RFID proximity access to only permit the pet to eat from reciprocal.
* Solar powered with internal battery bank
* User notifying system for low feed reservoir or low/loss of power (3)
* Tracking feeding paterns to alert owner of illness or loss of appetite (3)

## **THE STM32 CORTEX M0+ MICROCONTROLLER I/O:**

## **INPUTS**

* 2.4 GHz transceiver (4)
* Digital scale signal (9)
* Voltmeter for charge state of battery (8)
* RFID digital signal (7)

## **OUTPUTS**

* 2.4 GHz transceiver (4)
* auger motor (5)
* reciprocal lid motor (6)

## **FOOTNOTES**

* (1) Sheetmetal container formed into a box/silo that holds 50-60 lbs of dog food
* (2) The reciprocal is sheltered and protected by a hinged and motor driven lid.
* (3) An app for android or a raspberry pi application for user to unit communication
* (4) MKW41Z for Bluetooth low energy app communication
* (5) Servo motor dynamic loads
* (6) Stepper motor for holding torque
* (7) Grove - 125KHz RFID Reader
* (8) two resistors
* (9) Ardest A/D Converter Weighing Sensor HX711 Balance Module for Load Cell MCU AVR Arduino