Auto cat snack dispenser and exercise machine

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Problem

When people are not at home, pet cats may get bored and hungry. Although there are many types of auto feeders on the market, most of them are designed to dispense food based simply on the remote command of the owner or the request of the cat itself. There are several problems related to such designs. Feeders that are based solely on the cats' demands may cause cats to overeat and have unhealthy diet habits. Other feeders, which require owners to grant permission every time, can be inconvenient and useless when owners are not able to stay active. In addition, both two types of feeders mentioned above fail to keep track of the amount of exercise cats have done, especially when the owners are not there to play with their cats. Therefore, how to cheer cats up, feed them automatically, and ensure enough exercise of them have all become problems.

Solution

To solve the three problems mentioned above, we are planning to design an auto cat snack dispenser and exercise machine. This cat feeder toy project involves two crucial parts: a movement detection unit, an entertainment unit, and a snack dispenser. It can attract cats' attention and lead them to do exercise, and it can also detect cats' movements and record how many exercises cats have done. After the cats have done enough exercises, this device will start to drop food for them.

Solution Components

Subsystem 1: The entertainment unit

We plan to use a red laser pointer to attract cats' attention. This red laser pointer will be attached to the ceiling, which can be turned on once the infrared sensor detects cats' approaching. Once the laser pointer is turned on, the system starts to record cats' movements.

Subsystem 2: The movement detection unit

We will use four types of sensors to detect cats' movement. Three sensors will be placed in a special cat collar except for the infrared sensor, which will be placed on the dispenser.

Gyroscope: This sensor is to measure the angular rotational velocity and acceleration of cats.

Gravity sensors: This sensor measures cats' movement in a vertical direction. When cats jump up on the table, their movements can also be recorded.

Accelerometers: This sensor is to ensure that cats are physically doing exercises. It can measure the acceleration of our cats.

Infrared sensors: This sensor is used to detect if cats approach the machine. It turns on the machine when the cat is seeking snacks under it.

Subsystem 3: The snacks dispenser

After enough exercises are recorded, snacks will be dispensed. This subsystem ensures a fixed amount of snacks is dispensed each time. The system then halts for a period of time until the next activation becomes available.

Criterion For Success

- The machine turns itself on and activates the entertainment subsystem when a cat is seeking food under the dispenser.
- If the cat does not react to the entertainment system after a short period of time, the machine turns off automatically and waits for the next activation.

- Cats' movements are recorded, and the machine will dispense snacks after a certain amount of exercise is reached.
- Once snacks are dispensed, the system will turn off and rest for a period of time before the next activation is available to limit the total amount of snacks offered.