

There are two type of prototypes, and I want my prototype to be as close as possible to the final product. But I know that the most important thing is that I need to be functionally close to the final product first, and then the appearance. I think the significance of the prototype is that prototype is the expression design ideas. Prototypes allow designers to present their designs and simulate real-life scenarios. In the context of digitization, prototypes can simulate the ultimate interaction between the user and the interface. Prototypes can simulate all or part of the interaction behaviour, depending on the needs. Prototypes can simulate how the final product works. It supports the usability and feasibility of user test designs. The concept of "interactivity" is the root of the prototype.

The prototype is mainly to test the design and product ideas before making the actual product. prototype is directly related to the success of the project. Prototypes don't have to look like the final product - they can have different fidelities. The fidelity of the prototype refers to how it conveys the appearance of the final product, that is, its level of detail and realism. Fidelity can vary in the following ways: visual design, content, Interactivity. The presentation and functionality of the Hi-fi prototype is as similar as possible to the actual product released.

In term of visual design, hi-fi prototype is a realistic and detailed design – all interface elements, spacing and graphics look like a real product. In term of content, designers use real or similar real content. The prototype includes most or all of the content shown in the final design. Interactivity of hi-fi prototype is highly represented. it is good that hi-fi prototype can get meaningful feedback during usability testing. For users, high-fidelity prototypes often look like real products. This means that in a usability testing session, test participants will be more likely to behave naturally—as if they were interacting with a real product. An excellent high-fidelity prototype makes people excited about your design, but a low-fidelity prototype is not. what is not so great about hi-fi prototype is usually causing higher cost of time and finance.

Low fidelity prototype is a quick and easy way to convert advanced design concepts into tangible, testable objects. Its primary and most important role is to check and test product features, not the visual appearance of the product. my prototype is basically a low fidelity prototype. what is not so good about low fi prototype is the uncertainty during the test. Using a low-fidelity prototype, it is easy for the tester to know what is actually valid and what is not. In addition, low-fidelity prototypes require the user's full imagination and limit the effectiveness of user testing. Because of the time limit, this means that my prototype is mainly a low-fidelity model, but I am planning to do this prototype as close as possible to the high-fidelity model.

The development process follows down below.

First design ideas. point out the problem that is going to be solved during the process of prototype, to fulfill the functional requirements. From the perspective of my project, my client is a cat owner and the cat which the cats that feeder services for. From this point of view, I need to meet the requirements of the two roles. First, the cat owner needs a mobile application to set the cat's food consumption, and owner can adjust the food intake and feeding time, and need to know the stock of the food and get a reminder. From the perspective of the product beneficiary cat, it needs to interact with the feeder to get food from it. From the cat's view, a cat needs to make a request by getting close to the feeder, and the feeder responds. If it is close to the feeder in the time range set by the owner, he will get the food component which set by the owner. To consider the solution from this need, I am required an mobile app to handle the time setting and the amount of things being fed. The app interacts with the feeder, and get feedback of switch actions (open and close) and food shortage notifications. I need a wifi internet connector to do this app. Here I used the instructor's recommend using particle photon. For controlling the food, I used stepper motor to open the control switch to achieve feeding. I am also going to use an ultrasonic sensor to sense the distance between the cat and the feeder to understand the cat's need for food and thus influence the feeding time strategy. For example, if cat gets close to the feeder within 15cm, the signal will be sent to app, app will check the time, if it is within 1 hour or less of the setting of timer, allow this cat get food. otherwise, refuse to provide food.

Also, for the food supply notification, there will be a pressure sensor to detect if the food is not enough for next time feeding. System will be sending a signal of lacking food to the app. the owner is going to get the message from the app.

Evaluation of sensors and motors:

1. Particle Photon:

Particle's Wi-Fi offering was the perfect solution. The hardware is always connected to the Device Cloud, informing it of our thread spindle utilization. This information is important to help make expensive capital budgeting decisions.

2. Stepper motor

The motor's position can then be commanded to move and hold at one of these steps without any position Sensor for feedback (an open-loop controller), as long as the motor is carefully sized to the application in respect to torque and speed. This motor is the right one for

my project, because it can turn exactly degrees that the can need, which is 36 degrees by calculation. My can has a hole for dropping the food, diameter is 3.5CM, the motor will be attached in the middle of can's bottom. In case of cover/open the hole, I need turn my key 36 degree to do so.

3. Ultrasonic sensors measure distance by using ultrasonic waves.

The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception.

4. pressure sensor

A pressure sensor is a device for pressure measurement of gases or liquids. Pressure is an expression of the force required to stop a fluid from expanding, and is usually stated in terms of force per unit area. A pressure sensor usually acts as a transducer; it generates a signal as a function of the pressure imposed. For the purposes of this article, such a signal is electrical. the sensor has to be a captive pressure sensor in order to get the sense from the food.

In the process of making the prototype, the original idea was to make a feeder similar to the timed medicine box. by turning the disc, and the gap in the middle of the disc can be used for the cat to enjoy the food. This is just a timing device, simple, only Satisfy some of the features, not perfect. The idea now is to make an IoT, easy to use, adjust parameters, and the function is relatively perfect. The original idea was to place the switch outside the storage compartment. To reduce the pressure on the switch, I took the instructor's advice to reduce the size of the rotating disk, and I place it outside the can, and add two trigger switches to record the position of the rotation.

Through continuous reflection, the transmission should reduce the chance of getting stuck as much as possible, and the durability should be strengthened. by constant thinking, it promotes me to use the most effective and stable solution to improve my design. This is the meaning and charm of prototyping. the three part of prototyping is production, feedback, improvement, and finally the product will be done properly.