Meow Meow

Smart Pet Interaction System

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Section 1 - Meow Meow

Meow Meow is composed of two separate systems, as described below.

Fig. 1　*Meow Meow*, a smart pet interaction system

Section 2 - Environment Monitoring System

- **Climate module**
  - monitor the temperature and humidity
  - update *climate/temperature* and *climate/humidity* in Firebase realtime database
  - update *climate/hot* to true when the temperature rises over 28°C and update *climate/hot* to false when the temperature drops below 25 °C.

- **Relay module**
  - control the fan and the light bulb
  - automatically turn on the fan when temperature rises
  - automatically turn on the light at night(18:00~06:00) and turn it off at daytime(06:00~18:00)
  - enable clients to send request to control the fan and the light bulb

Fig. 2　Environment monitoring system

Section 3 - Interactive Feeding System

- **Server**
  - establish a local host using socket.io
- **Button(via GPIO)**
  - enable your pet to call you
- **Servo module**
  - control the direction of the camera
  - control the pet food dispenser
- **USB camera module**
  - stream live video
- **USB audio module**
  - play recorded voice message when you call
  - play recorded voice message when you feed remotely

Fig. 3 Interactive feeding system

Section 4 - User Interface

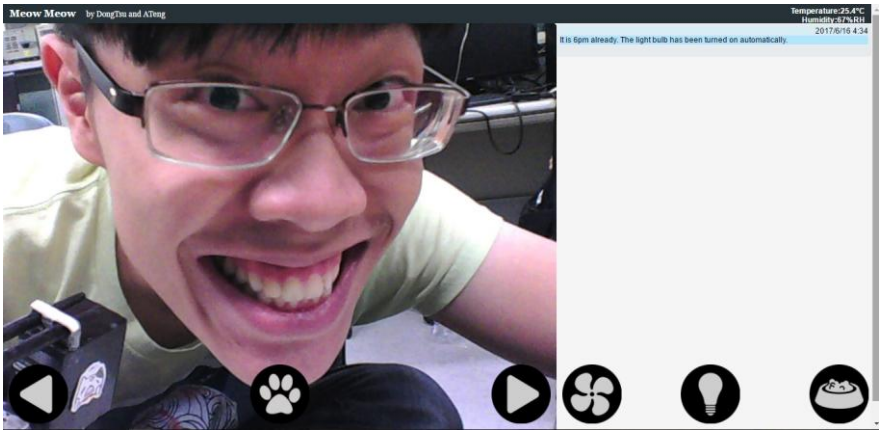

Fig. 4 User Interface

- **Firebase API**
  - connect to Firebase realtime database
  - fetch climate data updated by the environmental monitoring system
  - acquire the state of relay module of the environmental monitoring system
  - send relay control request when the fan/light buttons are clicked(will be elaborated in Sec. 5)

- **Message List**
  - show messages when your pet calls you by pressing the GPIO button
  - show messages when the temperature rises over 28°C
  - show messages when the light bulb is turned on automatically at night
  - show date and time information of every message

Fig. 4 Message List

- **Buttons**
  - Camera control
    - trigger the servo module
    - adjust the direction (left/right) of camera
  - Call meow
    - trigger the audio module
    - your pets will hear you prerecorded voice
  - Fan switch ↔
    - trigger the relay module
    - turn on/off the fan
  - Light switch ↔
    - trigger the relay module
    - turn on/off the light
  - Feed button
    - trigger the servo module
    - activate the feeding system
    - your pets will hear you prerecorded voice

Section 5 - Implementation Details

How do we use Firebase API to establish robust connection?

We try to construct a request/response connection model between the browser(which acts like a client) and the environmental monitoring system(which acts like a server). To illustrate the idea, we take light control for example and some trivial checks are skipped. Note that true means 'on'/'turn on' and false means 'off'/'turn off' for *relay/status.lightIsOn and relay/command.switchLight*.

- Whenever the user click the light bulb button, the client will check if *relay/command.switchLight* is equal to *relay/status.lightIsOn*. If so, then the client will change *relay/command.switchLight* into the target state. If *relay/command.switchLight* is not equal to *relay/status.lightIsOn*, it means the server has not completed the last command sent by the clients so we simply skip it..
- The server listens on *relay/command.switchLight*. Whenever its value is changed, the server will change the relay controlling the light bulb into the target state.

- After the server has successfully change the state, the server will change the *relay/status.lightIsOn* into the current state of the relay controlling the light bulb. Note that this is why we say if *relay/command.switchLight* is not equal to *relay/status.lightIsOn*, it means the server has not completed the last command sent by the clients.
- The client listens on *relay/status.lightIsOn*. Whenever its value is changed, the client will change the unlighted light bulb image into lighted light bulb image or in the opposite way.

Close-up of the structure of the pet food dispenser

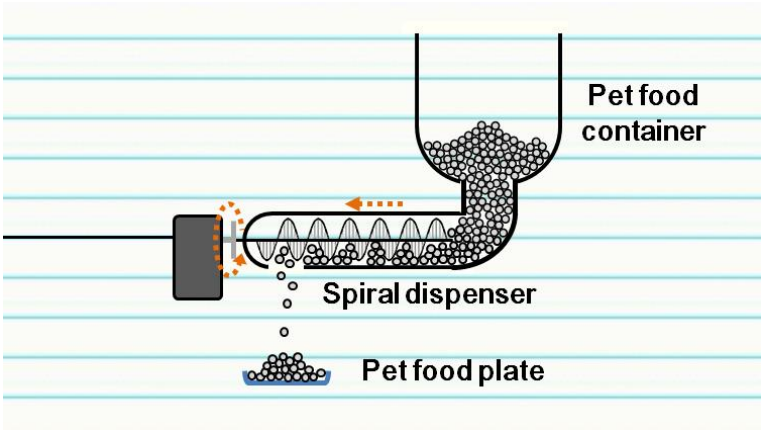

Fig. 5 Close-up of the structure of the pet food dispenser