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Pet Care Unit- An Automated Feeding System Using Bluetooth Module

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Abstract - *With the help of a mobile application the machine- Pet care unit, provides meals to pets at pre-set times. The mobile is connected to the pet care unit using a Bluetooth module. When a command is sent from the mobile application to the controller board through a Bluetooth module, the controller board works accordingly to perform the assigned tasks. When an appropriate input is given to the system, food and water gets poured into the bowls placed below the pet care unit. Similarly, there is a buzzer sound before every dispensing action for the purpose of training the pet to get used to a new system. The system also has a camera which is used for visual confirmation for food and water dispense. This product will help people to feed their pets even if they are not present at home.*

Key Words: Automatic food and water dispenser, Arduino, Servo motor, HC-05 Bluetooth module, ESP 32 CAM module

1.INTRODUCTION

In a home with pets, from time to time, pet owner could be unavailable to feed pets due to work or any other reason. So, a pet care unit is designed to provide assistance for such feeding tasks. This system can be pre-programmed for time intervals to feed pets. It is a system which will help people to feed their pets even if they are not present at home. The mobile application provides a wireless connection to the pet care unit and camera system is useful for visual purposes.

To provide meals, the system has a storage unit. In the storage unit, there are two compartments. One is for storing food material and the other one for water. These two storage units will be controlled by an Arduino processor using servo motors. And all these functions are controlled by the mobile application called PetCU. The camera stream can be seen on the mobile application as well.

2. OBJECTIVE

The primary objective is to design and develop a pet care unit from which food and water can be given to a pet instantly and also at pre-defined time intervals using a mobile application.

3. PROPOSED METHODOLOGY

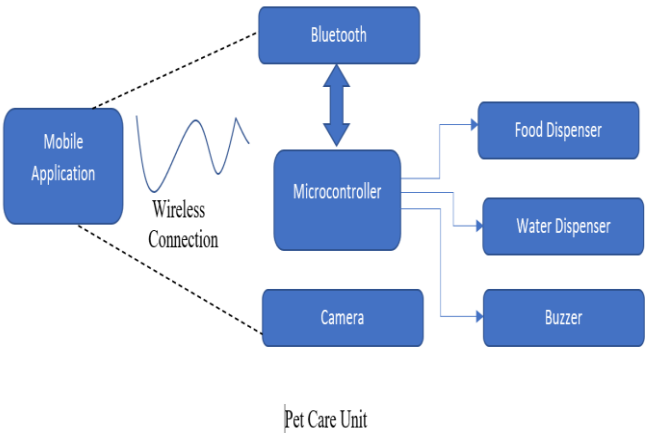

Figure 1: **Block diagram of Pet Care Unit**

In the pet care unit, two servo motors are used to control the opening of the valves of the food and water storage containers. Servo motors are small, compact, and have an output shaft. The position of this shaft can be set to a particular angular position. The angular position of the output shaft depends on the signal sent to the servo motor.

The control valves of the container are attached to the servo motors. When there is a particular signal from the Arduino board, the servo motors pour food and water into the bowls outside.

A mobile application, PetCU, is created for controlling the functions of the pet care unit. This application is connected to the device using an HC:05 Bluetooth module. After the connection, on the mobile screen, there are options available such as camera stream, instant food, water dispense, and setting for time intervals between dispenses, etc.

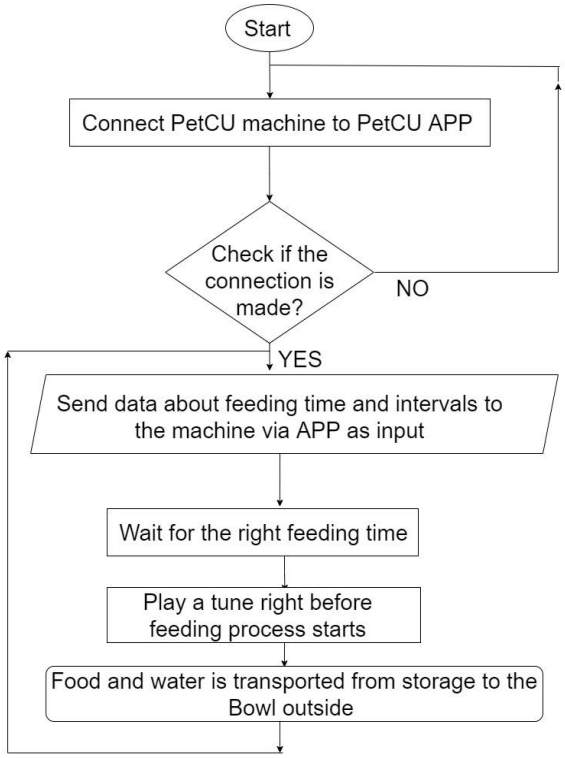

Figure 2: Flow chart of the pet care system

4. RESULT

The first screen of the PetCU application would welcome pet owners and then take them to the screen with feeding settings. Here, the pet owner connects to the pet care unit by clicking the Bluetooth button and selecting the device to pair. After connecting to the machine, we see two options of feeding available- Instant Feed and Later Feed.

Figure 3: First screen of the PetCU mobile application

In the Instant feed option, you can click on food or water to feed your pet right away. It will send a signal to the machine to provide a meal right away. It will also play a tune before dispensing food or water via nozzles in the pet's bowl. This option is useful when the pet owners are at home and wants to feed their pets.

In the Later feed option, the pet owner will set two values- interval hours and the number of intervals. Interval hours will let the machine know when to provide meals. It takes an interval-hour period set by the pet owner as an input. The input of Interval numbers lets the machine know about the number of times the feeding cycle has to be repeated. After setting the feeding cycle, a text would be displayed at the bottom indicating the feeding hours and the number of cycles.

This option is especially useful when the pet owners are not going to be available to feed their pets.

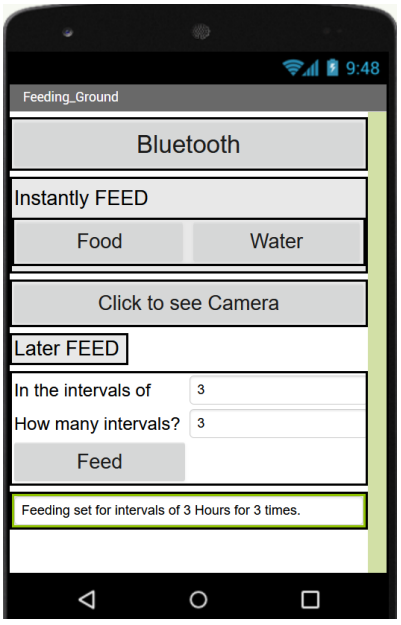

Figure 4: PetCU application's feeding settings Screen

One more feature available in the PetCU application is the camera feed from the pet care unit which lets the pet owner keep an eye on their pets and home. If the pet owners click on the camera button, pet owners will be directed to the live stream of the camera module.

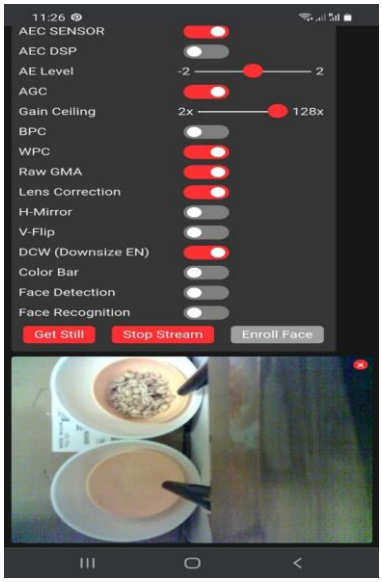

Figure 5: Camera feed on the PetCU application

When a signal is sent from the application, it comes to the Arduino board through the Bluetooth module. After receiving the signal, the Arduino gives commands to the buzzer and servo motors according to the input signals. Using one of the Arduino microcontroller data pins, a simple sound signal is sent to the buzzer. So, a tune is produced by this buzzer.

A simple tune is created by changing the frequency of the input to the buzzer and delay functions. This tune is used to indicate the action of dispensing food and water is about to begin. Playing this tune before every feeding action helps the pet form a connection to the pet care unit as the feeding area. This connection is used during feeding cycles when the pet owner is not available to guide the pet to the bowl. We are using the Pavlov's experiment phenomenon to create the association of getting food to the tune being played.

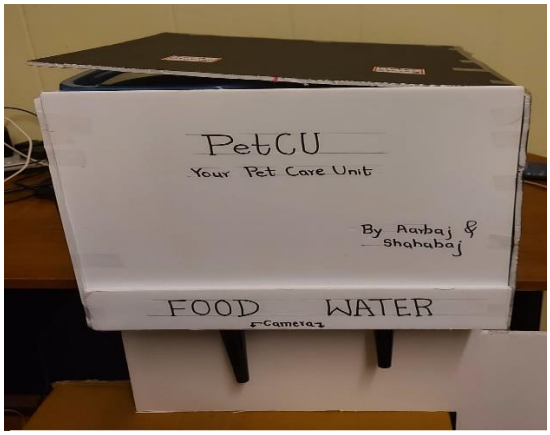

Figure 6: Pet Care Unit (PetCU Device)

5. FUTURE SCOPE

In the future development of this device, the use of a Wifi module can be made to attain more feasibility of feeding option instead of the Bluetooth module. Pet care devices can be made accessible to pet owners via using servers to access the device at home if the wifi module is utilized to its full potential. High-quality storage containers in pet care units can extend the device's use for a longer period. Also, if the storage containers are made to be temperature-controlled and airtight, they would become more long-lasting.

Controlling power consumption will play an essential role in future development. With more features, availability to store food longer, power consumption is sure to rise. Creative and innovative techniques like the use of low power mode and sleep mode with interrupt calling can be made to lower the power consumption.

The pet care units can not only be used by individual pet owners but also by places like dog rescue shelters, dairies, and farms to feed pets and farm animals. Also, pet care unit can be made mobile to allow it to move and find pets to feed them instead of waiting for them to come to the machine.

6. CONCLUSIONS

The pet care unit can automate the process of providing meals to your pet. It can execute feeding intervals set by the pet owner via 'PetCU' mobile application. As per the pet owner's requirement, feeding hours can also be arranged in a way so the eating habits of the pet won't change if the pet owners are not available to feed their pets.

With the help of a camera module installed in the pet care unit, pet owners can keep track of their pets. Using a camera module focused on the pet's feeding bowl, they can see if their pet has been fed or not.

Playing a tune before dispensing food or water can cause the development of a sense of the feeding ground towards the pet care unit in the pet's mind. So, when the tune is played, the pet will reckon it's a feeding time and come to the pet care unit. Our pets depend on us to provide for them, take care of them. Sometimes, we are bound by our day-to-day busy life. So, we can miss or be unavailable to provide them meals at their feeding times. It can have an adverse effect on the feeding habits of our pets. Pet Care Unit tries to solve such problems.

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