

# Automated Pet Surveillance

Atharva Munshi, Kapil Mulchandani, Namrata Deshmukh, Vijay Ghanshani

Computer Engineering Department  
San José State University (SJSU)  
San José, CA, USA

Email: {atharvachaitanya.munshi, kapilchandra.lal.mulchandani, namratabalasaheb.deshmukh, vijay.ghanshani}@sjsu.edu

**Abstract**—The increase in the computational power of computers has made it possible to capture important information, make use of the context and interact directly with the physical object. The IoT provides a set of standards and methodologies to associate an object in the real world. In our project, the proposed device will help the dog owners to keep an activity track on their pet remotely via webcam and feed them by just clicking a button. It will also send the notifications to the owner whenever the dog behaves abnormally like excessive barking and thus fulfilling the need of the customers by letting owners leave their pets at home without any worries and let them take care of their pet's food requirements while they are not home.

**Index Terms**—rasberry pi, Servo motor SG90, Electret Microphone Amplifier - MAX4466 (sound sensor), MAC3008 ADC

## I. INTRODUCTION

As a pet owner, providing proper care to pets is of utmost importance. But today's fast-paced and busy life does not allow being at home or with your pet 24/7. The negligence in proper treatment can lead to serious issues regarding the pet's health and might adversely affect the relationship between them. This gives rise to the need for products that can take place of the owner at times. Presently, different products exist for the surveillance of pets. But the main problem is that these products are expensive. Everyone cannot afford such products. Also, the available products rarely provide the integrated functionality of surveillance and feeding.

In order to tackle this problem, we aim to provide a pocket-friendly device which will help the owners to monitor the pet from a remote location as well as feed the pet whenever required. The proposed solution also offers an important feature of notifying the customer in case of any unusual behavior shown by the pets. Thus, the device provides an integrated platform which allows users to leave their pet unattended, without worrying about the consequences.

## II. SOFTWARE USED

### A. Raspbian OS

It is a Debian based Linux distribution. Generally, the use of python language is promoted. The unofficial open source is available while the default firmware is a closed source. Its mainly used for Raspberry Pi hardware. PIXEL is used where Pi enhances window Environment, its main desktop

environment as lightweight. It is a mixture of an enhanced version of LXDE desktop environment as well as the Openbox stacking window manager.

### B. Flask server

Flask is a micro web framework written in Python. The main reason it is classified as a microframework is because specific tools or libraries are not required. Flask supports extensions that can add application features as if they were implemented in Flask itself.

### C. MongoDB

MongoDB is a cross-platform document-oriented database program. It uses documents similar to JSON. It is classified as a NoSQL database program. Documents and collections are used to store data.

## III. HARDWARE USED

### A. Raspberry Pi

It is a low priced, compact computer that can be easily plugged into television or monitor. Programming in languages like Scratch and Python can be learned. It makes possible for people to explore the world of computing.

### B. Servomotor SG90

In servo motor, position feedback is used to control the movement and the final position. It is a closed-loop servomechanism. The input to its control is a signal which can be analog or digital and it represents the position commanded for the output shaft.

### C. Electret Microphone Amplifier - MAX4466 (sound sensor)

An electret microphone is a type of electrostatic capacitor-based microphone. The need for a polarizing power supply by using a permanently charged material is eliminated. The heart of the Sound Detector is the electret microphone capsule and without it, we couldn't convert acoustic energy into electrical energy. The audio sensor senses the presence of sound.

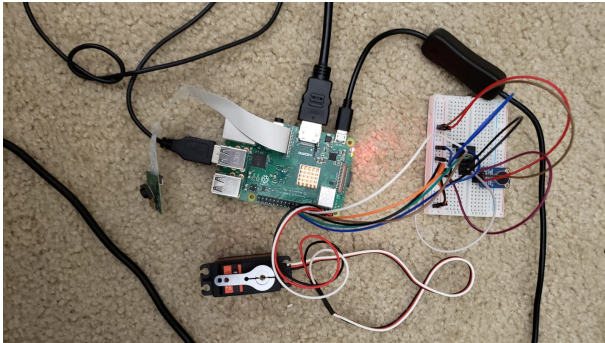
### D. MAC3008 ADC

Digital input is needed by computers. An analog-to-digital converter is required if an analog input is sent to the computer. This device can take an analog signal and convert it into a binary format so that the computer will be able to process it.

### E. Camera

A device which is used when we want to record visual images which can be in the form of photographs, film, or video signals.

### F. Hardware setup

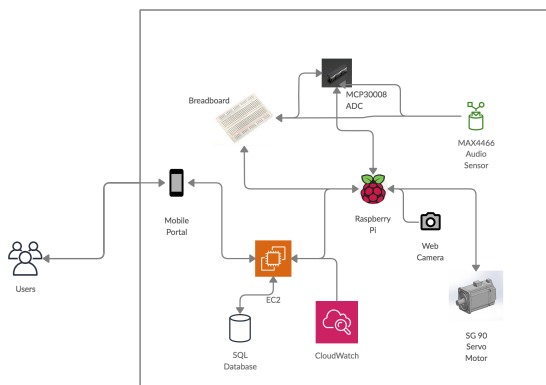


## IV. APPROACH

- Raspberry pi is very flexible and it is easy to connect it to different devices.
- We connected servo motor, camera to raspberry pi .
- Sensor was connected to ADC via breadboard.
- In order to make REST-API calls from the front end, we made use of Flask server in raspbian os.
- The python code was written in flask server .
- Its use was to handle the REST API calls and it made raspberry pi control the servo motor
- We were able to see the live stream as well as feed the dog remotely.
- Whenever the sensor encountered abnormal barking of the dog, the owner was notified.
- Apart from that, by setting the speed of servo motor, the amount of feed to be given to the dog could also be manipulated.

## V. ARCHITECTURE

Below is the architecture diagram for the project

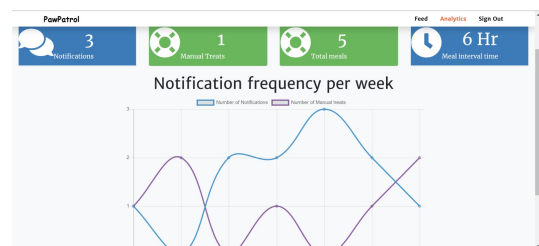
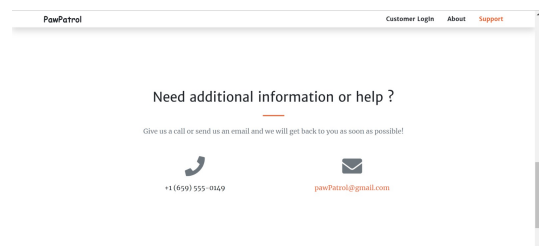
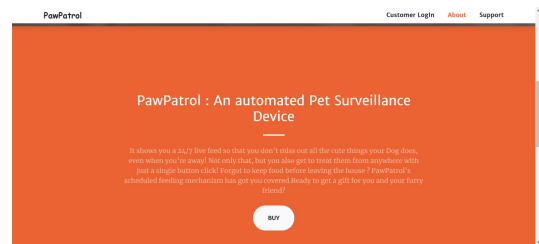
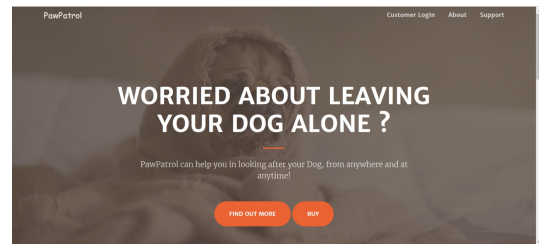


- Raspberry Pi will act as the heart of the system with all the components mounted on it for synchronization and processing.
- MCP3008 ADC will convert the analog sound signals to digital signals which will be required as input to

Raspberry pi. As soon as the raspberry pi detects the digital signal in the form of voltage, a call will be made designed to send the push notification to the pet owner.

- BreadBoard will be used to connect Electret Microphone Amplifier - MAX4466 (sound sensor) with Raspberry Pi.
- SG90 Servo Motor will be used to dispatch the food for the pet and will be controlled by centralized Raspberry Pi.
- The camera will be connected to raspberry pi and will help to live stream the data.
- The main use of sensor will be to detect the sound and pass it on to ADC.

## VI. UI IMAGES



## VII. MARKET RESEARCH

A survey was conducted by us in which we asked several dog owners regarding the pet problems that they were facing.

The most prominent one was that while going to work, they were afraid to leave their pets alone at home. When we asked about how they tackled that problem, their replies were -

- I have to leave my dog at pet care.
- I have hired dog walkers and pet sitters.
- I have turned on DogTV on my Roku.
- My dog gets depressed when I leave him alone as there is no one to interact with him.

All of this requires a lot of effort and money. This persistent problem inspired us to build a pocket friendly product that solves all of these problems. The solution to all the above problems was to build a web portal which lets you see, talk, and give treats to your dog when you're away.

#### VIII. FUTURE WORK

- We plan to extend our model to support multiple cameras.
- The model will be enhanced to support multiple pets.

#### IX. ACKNOWLEDGEMENT

We would like to thank Prof. Rakesh Ranjan for his guidance and support which helped us complete this project. The Github link for the project is as follows: <https://github.com/SJSUFall2019-CMPE272/Automated-pet-surveillance>

#### X. REFERENCES

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