



SOLAR BASED SMART PET FEEDER SYSTEM

Karan Singh Asoliya
Computer Science and Engineering
Geetanjali Institute of Technical Studies
Udaipur, India
karansinghasoliya8@gmail.com
Suraj Joshi
Computer Science and Engineering
Geetanjali Institute of Technical Studies
Udaipur, India
surajrjoshi@gmail.com
Dharmendra Vaishnav
Electrical Engineering
Geetanjali Institute of Technical Studies
Udaipur, India
Vaishnavdharmendra481@gmail.com
Jahanvi Kumawat
Computer Science and Engineering
Geetanjali Institute of Technical Studies
Udaipur, India
kumawatjahanvi14@gmail.com

Varun Mehra
Computer Science and Engineering
Geetanjali Institute of Technical Studies
Udaipur, India
mehravarun666@gmail.com
Bhavin Bhatnagar
Computer Science and Engineering
Geetanjali Institute of Technical Studies
Udaipur, India
Bhavinbhatnagar2@gmail.com
Kushal Sharma
Computer Science and Engineering
Geetanjali Institute of Technical Studies
Udaipur, India
sharmakushal651@gmail.com
Mr. Latif Khan
Geetanjali Institute of Technical Studies
Udaipur, India
latifnizami@gmail.com

Dr. Mayank Patel
Geetanjali Institute of Technical Studies
Udaipur, India
Mayank9999_udaipur@yahoo.com

Abstract: Over half of the people in the world intentionally have pets as their chums, but these pets are becoming impediment to the pet owners. There is a lot of stress to the owner regarding feeding their pets. Over the years different automatic pet feeders are available in the market, but none of them are still not able to solve lot of problems like overeating, obesity. Moreover, it will also feed the fishes by pitching the food into fish tank. This project aims in rectifying the problems caused by existing feeders and designing an efficient automatic pet feeders using internet of things. This system has also a supplemental feature of watering in plants according to individual plant's need (different species). We have installed a soil moisture sensor which will sense the moisture in soil of plants, and if it will get the moisture quantity lower than needed quantity (according to individual species), it will start watering the plants. Solar based smart pet feeder is an automated system as suggested by its name it has the capabilities to automatically function according to the needs of users. The system also has the update system which keep on updating the user through the mobile application. The system also shows the quantity of food fed to the pets and fishes, the quantity of water, moisture quantity in the soil. The Solar Panels are used in order to save electricity to make our system mobile and self-powered. The system has hybrid mobile application from which the data is updated time to time. It also shows us the real time data of the system.

Keyword: Internet of things(IoT), 2 DC Servo Motor, Diaphragm pump, 2 channel Relay module, GSM900A, Arduino UNO, Soil moisture sensor, Solenoid valve.

1. INTRODUCTION

Automatic pet feeder is one of the new technologies for feeding pet. It will help pet owner to take care of their pets and plants while they are not at home. Automatic pet feeder is built to help pet owner taking care of their pet and plants. It will give a fixed quantity of food to pets (including fishes) and water to both pets and plants. IoT pet feeder is one of the pet feeders that will be

controlled by a mobile application through internet. This device will take power supply from solar panels to prevent any fails in working. The automatic pet feeder will automatically dispense predetermined amount of food and water to the bowls and fish tank. As pet lovers, user should understand that pets also need a proper diet management. The Automatic pet feeder will solve three problems which pet owners and plant lovers face: at first making sure that each pet has access to a

healthy amount of food throughout the day, besides it will feed fishes too by pitching water into the fish tank according to schedule , last but not the least it will corroborate whether the plants are watered properly or not with the help of soil moisture sensor .The automatic pet feeder will give pet owners a solution to both problems, thereby improving the lives of both pets and owners by allowing the owner to reliably provide food to a pet at the time the owner wishes and keep the pet from reaching the food stored for later feeding .This solar based smart pet Feeder will be very useful for pet owners who have a busy schedule and often leaves home. The owners do not have to worry about leaving their pets at home and can monitor their diets through his smartphone.

2. OBJECTIVE

The objective of this project is to create an automatic feeding machine for pets/fishes, and an automatic watering machine for plants. This project is designed by keeping the view of very common problem in pets which is “Obesity”.Generally, pet owners keep filling the food bowl of pet whenever its empty. Obese pets develop an increased risk for: many types of cancer, diabetic mellitus, heart disease, and hypertension. Now a days, everyone can havepets and plants at home without giving their full commitment to take care of them.With this feeding machine, it will help pet owner to manage their pet diet wheel. And it will also provide fixed amount of water to the plants in accordance to the data of individual plants given. Whenever the usergoes to work or are away on vacation. He/she always end up paying so much money for pet sitters to feed the pets.

Therefore, we have realized that adapting a pet feeder to an IOT application would not only solve our problem but would also benefit other pet owners.

3. HARDWARE UNIT

- **GSM 900 A Module**
It receives the signal and transmit the information.
- **Servo Motor**
It opens the gate of the container at a desired angle.
- **Solenoid Valve**
It opens the gate of the water container at a desired angle.
- **Soil Moisture Sensor**
It detects the moisture in the soil.
- **Diaphragm Pump**
It is used to control the water pressure in the system.
- **Ultrasonic Sensors**
To measure the quantity of remaining food in the container.
- **ATmega328P**
The **ATmega328** is a single-chip micro-controller
- **Relay module**
It is used as switch to switch the current.

4. BLOCKDIAGRAM

The block diagram of the Solar based smart pet feeder represents the components that are used and the connections which are made accordingly. The block diagram is depicted in the figure below. The below block diagram consists of the components like ultrasonic sensor, DC motor, relay. The power supply is used to supply the necessary power to make the board function.

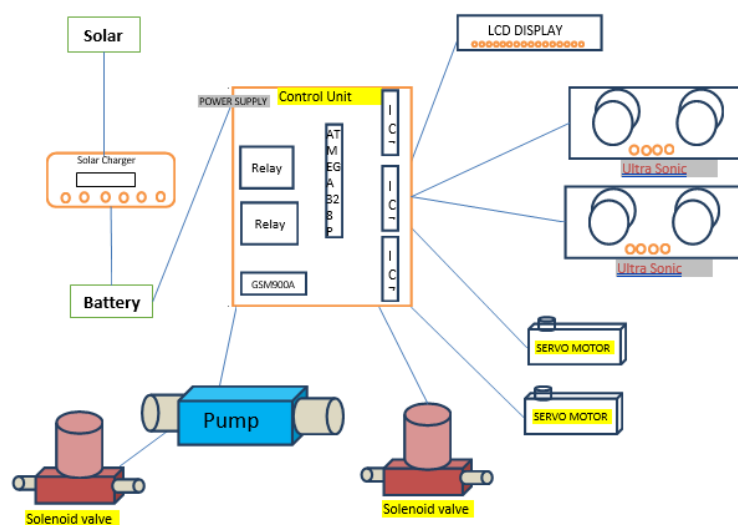


Fig 1. Block diagram of solar based smart pet feeder

4.1 Ultrasonic Sensor

Ultrasonic sensors emit short, high-frequency sound pulses at regular intervals. These propagate in the air at the velocity of sound. If they strike an object, then they are reflected back as echo signals to the sensor, which itself computes the distance to the target based on the time-span between emitting the signal and receiving the echo. With the help of ultrasonic sensors, we will measure the level of food and water in the container, thereby will get the quantity of the food in container. In simple words, it is used to measure the distance of an obstacle.

4.2 Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a lowpower signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal.

4.3 Water Pump

A centrifugal pump is one of the simplest pieces of equipment in any process plant. Its purpose is to convert energy of a prime mover (a electric motor or turbine) first into velocity or kinetic energy and then into pressure energy of a fluid that is being pumped.

4.4 DC Motor

Almost every mechanical movement that we see today is accomplished by an electric motor. An electric motor takes electrical energy and produces mechanical energy. Electric motors come in various ratings and sizes. Some applications of large electric motors include elevators, rolling mills and electric trains. Some applications of small electric motors are robots, automobiles and power tools

4.5 GSM 900A MODULE

SIM900A GSM Module is the smallest and cheapest module for GPRS/GSM communication. It is common with Arduino and microcontroller in most of embedded application. The module offers GPRS/GSM technology for communication with the uses of a mobile sim. It uses a 900 and 1800MHz frequency band and allows users to receive/send mobile calls and SMS. The keypad and display interface allows the developers to make the customize application with it. Furthermore, it also has modes, command mode and data mode. In every country the GPRS/GSM and different protocols/frequencies to operate. Command mode helps the developers to change the default setting according to

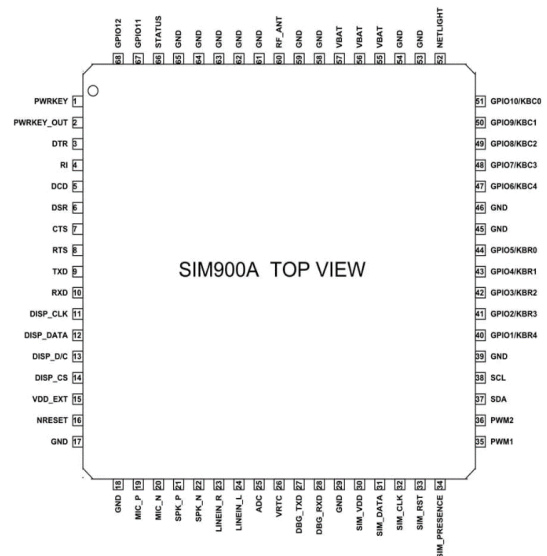
their requirements.

4.6 GSM SIM 900A specifications

- Voltage: 4.5V-12.5V.
- Band 900/ 1800 MH.
- GPRS multi-slot class 10/8.
- GPRS mobile station class B.
- Compliant to GSM phase 2/2+ Class 4 (2 W @ 900 MHz) Class 1
 - (1 W @ 1800MHz)
- Dimensions: 24x24x3mm.
- Weight: 3.4g.
- Control via AT commands (GSM 07.07 ,07.05 and SIMCOM enhanced AT Commands)
- SIM application toolkit

4.7 SIM900A Pin Configuration

The module SIM900A looks like a single chip but it has a bunch of features that can help to build almost all commercial applications. Although there are a total of 68 pins on SIM900A and using these pins, we can build the applications. But we will need a few pins if we use a module for interfacing with Arduino. We will list details of pinout diagram in the next section.



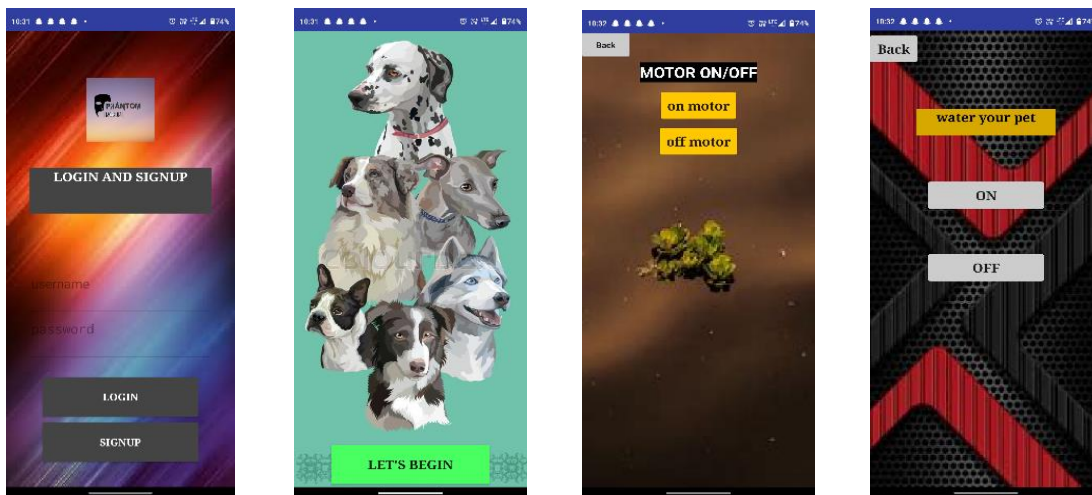
5. METHODOLOGY

1. Initially user will start the app by logging in with his/her ID.
2. After getting logged in, user will get 4 options: Feed pet, Feed fishes, Water plants, Water pet.
3. He/she can choose the option, according to the need.
4. At first for feeding the pet, GSM will receive the signal from the app and it will activate the servo motor's gate and the gates will spin to let the food

material come down to the feeding bowl.

5. Soil moisture sensor will indicate whether the plant’s soil is dry or wet, if dry, the watering in plants will be done automatically with the help of diaphragm pump.
6. For providing water to the pet again the diaphragm pump will get activated and with the help of hose, the water will come down into the water bowl.
7. For feeding fishes, servo motor will come into play again, and from the fish food chamber, food will get transferred to the aquarium through a pipe.
8. We have installed ultrasonic sensors on the top of the food and water chambers which will indicate the food and water level, thereby we can find the quantity of both, so that the user can identify when to refill the containers.
9. One of the features in our system, is water will not get triggered into the bowl, if it is not completely empty, to reduce the wastage of water.

1. Login Page



The above image shows the output of the system in pet feeder application. Our first screen is a login page from which user can log in from his given ID. Thenceforth, he/she has to click on the “Let’s begin” button to initialize the functioning.

2. Select your choice



3. Start and stop the system

After choosing any option, we will get two choices to proceed with – on or off. For initializing user has to click on “on” option, and for ending up the process user has to click on “off” option.

7. CONCLUSION

We, with the solar based smart pet feeder, are here to resolve all the circumstances or emergencies when the pet is all alone in the house. The food and water cycle of the pet and plants can be fulfilled even without being there all the time. In this technical era the interaction between humans,

6. RESULT

Automatic pet feeder works efficiently and fulfils the objective of feeding pet in absence of its master. It works on 12v D.C. supply. GSM 900A receives the signal to turn the system on or off. The servomotor rotates the propeller and food gets delivered into the food pipes and from there all the way into the food bowls as programmed in the Arduino UNO. The whole system is connected to the mobile phone via SMS services called IFTTT. For example, in order to start food motor on we have to press on button in the app, then the signal is transmitted to GSM there by it turns on the servo motor which guides the food down to the food bowl through propeller. The Diaphragm pump (maintaining and controlling the pressure) and the solenoid valve is used to transfer the water to the bowl.

6.1 Output on Pet Feeder app

physical devices and objects is increasing and attracting attention. Many studies have attempted to provide a natural and intuitive approach to request services. The current trend of combining pet control and IOT technology offers exciting future developments. The proposed system is referred to as smartpet feeder. The results meet the demand of pet owners. The basic vision behind the IOT, it may have a new way of operational method, it may have a new method of connecting devices, and there might be the even complete clean-slate approach. Approaching an IoT based solution gives us an opportunity to update our system to compete with the advance technologies in the future. As the full operational definition is finalized, but there are numerous research issues that can be worked on. As a next step, we will fully integrate the other pet care devices into our system, including litter boxes, pet cam, two way interaction system etc. With that, the diverse needs of the owners can be met, and the health and monitoring topics for pets are all covered. Besides, standing as the cloud term, how to connect the numerous networking devices around the globe is the next issue. In the future, we will centralize our system on the study of the IOT gateway and long-distance detection of the pets.

8. FUTURE SCOPE

FUTURE SCOPE With the correct libraries used and codes used we were able to merge the codes we have and also the components to work as one with a process that work the way we wanted to. After a series of troubleshooting and code editing, we were able to create an Automatic Pet feeder that dispense food and water at right time that can help the owner to support and maintain their pet's health and condition. Our Automatic pet feeder has a lot more things to improve. For further and deeper research, they can put more functionalities in our Automatic Pet feeder like putting an additional camera so that the owner can see

9. REFERENCES:

1. S.Irin Sherly, M.Haripushpam, B.Infantina Rinie, D.Jyotsna Devi "Wildlife Intrusion and Early Fire Detection System Using IoT" International Journal of Innovative Research in Computer and Communication Engineering, Vol. 6, Issue 2, February 2018.
2. Mr. Vikram M. Kakaderly, "Design and Implementation of an Advanced Security System for Farm Protection from Wild Animals" Global Research and Development Journal for Engineering, Volume 4, Issue 3, February 2019.
3. P.Navaneetha, R.Ramiya Devi, S.Vennila, P.Manikandan, Dr.S.Saravanan "IOT Based Crop Protection System against Birds and Wild Animal Attacks" International Journal of Innovative Research in Technology, Vol. 6, Issue 11, April 2020.
4. S. Santhiya, Y. Dhamodharan, N E. Kavi Priya, C S. Santhosh, M.Surekha, "A Smart Farmland Using Raspberry PI Crop Prevention And Animal Intrusion Detection System" International Research Journal of Engineering and Technology, Vol. 5, Issue 3, March 2018.
5. Shekhawat, V.S., Tiwari, M., Patel, M. (2021). A Secured Steganography Algorithm for Hiding an Image and Data in an Image Using LSB Technique. In: Singh, V., Asari, V.K., Kumar, S., Patel, R.B. (eds) Computational Methods and Data Engineering. Advances in Intelligent Systems and Computing, vol 1257. Springer, Singapore. https://doi.org/10.1007/978-981-15-7907-3_35
6. Vikhram.B, Revathi.B, Shanmugapriya.R, Sowmiya.S, Pragadeeswaran.G, "Animal Detection System in Farm Areas" International Journal of Advanced Research in Computer and Communication Engineering, Vol. 6, Issue 3, March 2017.
7. Nagaraju Andavarapu1 and Valli Kumari Vatsavayi, "Wild-Animal Recognition in Agriculture Farms Using W-COHOG for Agro-Security" International Journal of Computational Intelligence Research, ISSN 0973-1873 Volume 13, Number 9 (2017), pp. 2247-2257
8. Mr.P.Venkateswara Rao, Mr. Ch Siva Rama Krishna and Mr. M Samba Siva Reddy, "A Smart Crop Protection Against Animals Attack" International Journal of Scientific Research and Review, Volume 8, Issue 6, 2019.
9. Vidhya S, Vishwashankar TJ, Akshaya K, Aiswarya Premdas, Rohith R, "Smart Crop Protection using Deep Learning Approach" International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-8 June, 2019.
10. Krishnamurthy B, Divya M, Abhishek S, Shashank H A, "Solar Fencing Unit and Alarm for Animal Entry Prevention" International Journal of Latest Engineering Research and Applications, Volume -02, Issue -05, May - 2017.
11. K. C. Giri, M. Patel, A. Sinhal and D. Gautam, "A Novel Paradigm of Melanoma Diagnosis Using Machine Learning and Information Theory," 2019 International Conference on Advances in Computing and Communication Engineering (ICACCE), 2019, pp. 1-7, doi: 10.1109/ICACCE46606.2019.9079975.
12. Sudip Pandey and Siddhartha Bajra Bajracharya, "Crop Protection and Its Effectiveness against Wildlife: A Case Study of Two Villages of Shivapuri National Park, Nepal" Nepal Journal of Science and Technology Vol. 16, No.1 (2015)1-10.
13. Menaria, H.K., Nagar, P., Patel, M. (2020). Tweet Sentiment Classification by Semantic and Frequency Base Features Using Hybrid Classifier. In: Luhach, A., Kosa, J., Poonia, R., Gao, XZ., Singh, D. (eds) First International Conference on Sustainable Technologies for Computational Intelligence. Advances in Intelligent Systems and Computing, vol 1045. Springer, Singapore. https://doi.org/10.1007/978-981-15-0029-9_9
14. Ameta, U., Patel, M., Sharma, A.K. (2021). Scrum Framework Based on Agile Methodology in Software Development and Management. In: Mathur, R., Gupta, C.P., Katewa, V., Jat, D.S., Yadav, N. (eds) Emerging Trends in Data Driven Computing and Communications. Studies in Autonomic, Data-driven and Industrial Computing. Springer, Singapore. https://doi.org/10.1007/978-981-16-3915-9_28
15. S. S. . et. al., "Self-Intrusion Detection System for Protection of Agricultural Fields Against Wild Animals", IJMA, vol. 10, no. 2, pp. 2686 - 2691, Apr. 2021.