IoT Pet Feeder
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***Abstract*— The motive of the project is to make a remotely controllable pet feeder to keep the pets well-fed and watered while the owner is away or outside the house.**

Often, pet-owners who are regular office goers are faced with the problem of having to leave the pet alone at home.

This setup can be remote triggered, meaning that they can activate it to feed the pet when required at different time of the day. This helps to perform this crucial task when they are away.

The way it works is, basically when the user provides a prompt with their mobile phone application, a buzzer sounds, attracting the pet's attention. A PIR motion sensor detects if the animal is in place. If so, a servo motor opens the feed chute to let the feed drop into the bowl. The chute is closed back up and the process restarts when the user gives the prompt again.

I. Introduction

There are many ways to implement a pet feeder: you can set it to fill up the bowl at a certain time, you can command it to fill up whenever it gets empty, or maybe to give your dog food after they follow a set of orders that you taught them.

In this specific project, we set the feeder to start beeping from time to time. Once the dog comes closer to the device, the PIR sensor recognizes it and the servo is triggered.

In addition, we also decided to add the option to control the pet feeder from our website,.

II. Literature Survey

IoT Based Domestic Fish Feeder(2018)

The author of the article develops a logic flow for an automatic fish feeder circuit. We adopt this method for terrane animals like dogs, while implementing new ideas of our own

IoT BASED INTRUSION DETECTION SYSTEM USING PIR SENSOR

This paper presents the design and implementation of an intrusion detection system using PIR sensor. ZigBee here is used for creating a wireless sensor network (WSN). We use ESP8266(like in this research paper) to communicate between the module and the microcontroller(Arduino)

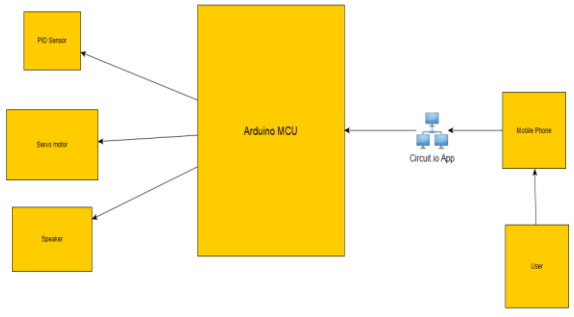
IoT-BASED WIRELESS INDUCTION MOTOR MONITORING

This learning method can be used for motor power ratings, especially for 7/24 machines. This study has provided statistics not only for creating mathematical models but also for enabling to establish a motor maintenance schedule. This is be useful to us since we are interfacing wireless motors with an Arduino

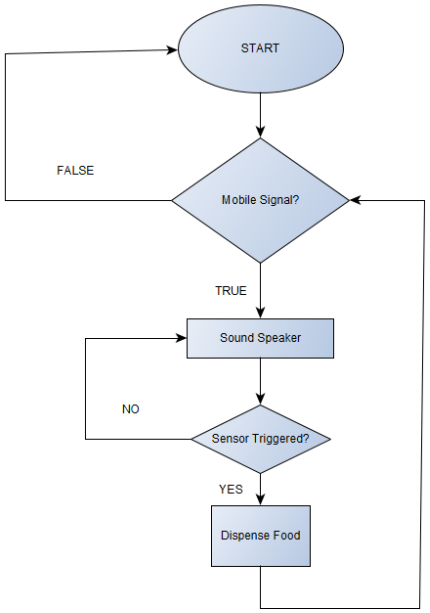
DESIGNING IoT ARCHITECTURE(S): A EUROPEAN PERSPECTIVE

Understanding the IOT-A and IOT6 architectures proposed by European Commission. Using the acquired knowledge, we design our model adhering to the standard architecture in order to make the model more flexible to connect with other futuristic models

III. System Block Diagram



IV. PROCESS FLOW



V. PROPOSED WORK

Components Used

i) Arduino
ii) NodeMCU
iii) Resistors
iv) PIR Sensor
v) Servo Motor
vi) Jumper Wires
vii) Power Supplyy
viii) A switch

ARDUINO

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL),[1] permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as do-it-yourself (DIY) kits. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers can be programmed using C and C++ programming languages. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

Pin Configuration for Arduino with other components

Arduino	GPS Module
Tx (Pin 5)	Rx
Rx (Pin 4)	Tx
GND	GND
3.3V	Vin
Arduino	GPS Module
Tx (Pin 3)	Rx
Rx (Pin 2)	Tx
GND	G

VI. HELPFUL HINTS

NODEMCU

NodeMCU is an open source LUA based firmware developed for ESP8266 wifi chip. By exploring functionality with ESP8266 chip, NodeMCU firmware comes with ESP8266 Development board/kit i.e. NodeMCU Development board.

NodeMCU Dev Board/Kit v0.9

Since NodeMCU is open source platform, their hardware design is open for edit/modify/build.

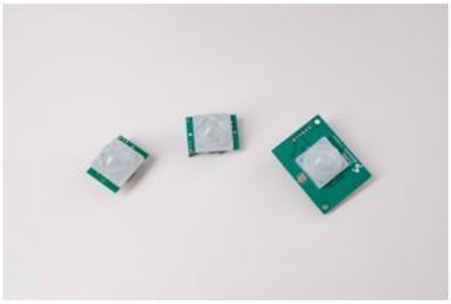
NodeMCU Dev Kit/board consist of ESP8266 wifi enabled chip. The ESP8266 is a low-cost Wi-Fi chip developed by Espressif Systems with TCP/IP protocol.

NodeMCU Development board is featured with wifi capability, analog pin, digital pins and serial communication protocols.

To get start with using NodeMCU for IoT applications first we need to know about how to write/download NodeMCU firmware in NodeMCU Development Boards. And before that where this NodeMCU firmware will get as per our requirement.

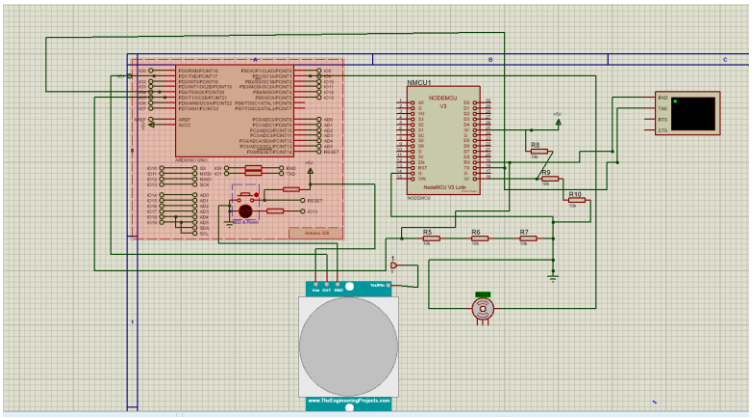
PIR Sensor:

PIR sensor detects a human being moving around within approximately 10m from the sensor. This is an average value, as the actual detection range is between 5m and 12m.PIR are fundamentally made of a pyro electric sensor, which can detect levels of infrared radiation. For numerous essential projects or items that need to discover when an individual has left or entered the area. PIR sensors are incredible, they are flat control and minimal effort, have a wide lens range, and are simple to interface with.

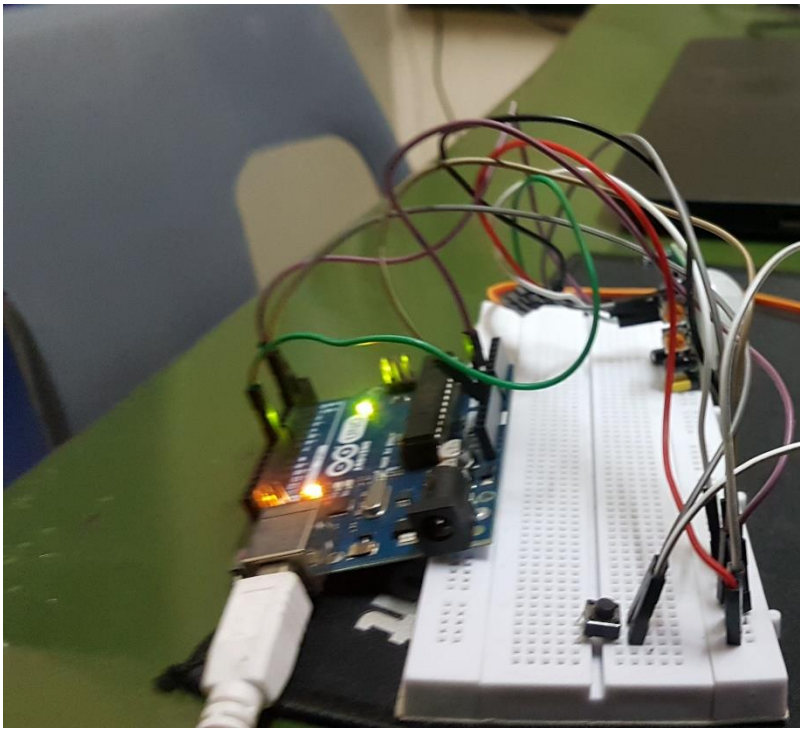


Most PIR sensors have a 3-pin connection at the side or bottom. One pin will be ground, another will be signal and the last pin will be power. Power is usually up to 5V. Sometimes bigger modules don't have direct output and instead just operate a relay which case there is ground, power and the two switch associations. Interfacing PIR with microcontroller is very easy and simple. The PIR acts as a digital output so all you need to do is listening for the pin to flip high or low. The motion can be detected by checking for a high signal on a single I/O pin. Once the sensor warms up the output will remain low until there is motion, at which time the output will swing high for a couple of seconds, then return low. If motion continues the output will cycle in this manner until the sensors line of sight of still again. The PIR sensor needs a warm-up time with a specific end goal to capacity fittingly. This is because of the settling time included in studying nature's domain. This could be anyplace from 10-60 seconds.

VII. CIRCUIT SCHEMATIC



VIII. OUTPUT



IX. CODE:

```
#include <SoftwareSerial.h>       //Including the software serial library
#include <Servo.h>                //including the servo library
SoftwareSerial esp(4, 5);
#define DEBUG true                //This will display the ESP8266 messages on Serial Monitor
#define servopin 9                //connect servo on pin 9
Servo ser;                        //variable for servo

int sensor = 2;              // the pin that the sensor is atteched to
int state = LOW;             // by default, no motion detected
int val = 0;                 // variable to store the sensor status (value)

int current_pos = 170;
```

```
int v = 10;
int minpos = 20;
int maxpos = ;160
void setup()
{
  ser.attach(servopin);
  ser.write(maxpos);
  ser.detach();
  Serial.begin(115200);
  esp.begin(115200);

  sendData("AT+RST\r\n", 2000, DEBUG);
//This command will reset module
  sendData("AT+CWMODE=1\r\n", 1000, DEBUG);
//This will set the esp mode as station mode
  sendData("AT+CWJAP=\"wifi-name\",\"wifi-
password\"\r\n", 2000, DEBUG);   //This will connect to wifi
network
  while(!esp.find("OK")) {                          //this will wait
for connection
  }
  sendData("AT+CIFSR\r\n", 1000, DEBUG);          //This will
show IP address on the serial monitor
  sendData("AT+CIPMUX=1\r\n", 1000, DEBUG);       //This
will allow multiple connections
  sendData("AT+CIPSERVER=1,80\r\n", 1000, DEBUG);
//This will start the web server on port 80
}

void loop()
{
  if (esp.available())     //check if there is data available on
ESP8266
  {
    if (esp.find("+IPD,")) //if there is a new command
    {
      String msg;
      esp.find("?");                    //run cursor until command
is found
      msg = esp.readStringUntil(' ');          //read the message
      String command = msg.substring(0, 3);    //command is
informed in the first 3 characters "sr1"
      String valueStr = msg.substring(4);      //next 3 characters
inform the desired angle
      int value = valueStr.toInt();           //convert to integer
      if (DEBUG) {
        Serial.println(command);
        Serial.println(value);
      }
      delay(100);
      val = digitalRead(sensor);   // read sensor value
      if (val == HIGH) {           // check if the sensor is HIGH
      {if(command == "sr1") {
        //limit input angle
        if (value >= maxpos) {
          value = maxpos;
        }
        if (value <= minpos) {
          value = minpos;
        }
        ser.attach(servopin); //attach servo
        while(current_pos != value) {
          if (current_pos > value) {
            current_pos -= 1;
            ser.write(current_pos);
            delay(100/v);
          }
          if (current_pos < value) {
            current_pos += 1;
            ser.write(current_pos);
            delay(100/v);
          }
        }
        ser.detach(); //dettach
      }}
  }}
String sendData(String command, const int timeout, boolean
debug)
{
  String response = "";
  esp.print(command);
  long int time = millis();
  while ( (time + timeout) > millis())
  {
    while (esp.available())
    {
      char c = esp.read();
      response += c;
    }
  }
  if (debug)
  {
    Serial.print(response);
  }
  return response;
}
```

X. Conclusion

In this project, we have demonstrated the working of an IoT pet feeder. This application can be used in many households which grow pets and struggle to maintain a proper diet routine for their pets. With a few additions such as better packaging and better user interface, this project has a real scope of performing well in the market

XI. References

a) http://ieeexplore.ieee.org.egateway.vit.ac.in/document/8474829

b) http://ieeexplore.ieee.org.egateway.vit.ac.in/document/8256877

c)http://ieeexplore.ieee.org.egateway.vit.ac.in/document/8124386

d)http://ieeexplore.ieee.org.egateway.vit.ac.in/document/6803124