SMART MILK CONTAINER

A PROJECT REPORT

Submitted by

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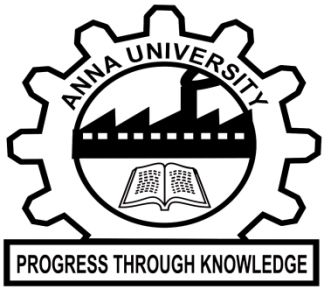

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APPENDIX 2

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BONAFIDE CERTIFICATE

Certified that this project report **"SMART MILK BOX"** is the bonafide work of "VANCHEESWARAN VAIDYANATHAN, VIJAY LOGESH, SURIYA NARAYANAN A, SARAVANAN A**"** who carried out the project work under my supervision.

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TABLE OF CONTENT

ABSTRACT

The world currently produces more than enough food to feed everyone, yet 815 million people (roughly 11% of the global population) went hungry in 2016, according to the U.N [1] .True to the words of a Chinese philosopher “a journey of thousand miles begins with a single step”, we have worked on a product to prevent wastage of milk.

Very often we forget to pick the milk from the milk box. This invariably, results in spoilt milk which cannot be consumed and hence there is wastage of milk. Another cause for wastage of milk is forgetting to inform the milk supplier when we go for a vacation.

We propose a device that can prevent the aforementioned problems. This device consists of a cooling system that turns on whenever milk is placed in it and sends a notification to the user’s mobile phone. The user will also be able to display the number of milk packets required in the LCD display in the milk box.

We believe that prevention of wastage of milk at this level can cause a change in the overall scheme of things and provide food to feed more people.

OBJECTIVE

We plan to implement a device to prevent wastage of milk. To achieve this we intend to use a Peltier module for cooling, ultrasonic sensor for object detection and a few protocols coupled with an application to transmit and receive data.

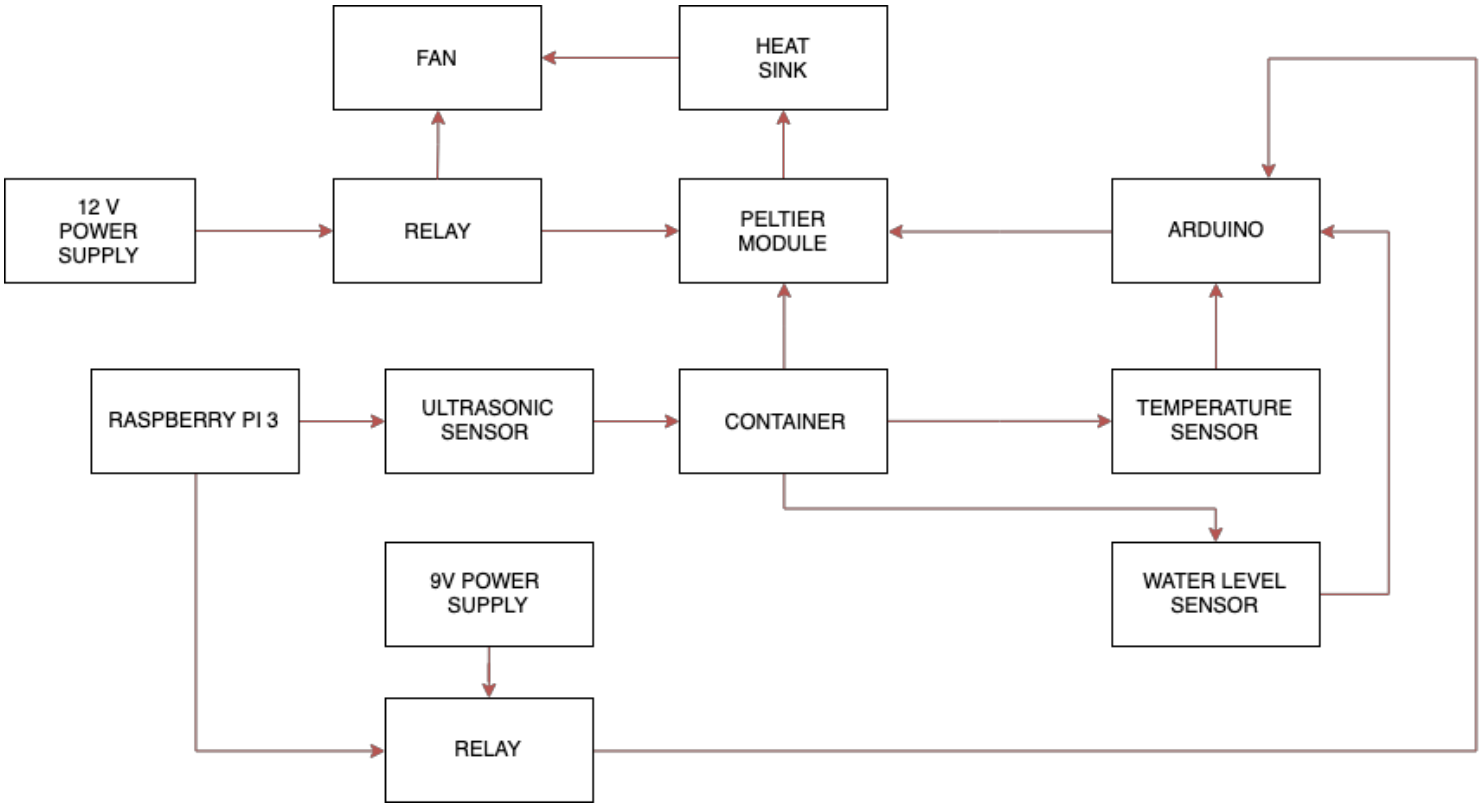
LITERATURE SURVEY

1. THERMOELECTRIC REFRIGERATION USING PELTIER EFFECT , Prof. Rajendra. P. Patil*, Pradhyumna Suryawanshi, Akshay Pawar, Avdhoot Pawar * Assistant Professor, Department Of Mechanical Engineering, PVPIT, Bavdhan, Pune, India Department Of Mechanical Engineering, PVPIT, Bavdhan, Pune, India, INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY.

2. Design and Deployment of MQTT Based HeTNeT Using IEEE 802.15.4 and IEEE 802.11 for Internet of Things Ayaskanta Mishra,Assistant Professor, School of Electronics Engineering, KIIT University, Bhubaneswar, Odisha, Postal Zip-751024 India, International Journal for Research in Applied Science & Engineering Technology.

3. IMPLEMENTATION OF MQTT PROTOCOL ON LOW RESOURCED EMBEDDED NETWORK, P Gopi Krishna , K Sreenivasa Ravi , V.S.S Sailendra Kumar, M.V.S.N Sai Kumar, International Journal of Pure and Applied Mathematics.

BLOCK DIAGRAM



HARDWARE COMPONENTS

1. HARDWARE:

   A. Arduino
   B. Raspberry Pi 3b+
   C. Ultrasonic sensor
   D. 4- Ch relay
   E. Temperature Sensor
   F. Battery (12V & 9V)
   G. Water Sensor
   H. Heat sink
   I. Peltier Element
   J. Fan
   K. LCD
   L. LED/LDR

SOFTWARE DETAILS

SOFTWARE:

   A. Arduino IDE (C)
   B. IDLE [Python (Raspberry pi)]
   C. TCP/IP (Socket programming)

DESCRIPTION

In this project, as mentioned before we intend to build a leakage detection system, alerting system and a cooling system. In this section we try to explain the working in three subsections.

1. Leakage Detection: To detect the leakage we employ the water level sensor which detects the leakage and sends a signal to the arduino which then processes the data and lights up the LED. This optical signal is received by the LDR which in-turn is connected to the Raspberry Pi. The pi then transmits the leakage notification to the user's device.

2. Alerting System: When the milk is placed in the container, the ultrasonic sensor which is connected with Raspberry Pi, detects it inside the container and sends the notification to the user's device.Also we turn on the cooling system and arduino only when we detect the milk in the container. This feature is included to ensure power saving.

3. Cooling system: According to US Food and Drug Administration milk can stay without refrigeration upto 2 hours, beyond that it shouldn't be consumed. In order to cool the milk inside the container we use the Peltier Element. We place a temperature sensor to monitor the temperature inside the container. This can be used to reduce the power consumption (as the Peltier Element and Fans can be switched according to a predefined threshold temperature) .

OUTCOME OF THE PROJECT

1. Through this project we learnt about Peltier effect and it's implementation, Socket programming for transmission of data, LCD control and about heat sinks and how to integrate it with Peltier for achieving low temperatures.

2. We intend to make this a commercial product and get a patent (if possible).

3. We plan on making variations in the hardware to make it more cost effective, and, add a few new features to make the product more attractive.

REFERENCES

[1] UN REPORT and TIME magazine

[2] https://www.instructables.com/id/DIY-Cooler/

[3]. https://www.tutorialspoint.com/python3/ python_networking.htm

[4] http://www.electronicdesign.com/power/circuit-optionsexplore-issues-solutions-relay-drivers

APPENDIX A
ARDUINO CODE

```
#include <OneWire.h>
#include <DallasTemperature.h>
#define ONE_WIRE_BUS 2
#define relay1 3
#define relay2 4
int lowtemp=6;
int hightemp=8;
const int waterSens = A0;
const int led = 9;
int waterVal;

OneWire oneWire(ONE_WIRE_BUS);
DallasTemperature sensors(&oneWire);

void setup(void)
{
 Serial.begin(9600);
 sensors.begin();
 pinMode(relay1, OUTPUT);
 pinMode(relay2, OUTPUT);
 digitalWrite(relay1, LOW);
 digitalWrite(relay2, LOW);
 pinMode(led, OUTPUT);
 pinMode(waterSens, INPUT);
}
```

```
void loop(void)
{
  sensors.requestTemperatures();
  Serial.print(sensors.getTempCByIndex(0));
  if (sensors.getTempCByIndex(0) < lowtemp){
    digitalWrite(relay1, HIGH);
    digitalWrite(relay2, HIGH);}
  if (sensors.getTempCByIndex(0) > hightemp){
    digitalWrite(relay1, LOW);
    digitalWrite(relay2, LOW);}
  waterVal = analogRead(waterSens); //read the water sensor

  Serial.println(waterVal); //print the value of the water sensor to the
serial monitor

  if (waterVal <= 0){
    digitalWrite(led, HIGH);}
  else{
    digitalWrite(led, LOW);}
}
```

APPENDIX B
RASPBERRY PI CODE

```
from gpiozero import DistanceSensor
from RPi import GPIO
pin=27
GPIO.setup(pin,GPIO.OUT)
ultrasonic=DistanceSensor(echo=17,trigger=4,threshold_distance=0.2
5)
def on():
   GPIO.output(pin,GPIO.HIGH)
   print("ON")
   print("milk delivered")
def off():
   GPIO.output(pin,GPIO.LOW)
   print("OFF")
ultrasonic.when_out_of_range=off
ultrasonic.when_in_range=on

from RPLCD import CharLCD
from RPi import GPIO


import RPi.GPIO as GPIO
try:
   lcd = CharLCD(numbering_mode=GPIO.BCM,cols=16, rows=2,
pin_rs=26, pin_e=19, pins_data=[21, 20, 16, 12, 13, 6, 5, 11])
   st="1. Modify the number of packets , 2. No milk status display,
3.exit"
   while True:
      print(st)
      n=int(input())
      if(n==1):
```

```
            k=input("enter the number of packets required")
            lcd.clear()
            lcd.write_string("Deliver"+k+"Packets")
        elif(n==2):
            k= input("How many days do you not want milk?")
            lcd.clear()
            lcd.write_string("No milk for"+k+"days")
        elif(n==3):
            lcd.clear()
            break
        else:
            print("invalid input")
except:
    print("FAILED")
finally:
    GPIO.cleanup()
```