V Chef: A Hot Food Vending Machine

[1]Rashmitha Nair, [2]Shreyas Gawali, [3]Sanket Makwana, [4]Rincy Joy, [5]Prof. Shrikant Velankar, [6]Prof. Poonam Shah

[1]Student, [2]Student, [3]Student, [4]Student, [5]Professor, [6]Assistant Professor
[1]Department of Electronics Engineering,
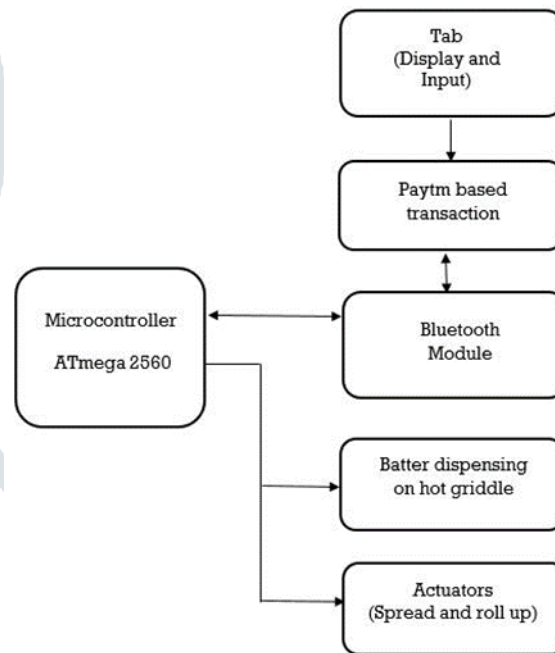[1]Vidyalankar Institute of Technology, Mumbai, India

Abstract: Employees of any institute may not be able to avail canteen services due to limited working hours of the canteen staff. In such situations, they have to resort to the packed food dispensed by vending machines which may not be healthy. VChef is a vending machine which makes and serves hygienic, healthy and hot dosas as and when required.

Keywords—Automation, vending machine, food vending

I. INTRODUCTION

Healthy food is an important element for providing the required nutrition to the body. However, access to healthy food is difficult for people working for longer periods of time in educational institutions and offices whose canteens are closed by evening. They have to resort to unhealthier alternatives. This in turn may lead to deteriorating health and lethargy.

II. ANALYSIS AND DESIGN

Microcontroller: The controller used is ATmega 2560.It has all the functional requirements required for this application.

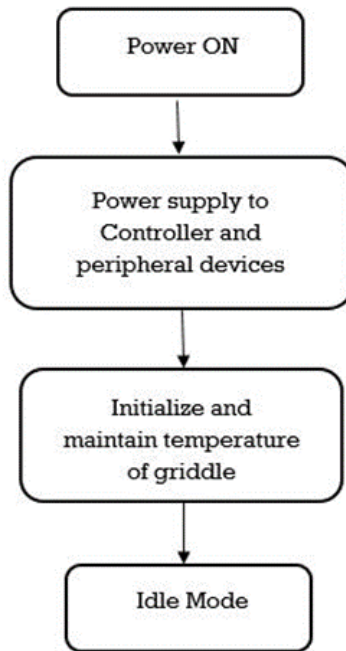*Paytm:* It is an e-wallet. It is used with the VChef application for transactions.

Tab: A tab or phone will be used as user interface.

Bluetooth module: HC05 Bluetooth module will be used to send data from the VChef app to the microcontroller.

Batter dispensing unit: This unit is responsible for dispensing of batter from the stainless-steel container onto nylon rods which will pour the batter on the griddle pan.

Actuators: The actuators will be responsible for spreading the batter on the griddle pan and rolling up the dosa once the batter is cooked. Spreading and rollup arms are attached to a single unit which is suspended on top of the griddle pan and moves in one direction for spreading and the opposite direction for roll up of dosa.
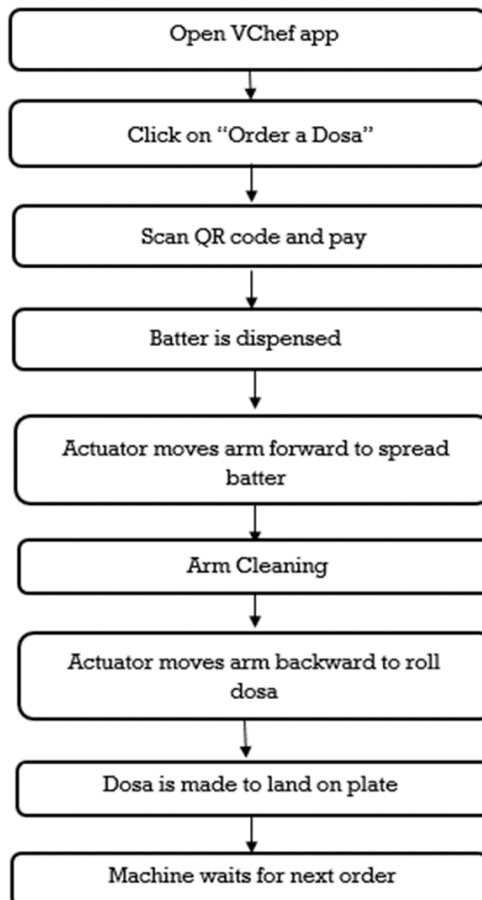
A. Working in detail Start Up:

```
┌─────────────────┐
│    Power ON     │
└─────────────────┘
         │
         ▼
┌─────────────────┐
│ Power supply to │
│  Controller and │
│ peripheral      │
│ devices         │
└─────────────────┘
         │
         ▼
┌─────────────────┐
│  Initialize and │
│maintain temp-   │
│erature of       │
│griddle          │
└─────────────────┘
         │
         ▼
┌─────────────────┐
│    Idle Mode    │
└─────────────────┘
```

Idle Mode:
Power cut down.
Griddle pan maintained at required temperature.
Normal Operation:

```
┌─────────────────────────┐
│     Open VChef app      │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  Click on "Order a Dosa" │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│    Scan QR code and pay  │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│    Batter is dispensed   │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Actuator moves arm       │
│ forward to spread batter │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│      Arm Cleaning        │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Actuator moves arm       │
│ backward to roll dosa    │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Dosa is made to land on  │
│ plate                    │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Machine waits for next   │
│ order                    │
└─────────────────────────┘
```

A. *Working of the vending machine:*

The start-up process of the vending machine starts when the machine is supplied power. The controller and griddle are switched on and the griddle is maintained at the required temperature in the idle mode.

The vending machine will be in an idle state when no orders are being processed. This mode is characterized with maintenance of the griddle temperature and lower power consumption. This mode is maintained till the next order is received.

The normal operation starts with the user logging into his/her Paytm account which is an e-Wallet. The order is taken using the VChef app by clicking on 'Order now' and then selecting the number of dosas and completing the payment. Once the order is confirmed, batter is dispensed onto the griddle. The batter is stored in a stainless-steel container above the griddle supported by metal frames.

This batter container has a rectangular slit in the middle through which the batter can flow. Below this slit another smaller steel container is attached which contains geared nylon rollers. The placement of this smaller container is such that the batter flows on top of the nylon rollers. One of the nylon rollers is attached to a DC motor which help in rotating the rollers and thus dispense the batter. These geared nylon rollers stop flow of batter when no order is placed and dispense the batter by rotating in opposite direction with respect to each other during the processing of an order.

When the batter is dispensed on the griddle, the movement of the arm is actuated. The arm is fitted on an arrangement of parallel rods of which one is threaded and the other acts as a guide. The parallel rods are mounted on 'T' supports which are fixed on a wooden board. The threaded rod is attached to Nema 23 stepper motor. The threaded rod has a ball screw for smooth movement about the rod. On the opposite guide rod a metal bushing is enclosed in an aluminum case. The ball screw is enclosed in an aluminum socket and an aluminum plate is mounted on top of it to accommodate a DC motor which will be responsible for the movement of the 'L' shaped channel fixed to the rod.
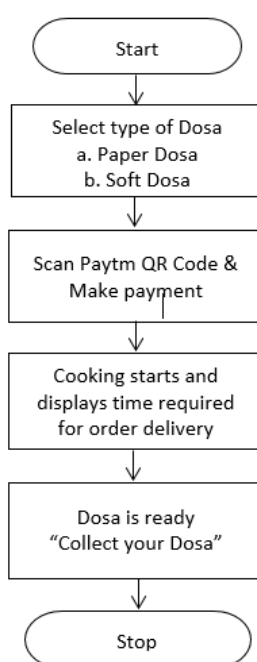
The 'L' shaped stainless-steel channel is fitted with a Teflon strip for spreading the batter and rolling the dosa once it's cooked. When batter has to be spread the arm is adjusted such that it is a few millimeters away from the griddle so that the desired thickness of dosa is achieved. This is done by keeping the front of the 'L' towards the user. When the batter is cooked, the 'L' channel is adjusted to touch the griddle and scrape the dosa out. When the dosa is being removed from the griddle, it comes in contact with the obstruction on the top of the 'L' shaped channel and starts rolling. As soon as the batter is dispensed, the arm moves over it to spread it and waits for the batter to cook. Meanwhile the arm which comes in contact with the batter is cleaned using a rolling brush immersed in water.

The cleaning setup consists of a container with water and cylindrical brush for cleaning the arm. The brush is connected with a DC motor and is half immersed in water. When the arm comes in contact with the brush, the motor starts rotating and hence the brush comes in contact with the arm and water consecutively and thus cleans the arm of any residual batter. The cooked dosa will then be removed from the griddle with the help of the 'L' channel and the dosa will then land on a plate. The time required for desired amount of batter to be dispensed, wait time for batter to cook will be precalculated. After this the vending machine goes to idle state and waits for the next order.

B. *Working of the user app:*

The user application is developed on android studio. The user is expected to login to their Paytm account before using the VChef app. In the VChef app the user clicks on 'Order a dosa'. The user is then required to scan a QR code and the order is confirmed by making the payment. This message is sent by the app to an HC05 Bluetooth module which sends this information to the controller. This communication takes place via 'USART' The controller then actuates the movement of the motor attached to the nylon rods.

III. CONCLUSION

This venture, if executed accurately will prove to be beneficial to different types of large organizations and provide a healthy alternative to the employees.

FUTURE SCOPE

This project can be extended to have additional functions along with the basic one it provides. A chutney dispensing unit could be attached or various modifications of dosas can be made and this product can be improved.

IV. ACKNOWLEDGEMENT

V. REFERENCES

[1] Direct Gear Design for Spur and Helical Involute Gears - AL Kapelevich, RE Kleiss - Gear Technology, 2002
[2] Ball Screw linear actuator- US patent May 2nd 1972
     Thomas O Paine, Gerald S Perkins
[3] http://www.dosamatic.com/
[4] https://developer.android.com/studio/intro/index.html
[5] https://paytm.com/
[6] http://www.electronicaestudio.com/docs/istd016A.pdf
[7] http://ww1.microchip.com/downloads/en/DeviceDoc/Atmel-2549-8-bit-AVR-Microcontroller-ATmega640-1280-1281-2560-2561_datasheet