IoT based Automatic Mocktail Maker

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Abstract

With the ever-expanding need for speed and efficiency of various human needs and the booming field of Internet of Things, the human life is becoming easier. This paper talks about a time saving system and one which reduces human contact for need of various Mocktails/Cocktails. The system includes an online ordering and payment Android application which then sends over data to the machine which makes the drink.

Keywords: Mocktail, Cocktail, IoT, Internet of Things, NodeMCU, Peristaltic Pump

Introduction

The IoT, that is the Internet of Things, is an embedded system that communicates to various sensors and devices connected to it via the internet. With a growing need of various drinks in less time and the demand for a variety of drinks, a need of smart dispensing system is seen. Reducing human contact is seen as an added advantage as it helps in avoiding spread of various germs and viruses. The Android application-based ordering and payment system helps achieve these goals as the user just needs to order via his/her mobile and pay via the same and just need to collect the drink when it is ready. In crowded areas, the process of making mocktails is inefficient. On busy days, the wait for beverages can last up to 15 minutes. Customers are annoyed and dissatisfied with services due to inefficient ordering and distribution in congested areas. Furthermore, offering drinks in a disorganized manner from stock, resulting in profit losses, is a common problem these days. The main goal of this project is to create a Mocktail Maker that automatically takes drink orders from customers through a menu on a phone and mixes drinks using six different pumps controlled by a microprocessor control. Users can choose from a predefined drink menu or create their own personalized drinks. The project also includes a database that keeps all orders for each processed table number. Despite the fact that there are already many different beverage dispensers on the market, the concept of introducing a device controlled by a mobile app is new and provides a technological experience to the users. Ordering, dispensing and delivering drinks is more efficient, accurate, and reliable thanks to the initiative. It offers a reliable, self-contained stand-alone device that completes the process at a reasonable cost.

Literature Survey

A. Design of a Smart Bartender with Peristaltic Pump

In this paper, the development of a smart scalable system for liquid supply based on high precision peristaltic pumps is described. The liquid supply system can be used for mixed and layered cocktail preparation in public catering establishments as well as home use. Due to flexibility and scalability of the system, it is possible to apply it in various branches of human activity where fine dosing of liquid is required, for example, beverage mixing, cooking, health, and medical applications.

Figure 1: The Flowchart of Cocktail Preparation
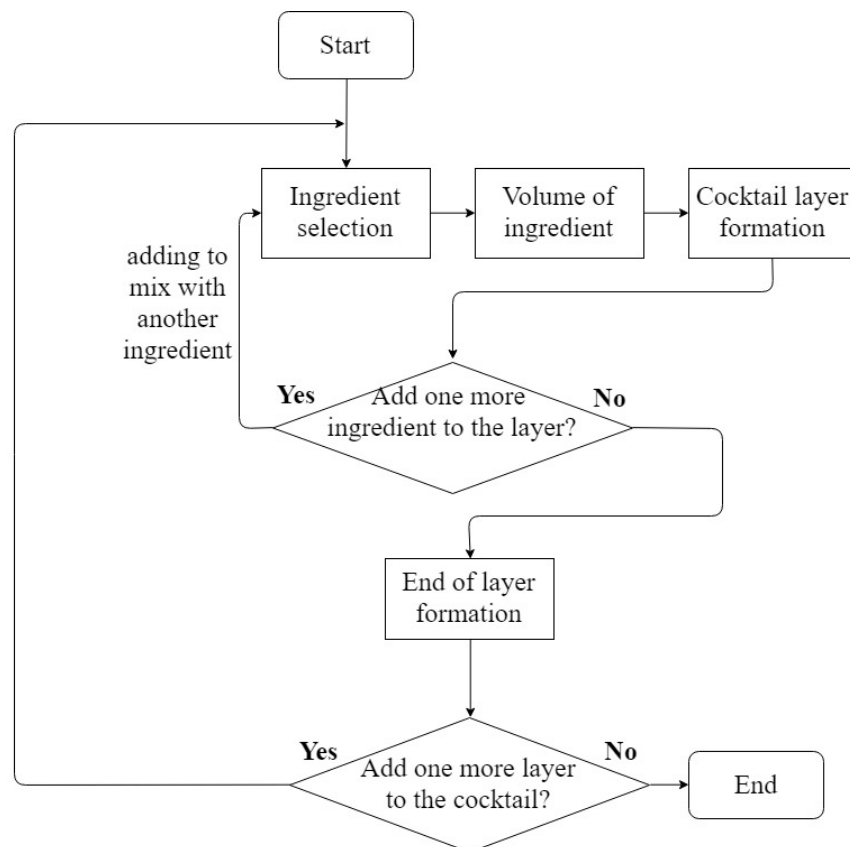
The process starts and evolves firstly by selecting the ingredients that the user enters. Accordingly, the selection of volume of ingredient is done, and lastly the layer of cocktail is formed. In the further evolvement of the process, the system questions the user about the addition of one more layer. If it is a "yes" then the process is repeated for a new layer; and if it's a "no" then it commences as end of layer formation. Further, for one last time, the system asks the user for an addition layer in the cocktail. If it's a no, the process ends. But if the user changes his mind then the process of making a new drink layer is started.

The peristaltic pumps are used to indulge the process of peristalsis in the system. The Kamoer Peristaltic Pumps are driven by a A4988 stepper motor driver.

As a hardware platform, Arduino Mega controller is used as it provides the following features:
•   Large number of digital input and output pins
•   Low cost
•   Accessibility

The Bluetooth module is added for distant control implementation. The system uses Asus Zen PadC z170CG-ICD 16A as a tablet to control system via Bluetooth interface.

The body construction comprises of 6 places for liquid containers. 6 peristaltic pumps KCS-B16SA3A are used. There is installation space for the tablet PC. There is a special space for embedded electronic components, control systems and power supply. The liquids are pumped through 4 mm medical silicone tubes. These tubes are inserted into flow mixers. The flow mixer is created using finite

difference flow simulation and allows pouring and mixing of all liquids with different viscosities in a mixing container. The special mixer reduces amount of leaking when changing any of the compartments.

The automated dosing system with 6 peristaltic pumps was designed for high precision dosing of liquids and preparing mixed or layered cocktails.

B. The Automatic Bartender

The mechanical design of the liquid source container and black box module can be split up into two different prototype directions. The first is investigating methods of easily interlocking and removing the container to and from the black box device. To promote consistent flow, there is a need for sufficient flow and sealing at the container/black box interface to ensure resistance to leaking, which is completely dependent on the method used to interlock the components together. The secondary mechanical design focus is that of the electronically controlled valve system that opens and closes to allow and restrict the flow of liquid ingredients. The two main directions this can go in is that of a solenoid valve that could easily be attached to a tube system leading from the container/black box interface to the cup or a pinch valve that would be composed of an actuator and a spring designed around a tube leading from the interface to the cup. The latter option would pose a greater risk because it would be a custom-made assembly of a tube cross-section being compressed by a spring with an actuator pulling the spring back to allow flow. Because commercial solenoid valves might be too expensive or produce a low flow rate, the pinch valve option could be more promising in responding to changing requirements. A prototype focusing on user interactivity would help determine what changed must be made to the interface to ensure that users clearly understand how they are meant to use the device. The main issue that should be addressed in this regard is the loading of ingredients into the liquid source containers based on prompts from the user interface. This prototype will require the development of a coded interface that is representative of the proposed "Load Ingredients" interface so that users can go through the motions of loading an ingredient and receive appropriate feedback from the device. By arranging 12 containers in a circular pattern and attaching programmed LEDs to each, further testing can be done by observing users loading ingredients using the digital application.

System Overview

The proposed system consists of NodeMCU as microcontroller and peristaltic pumps.

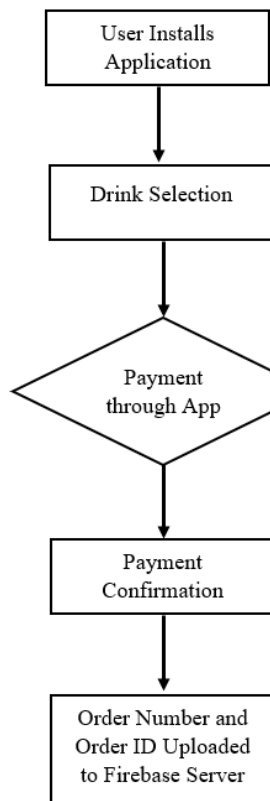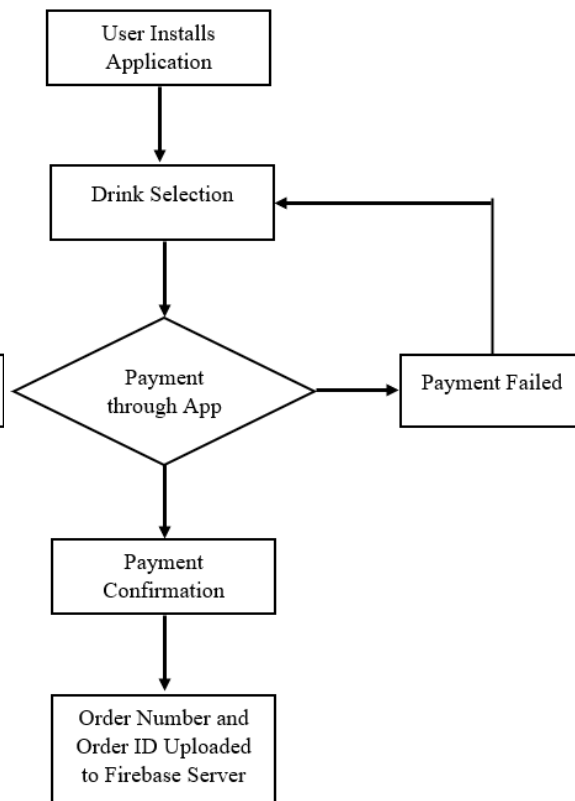Figure 2: Flowchart of the App   Figure 3: Flowchart of the App


User first installs the application in his device and opens it. On opening the app, a home page is seen. Upon proceeding further, on page one of the menus, basic cold drinks can be found. The Mocktails and Cocktails can be seen on the second page. The user needs to select the type of drink he wants and then is prompted to pay for the same. The current payment options provided are all UPI based. The payment can be done via any of the following portals:

• Google Pay
• PhonePe
• Amazon Pay
• Paytm
• WhatsApp

After payment, a unique Order ID is given to the user. Upon receiving payment confirmation, The Order ID and Order Number are uploaded on the Firebase database server. The NodeMCU on the machine then receives the Order ID and Order Number and mixes and dispenses the drink in the glass and prompts the user by displaying Order ID and a message saying that the drink is ready on the LCD screen on the machine.

Figure 4: Block Diagram of the Machine
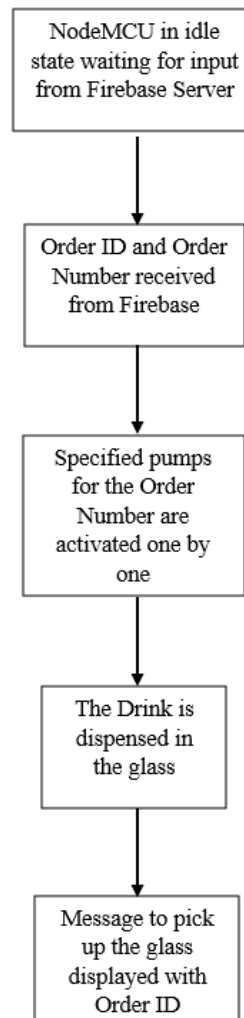
The NodeMCU on the machine is initially in the idle state waiting for input from the cloud server. As soon as it receives an Order ID and an Order Number from the server, it initiates pumping the ingredients one by one from the reserve. After all ingredients are pumped into the glass, a message to pick up the glass is displayed on the LCD screen.
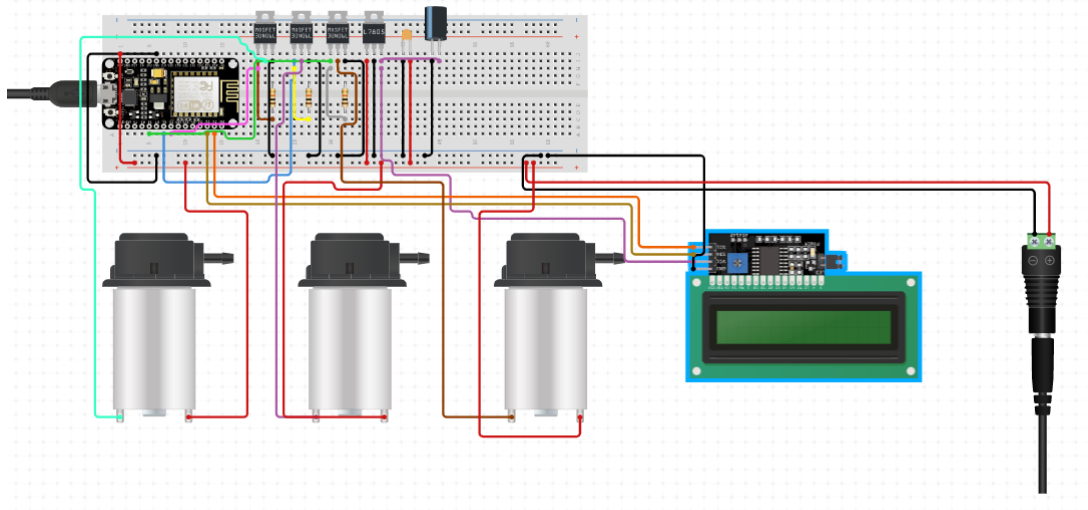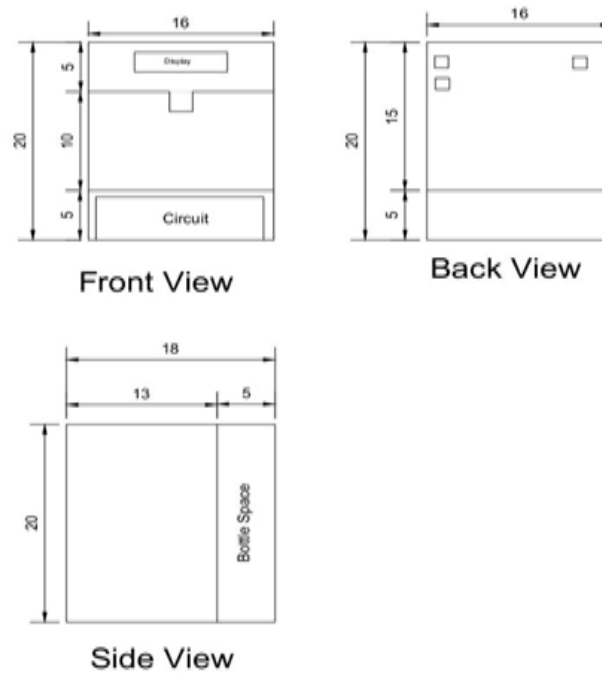
Figure 5: Table Circuit Visualization

Figure 6: Dimensions of Physical Model

Acknowledgment

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