

INTELLIGENT SMART COOKER

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ABSTRACT

The world is evolving rapidly and every appliance is getting smarter. People love to use smart appliances because they are easy to use and more efficient when compared to the traditional way of using appliances. The traditional way of cooking involves keeping the utensils on stove or flame and verifying to what extent the cooking has been completed. These days everyone is busy with their works and there are chances of forgetting, after putting the items on stove. Also there are only few current mechanisms which can perform the task of cooking remotely and in an effective manner. In order to avoid these problems, this EPICS project has been proposed entitled as “**Intelligent Smart Cooker**”.

An existing system will be developed with more feasibility and additionally added features to use the smart cooker in an efficient manner. The whole project has been divided into six different modules which include three modules that were previously divided which are Developing a mobile application, Remote connection, Setting duration and warming up the items. The latest modules are Adding voltage sensing circuit, Modifying and implementing the code for Arduino, ThingSpeak cloud using Wi-Fi modem.

Keywords: Android App, Smart Cooker, Wi-Fi, GSM module, Alert message, Voltage sensing circuit, ThingSpeak cloud, Wi-Fi modem.

1. BACKGROUND

Everyone has to agree that kitchen plays a very important role in life as it is a place where tasty and nutritious food is prepared. Internet of things is a network of Physical objects. IOT combines these with one another. Recent technologies have proved that cooking is no longer a burden to working people. Automated kitchens and the automated appliances are serving as a boon to the working class people by increasing the comfort level. Catering companies around the world are suffering from food wastage during cooking. It is because a large number of meals are being prepared at the same time, so the Chef may forget them on the Cooker while preparing another one. Various sensors collect the data and send it to the microcontroller. Arduino Uno is used here. The sensed data is analyzed in the Arduino board and necessary actions are taken with the help of Actuators. The controller uses GSM module to send notifications to the user and can be monitored using ThingSpeak cloud.

The proposed Intelligent Smart Cooker system helps to remotely control the cooker with the help of mobile application. The proposed system uses GSM module so it works within the reach of cellular network anywhere in the world. We can check if the power is available at the users place or not and can control the cooking operation anywhere from our house and also outside the house using mobile application. Presently the system is for four menu items including Rice, Upma, Tomato rice, Sambar. We can also monitor the power ratings using the ThingView app which consists of our private channel created using the ThingSpeak API connected to our Arduino with the ESP9266 Wi-Fi Module.

1.1. SCOPE OF THE PROJECT

The Scope of the project is

- Presently it develops for four menu items purpose only.
- Presently it allows to communicate remotely using app at a distance of 35 kms.
- Presently it provides time duration to on/off button.

1.2. OBJECTIVE OF THE PROJECT

The objective of the project is:

- To develop a smart cooker to allows people to Cook food remotely.
- To develop the Mobile application to control the Smart cooker.
- To allow user to select cooking item from menu using android application.
- To allow user to set time duration of cooking item by selecting the menu item.
- To monitor power using ThingSpeak.

1.3. ADVANTAGES

The advantages are as follows:

- It eliminates the workload of people.
- It provides the cooked food warmer at anytime without any work.

1.4. APPLICATIONS

The applications of the system are:

- It is used in houses to cook food without physical presence.
- It is used in household industry such as hotels to monitor the cooking process effectively.

1.5. ACTIVITY DIAGRAM

Activity diagram is another important behavioral diagram in UML diagram to describe dynamic aspects of the system. Activity diagram is essentially an advanced version of flow chart that modeling the flow from one activity to another activity.

The basic purpose of activity diagrams is similar to other four diagrams. It captures the dynamic behavior of the system. Other four diagrams are used to show the message flow from one object to another but activity diagram is used to show message flow from one activity to another.

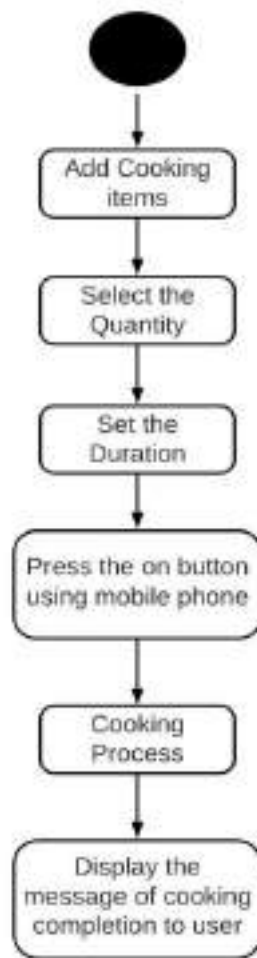


Figure1. Activity diagram of Intelligent Smart Cooker

Figure 1 Diagram describes activity diagram of Intelligent Smart Cooker contains add cooking items, setting the quantity, press the on button using mobile phone, display of status of cooker to the user.

2. PROPOSED METHOD

The Main methodology of proposed Intelligent Smart Cooker is to adjust and control cooking parameter such as time duration based on the type of food using Android app. It is connected to smart phone using Wi-Fi connectivity. It allows us to communicate or monitor the smart cooker anywhere in the house or even from outside by using the Global System for Mobile Communications (GSM) module. With the help of app selecting the quantity of the food menu items increase or decrease cooking time, switch the cooker to keep-warm function, or we can turn it off completely. It can also check the meal status that how much of cooking time is left in the form of message alerts. The Figure 1 below represents the methodology diagram of proposed Intelligent Smart Cooker System with Mobile phone, Arduino, GSM Module and Timer.

The proposed system called “**Intelligent Smart Cooker**” is divided into six modules.

1. Developing a mobile application
2. Remote Connection
3. Setting Timer and Warming up the food items
4. Add voltage sensing circuit for power availability check
5. Modify and improvise the code for Arduino
6. Use ThingSpeak cloud for continuous power monitoring using Wi-Fi module

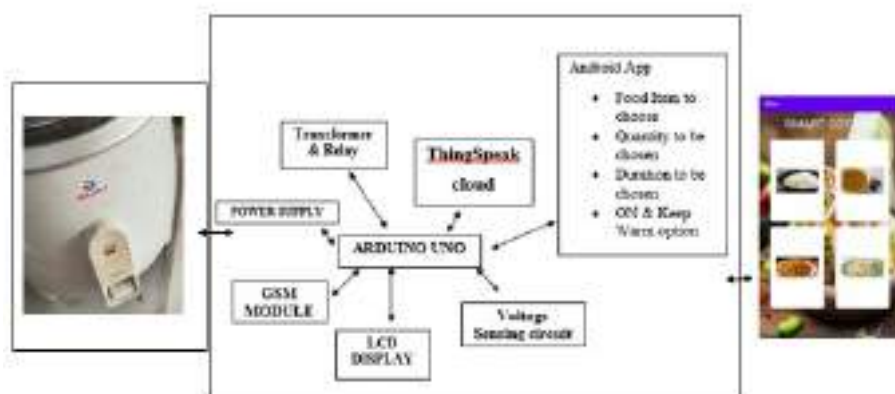


Figure 2: Block Diagram of Intelligent Smart Cooker

The above block diagram represents the whole system methodology of the Intelligent Smart cooker. It includes setting up the time, which is operated using the application created and the GSM Module is provided with a SIM Card which redirects the message received from the user to the cooker. The cooker will be designed with a more compact board and it will be inserted within the cooker. As shown above the message is sent from the android mobile, to the Arduino and then message is sent to the GSM Module and within it is the timer. The whole commands are sent to the cooker and the operation starts. As soon as the time is over, the cooker automatically stops and the power is OFF.

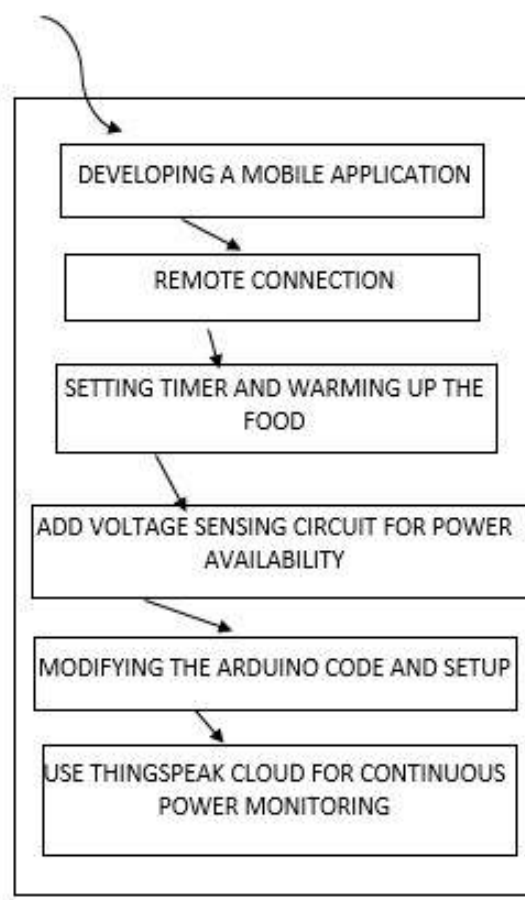


Figure 3: Simple Flow Diagram of Intelligent Smart Cooker

Figure 3 is the flow of the methodology and the steps involved in the whole working and implementations. The modules are specified with the flow, i.e. the mobile application is first developed, then the remote connections are set, later the timer and the warming up features are

setup, now the voltage sensing circuit is added for checking the power availability, based on it the arduino code and the setup are modified and finally the ThingSpeak cloud is set for the continuous power monitoring.

2.1. Developing a mobile application

Mobile application includes developing activity for home screen with card layout, activities for menu items and including on button for on operation and cancel button for cancellation operation of cooker. It facilitates the user to select menu item, quantity of food and automatically calculates the duration details to be cooked for respective item chosen.

2.2. Remote Connection

Interfacing Arduino with GSM module:

For establishing remote connection Arduino is connected to GSM module for sending messages to mobile about the operation to be performed in cooker. Power ON the GSM module by providing 5V and GND. Insert the SIM card to GSM module and lock it. Once the connection is established successfully, the network LED will blink continuously for every 3 seconds. Based on the operation selected by the user message code is sent to GSM module. Message code is read by GSM module and evaluates the code. Based on the code received, it proceeds, i.e. ON or OFF it performs the operation. If code is ON power is sent to the cooker and cooker gets ON for the respective duration. If code is off power supply gets stopped to cooker using relay.

2.3. Setting Timer and Warming up the food items:

Time duration of item is calculated based on the quantity and item selected by user for the provided four menu items in the mobile application. This duration is sent to GSM module in form of message code. It evaluates the code and performs the ON operation of cooker for

specified duration and automatically turns OFF the cooker after the completion of duration specified.

Some people prefer to warmup the food before consuming. So for the cooked item to get warm up before consuming a particular menu item is provided the warm up setting for 5 minutes which is used for warming up the menu item.

2.4. Add Voltage Sensing Circuit for power availability

Having the whole setup is indeed not an important factor, the implementation and proper working plays the key role. Though the cooker is connected to the IOT kit, the IOT kit requires the power from your house or the place it is being used. When there is no power there is no use or purpose of using the cooker. We can check the power availability even before ON-ing the cooker. Voltage sensing circuit is used to check the power status. It receives the voltage and current and converts the alternating current (AC) to direct current (DC) and generates the raw bits to understand if there is a power passage.

2.5. Modify and Improvise the code for Arduino

The Arduino code is modified and the power status function is added. When there is power we get the message “OK”. And in the case of unavailability the message “FAIL” is returned to the user.

2.6. Use ThingSpeak cloud for continuous power monitoring using Wi-Fi module

A Wi-Fi module is added to the Arduino Board or kit to connect it to the cloud. ThingSpeak API is used for this purpose. It uploads all the data related to power into the cloud in the form of graphs and returns back the data. A channel must be created and then, the private channel id must be given in the app i.e. ThingView app so as to view the power rating from time to time.

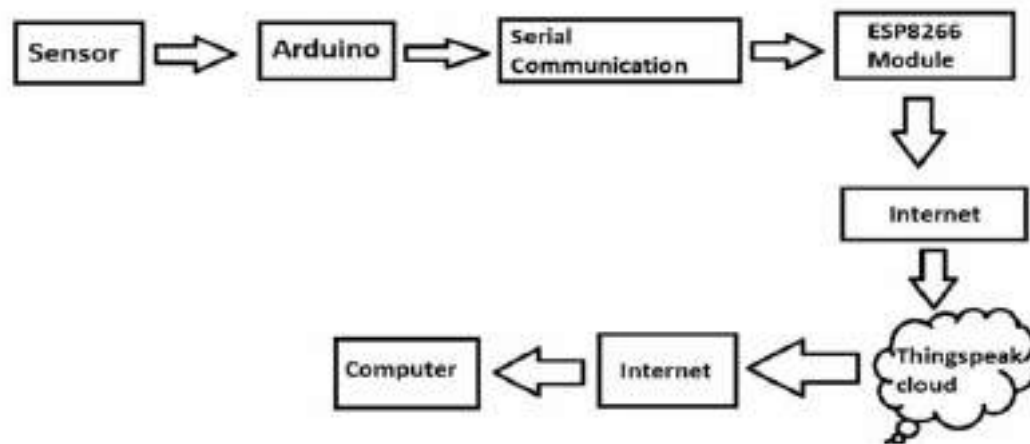


Figure 4: ThingSpeak Cloud methodology

Figure 4 shows how the ThingSpeak is setup i.e. how the steps on how the sensors, then the arduino are set for the serial communication, then to the Wi-Fi module and Internet, extending to the ThingSpeak Cloud and to the Internet and computer.

ALGORITHM:

The algorithm to implement the proposed system is

Mobile application:

1. Developing activity of home screen with card layout.
2. Developing activities for four menu items to be placed.
3. Developing buttons for on and off
4. Developing sliders for selecting quantity
5. Developing Time duration for menu items
6. Developing code for sending message to a phone number which is registered and inserted into GSM Module.
7. Based on the button pressed do the action.
8. If the button pressed is ON, Send ON code to the Arduino.
9. Setting Time Duration for the item to be cooked.
10. If the button pressed is OFF, Send OFF code to the Arduino

Arduino:

1. Message is read by GSM Module.
2. Evaluation of code sent i.e. ON or OFF.
3. If code is ON, Send power to the cooker.
4. Else, Stop power to cooker using relay.
5. Wait for the code to arrive at arduino.

3. OUTPUT

3.1. In the App:

The home screen of mobile application includes separate activities for each of the menu item like Rice, Sambar, Tomato rice and Upma. Upon selecting an item we see an interface which includes the quantity selection, option to set the duration, ON button, Cancel Button and keep warm button. It directly gets connected to the board and communicates with the GSM and performs the actions. The mobile application interface is as shown:

Figure 5 describes the home screen of mobile application which includes separate activities for each of the menu item like rice, sambar, tomato rice, upma.



Figure 5: Main Interface



Figure 6: Interface for Food Item Upma

Figure 7: Interface for Food Item Rice

Figure 8: Interface for Food Item Sambar

Figure 9: Interface for Food Item Tomato Rice

Similarly, Figures 6,7,8,9 show the individual interfaces of sambar, Tomato rice, upma and rice. They have the select quantity field for the quantity to be selected and the duration to be selected and the ON, CANCEL, KEEP WARM fields for selection.

3.2. In the IOT Board:

When the Board is given power supply, the LCD displays that the system is ready and upon receiving the message via the app or through manual commands given through messaging the GSM receives the message and performs the action accordingly. The same applies with the power status. The IOT Connectivity:



Figure 10: Status-1 of the Cooker



Figure 11: Status-2 of the Cooker

Figure 10 shows that the system is ready when the arduino is perfectly switched on and the sim is set into it. Figure 11 shows that the message sent is being received by the GSM Module in the IOT Board.

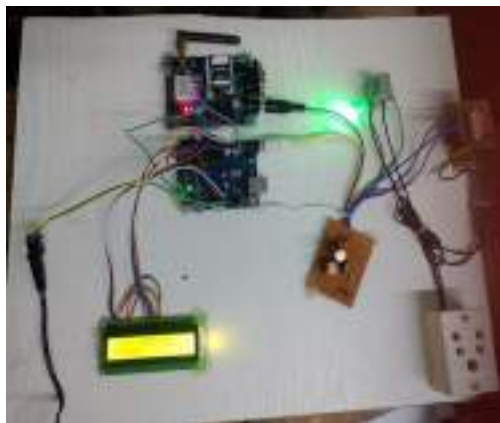


Figure 12: When cooker is ON



Figure 13: When cooker is OFF

Figure 12 shows that the Cooker is working as the Bulb set in the board is ON. The indication is that the cooker is on till the Bulb is ON. Similarly, Figure 13 shows that the Cooker is OFF as the Bulb is not Blinking.

3.3. In ThingView App:

The ThingView App shows the power rating periodically throughout the duration set up for the food item to be cooked. The power rating is shown in the form of graphs.



Figure 14: Power-1 in ThingSpeak

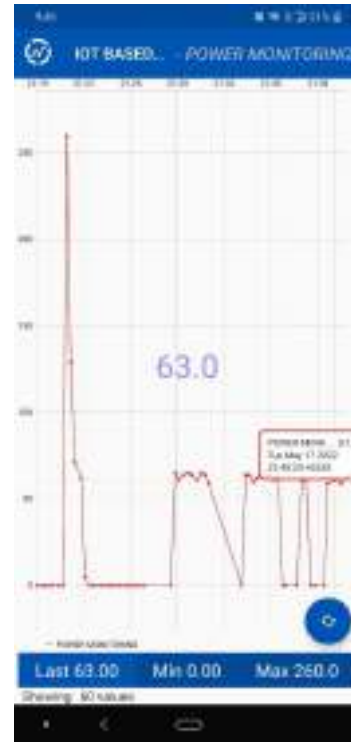


Figure 15: Power -2 in ThingSpeak

Figure 14 and 15 show the power rate monitoring in the ThingView App. The first one is that the power is null when the cooker is OFF, The figure 15 = is the power rate when the Cooker is ON.

4. CONCLUSION AND FUTURE WORK

The proposed Intelligent Smart Cooker system helps to remotely control the cooker with the help of mobile application. The proposed system uses GSM module so it works within the reach of cellular network anywhere in the world. We can check if the power is available at the users place or not and can control the cooking operation anywhere from our house and also outside the house using mobile application. Presently the system is for four menu items including Rice, Upma, Tomato rice, Sambar. We can also monitor the power ratings using the ThingsView app which consists of our private channel created using the ThingsSpeak API connected to our Arduino with the ESP9266 Wi-Fi Module.

This project can be improvised and developed by including the features like the Timer to ON the system using the Real time clock Method, Temperature alert can be set up, Moisture test for rice item to automatically off the system, Making the whole system into a compact device for feasible usage. This project can also be extended to other appliances like fans, lights, etc; The Power availability checking technique can also be implemented in other sectors like agriculture.