

ABSTRACT

- Event Name: Embedded
- Team Name: The Triple Tinkerers
- Tech ID: 11821
- College Name: Kamla Nehru Institute of Technology, Sultanpur
- Team Leader's Name: Mohd Saif
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- Names of all the team members:
Basu Gupta
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Model Details:

Home appliances being connected:

LED Bulb

Fan

Water Pump Starter Unit



Smart Home Appliances Control System with Touch Screen Control, Wifi and GSM

Material Used:

- Arduino Mega 2580
- 2.4 inch TFT touch screen module
- SIM800 GSM Module
- ESP8266-01 Wifi Module
- 5 V to 3.3 V Logic Converter
- Quad 5V Relay Module
- Jumper Wires
- Breadboard
- 12V @ 2 Amp Power Supply for GSM module
- 5V @ 1 Amp Power Supply for Arduino module

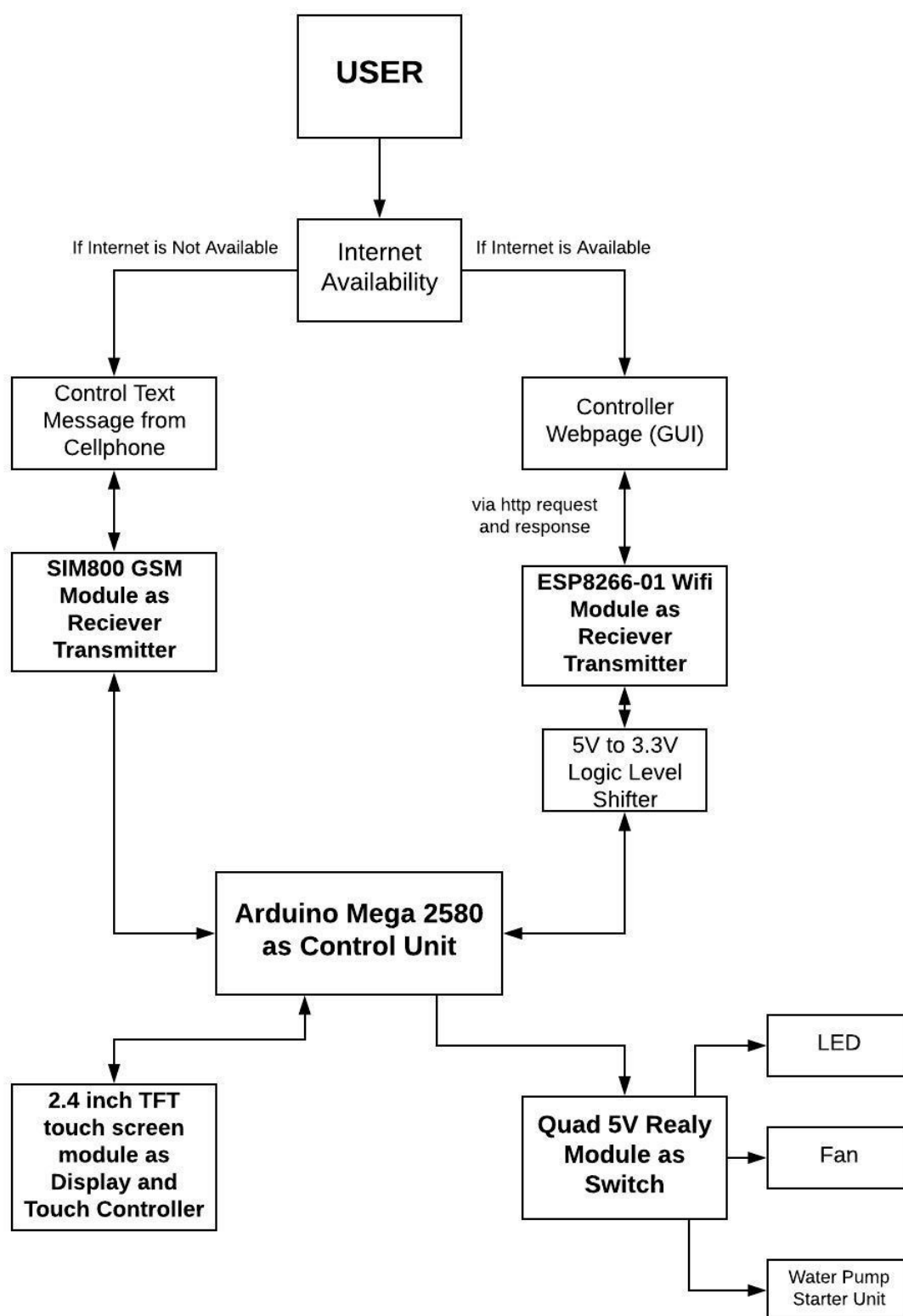
Libraries Used:

- [MCUFriend_kbv library by David Prentice](#)
 - [Adafruit GFX graphic Library](#)
 - [Adafruit Touch Screen Library](#)
 - [Software Serial Library](#)
- AT commands of ESP8266 - 01 and SIM800 GSM Module was also used



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System Flow Chart



Brief Description about System

- **Construction :**

This Smart home appliances control system was based on Arduino Mega 2580 microcontroller unit. This system has a main control unit which consists of the microcontroller, a 2.4 inch TFT touch screen shield which was connected to MCU via 8 bit parallel communication.

In the control unit, the ESP8266-01 Wifi receiver/transmitter module and the SIM800 GSM module was connected via UART communication.

Three of the four relays from 5 V Quad Relay module was connected to the Arduino Digital pins, and the AC supply for LED, Fan and Pump was connected to output pins of relay module.

- **Working :**

In this System, the appliances were controlled by three ways :-

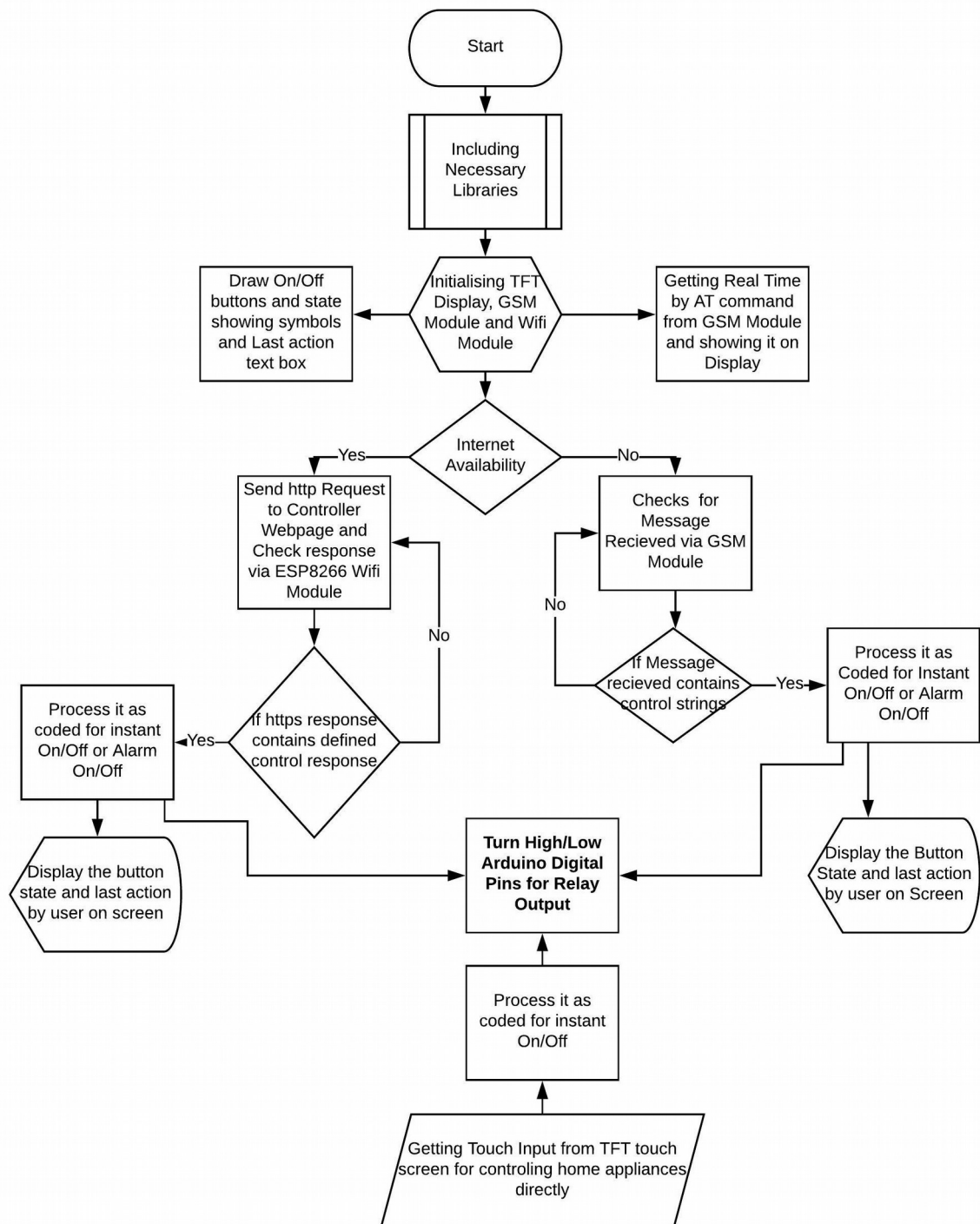
- By Touchscreen Input which was given by TFT touch screen module connected with Arduino for showing the state of the appliances
- By using the webpage, which contains button input for the appliances, sending data from the server to the ESP8266 - 01 Module over the internet
- By using Text Message which was sent from user's cellphone to SIM800 GSM Module

After getting command as 'predefined control string' like 'LED Off' from the Webpage or User's cell phone as text message, or as pixel read from touch screen controller, microcontroller compares it with the defined string or defined pixel read, and takes actions based on these inputs as defined by code which was described further.

After switching the relay input Digital pins of Arduino according to input, Arduino will send the return response to the server or user's cell phone accordingly, whose logic was also described further.



Microcontroller Code Flowchart



Code Logic Used for Problem Statement

Initially, The necessary libraries was included in the code and colour and pressure for TFT display module was defined, After that,the required variables was defined as respective data types ,which was further used for the storing of text messages and http response.In this step,the connection between SIM800 GSM Module and Arduino ,and ESP8266 Module and Arduino was started as defining Arduino Digital pins as Software Serial Pins.

After the include and define process, the communication between MCU and TFT touch screen was initialised,further, the SIM800 GSM Module and ESP8266 - 01 was initialised by sending AT commands.In this step,The buttons ,state showing symbol of appliances connected and Last action Text box was also drawn on TFT Screen Display module with the help of Adafruit GFX and MCUFriend_kbv libraries.In this process, the AT command for time query was also given to the GSM Module whose result was stored as variable for displaying time.

After that initialisation,the SIM800 GSM module was configured for recieving text messages by the AT command.Also, the ESP8266 module was configured to connect the WIFI network to access the internet by the AT command.

Now the system is ready for recieving input for controlling home appliances.

After that, the MCU send a http request to server where the Controller Webpage was hosted using required API to get the response of the control buttons, which will be getting stored in the form of strings.Then,MCU compares the string with the predefined control string for Instant ON/OFF or setting Alarm to ON/OFF,and If the response matches the control strings of any of these actions,then the microcontroller will HIGH/LOW the Digital pins which was connected to relay input of that connected home appliance.

If Internet was not working, then the ESP8266 will recieve the error response, Then User can send control string like 'LED ON' etc. as text message,which will further recieved by SIM800 GSM Module by using AT command and these text message was recieved by microcontroller by using UART communication , these control string then was compared with predefined control strings and microcontroller will then HIGH/LOW its Digital pin accordingly.



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The task of looking for input will be executed inside the loop hence the microcontroller unit continuously get the input for controlling connected home appliances.

After the Input processing and relay controlling by the arduino, the arduino then send the task completion http response to the server via the ESP8266 - 01 Module Or as a text message via the SIM800 GSM Module to the cell phone of user (if internet was not working). These return response will contain the state of the home appliances that will be switched ON/OFF by previously received Input. This task was also executed inside loop, hence, if there was any request to change the state of connected appliances, a confirmation output was generated.

This is how the system logically works .

Note: Please consider this text as a walk-through of system.

Any optimal change which doesn't break your constraint limit, or doesn't violate your policies can be expected.

Regards,

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