

## **GSM based Auto on Main Switch for Power Trips**

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**Abstract** People in Malaysia are particularly vulnerable to adverse weather, such as lightning and thunderstorms where it is required to spend 8 to 12 hours every day in the workplace and less aware about their house. When lightning strikes causes the main switch to power trips to protect the entire house from any mishap and protect the electrical appliances from getting burnt. When blackout happens, some essential gadgets require electrical power to work. The major goal of the project is to assist users with resetting the main switch following a power outage and to notify the users about failure when the system failed to switch ON back the main switch through SMS using GSM technology as well as to monitor the current flow and the ratio of the power trips occurs in a month through IOT in Thing speak. This device is able to help people who spend the most of their day at work or away from home safeguarding their homes and preserve their important belongings.

**Keywords:** Power Trip, Bad Weather, Main Switch, GSM, SMS, IOT, Thingspeak

### **1. Introduction**

The fast change in human lifestyles has been fueled by the growth of digital information. The use of electricity is critical as one of the most essential sources of energy in today's lifestyles. There are solutions available today that can protect your home and electrical equipment from fires caused by lightning and thunderstorms. [1] With the help of this project, it can automatically turn on the main switch after a power outage and alert the user of the outage through SMS to their smartphone.

The project concept is to receive dispatched Short Message Services (SMS). The benefit of SMS is that it provides greater coverage at a lower cost. The project able to send SMS to the user from a great distance independent of any physical geographical border as long as the user is under network coverage. The project will allow users to manage monthly current flow their home, among other things.

Project aims to create a GSM-based Self-ON Main Switch for Power Trips. When the system detects a power outage, it automatically activates the main switch. If the kicks up fail three times in a row, an SMS will be sent to the house owner to notify them.

### 1.1 Problem statement

In Malaysia, bad weather such as lightning and thunderstorms are common. Bad weathers cause our main switch to power trip in order to save other electrical appliances from getting burnt. The necessary electrical appliances such as refrigerator, automatic gate, CCTV cameras, and anti-theft alarm will be no functioning and the house is more vulnerable to theft. [2] Frozen status of fresh foods and meats in the refrigerator began to deteriorate, exposing them to microorganisms. Besides, people have become negligent in proper utilization of energy [3]and tend to forget to switch OFF power in their house when not in use. Power trips usually caused by electrical wiring shock, and this can lead to house fire. [4] Therefore, developing a project that helps the user retain back their electricity after a power trip without any human involvement, and notify the users about the power trips, and as well as to monitor the current flow in their house for each month.

### 1.2 Objective of the study

- i. To assist users by switching ON the main switch when the power trips occur.
- ii. To notify the users about the failure when the system failed to switch ON back the main switch through SMS using GSM technology.
- iii. To monitor the current flow and analysis the ratio of the power trips occurs in a month.

### 1.3 Scope

- i. The scope of the project focusses on switch ON back the main switch after power trips. When there is power cut, there will no power supply in the house. Some necessary appliances such as refrigerator, auto gate, security camera, security alarms and house lighting need electricity.
- ii. The scope of the project focusses on notifies the house owners about the failure after the system failed to switch ON back the main switch three times continuously and send text through SMS using GSM technology. It provides safe side where the owner might come back to the to figure out the problem and refix if they are nearby.
- iii. The scope of the project focuses on monitoring the current flow and the ratio of the power trips occurs in a month. This application encourages owners to be more responsible and disciplined to save electricity and frequent power trips is the reason either short circuit in the house or old wiring.

## 2. Materials and Methods

Describe more details on the method used to create GSM based Self ON Main Switch for Power Trips. The description will be all the details about hardware used, system flowchart and system block diagram.

### 2.1 Materials

Part Number	Part Name	Part Quantity	Function	Cost

1	NodeMCU ESP8266	1	To enable the WiFi that is built into the home automation system.	RM30.00
2	Arduino Nano	1	The Arduino Nano includes a number of communication ports for connecting to a computer, another Arduino, or other microcontrollers.	RM30.00
3	Power Window	1	This power window has been as uplifting as the main switch	RM35.00
4	Solid state relay	1	Made up of a sensor that responds to a specific input (control signal).	RM 20.00
5	Main switch	1	It applies or disconnects the control panel's electricity.	RM25.00
6	Miniature Circuit Breaker	1	To protect an electrical circuit from harm caused by excessive current.	RM50.00
7	Distribution Box	1	Providing a protective fuse or circuit breaker for each circuit in a single enclosure	RM10.00
8	GSM module	1	The circuit braker trips, this GSM module sends an instant notification to the user.	RM45.00
9	Step Down Regulator	1	To lower the voltage for GSM modules that require less than 4V.	RM15.00
10	L298N DC Motor Driver	1	Selecting forward or reverse rotation and regulating the speed of motor.	RM5.00
11	AC Voltage sensor	1	Capable of measuring voltage	RM10.00
12	DC adapter	1	To supply constant 12V DC power to the circuit	RM14.00
13	DC connector	1	DC power connector are electrical connectors that provide direct current (DC) power to a connected device.	RM6.00
14	Lamps	1	The lamps will be used as AC load to the solid state in the project	RM7.00
15	Connecting Wires	1	It is used to connect PCB headers with wire harnesses.	RM2.50

2.2 System Block Diagram

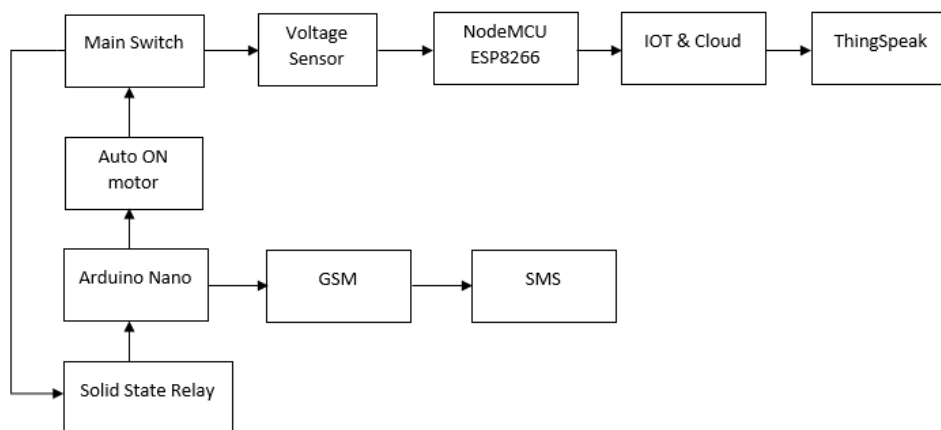
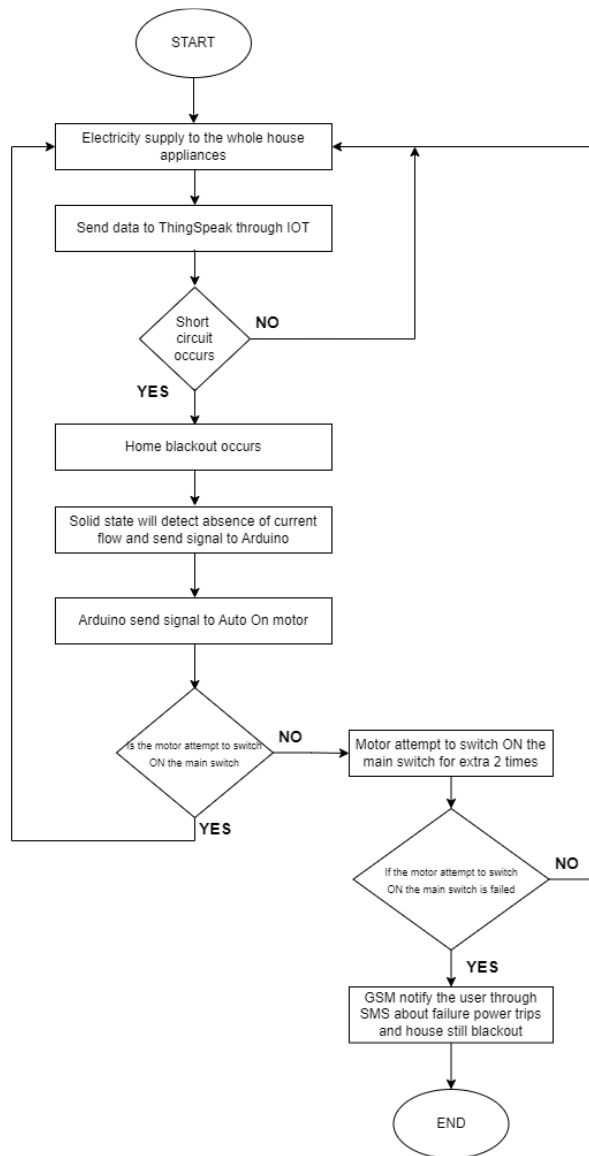


Figure 1: Full block diagram

The block diagram of a GSM-based Auto ON main switch for power outages, in which users can receive SMS messages on their smartphones if their house experiences a sudden blackout. The SMS feature will only activate if the main switch fails to reconnect the electricity after three attempts to turn it on. The application will allow users to track power outages and electricity usage over the course of a month. The main switch cuts the power off and the solid-state module detects no electricity. The solid-state module sends a signal to the Auto On switch, which then sends a simple SMS to the owner about power outage. Meanwhile ESP8266 collects data from voltage sensor and send it to the Thingspeak[5] via IOT.

### 2.3 System Flowchart



**Figure 2: System Flowchart**

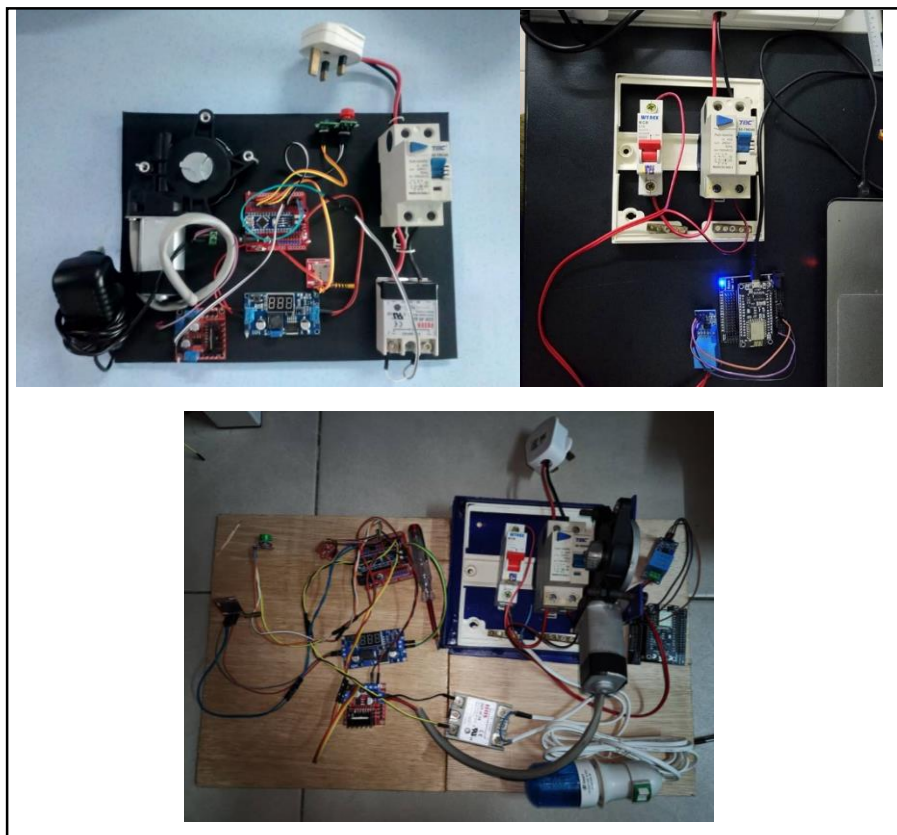
The system will be idle as the constant electrical supply is supplied and keep sending data to the Thingspeak through IOT. When a power outage happens, the system will be triggered. The solid-state module will detect no electricity and send a signal to the microcontroller Arduino when the power goes out due to a short circuit with the help of external power. Then the Arduino sends an output signal to the Auto ON motor. The Auto On motor will turn on and begin its first kick, which will raise the main switch, allowing for uninterrupted power flow throughout the house. If the main switch is successful in regaining power on the first try, the GSM will notify the user of the power outage and the successful

restoration of power. The GSM will warn the user about power trips and failure to regain its energy if the Auto ON motor failed to regain its electricity after trying to turn ON more than triple times. There will be a reminder for the user to check on their house since their house has lost power owing to a technical issue such as a wiring issue. When the house regains power, the user may use their smartphone and IOT to track the amount of electricity used and the number of power outages that occur in a month. As a result, users can work with a technician to fix any technical issues without causing further damage to their electrical appliances and avoid house fires. [6]

### 3. Results and Discussion

Discussion about the design and implementation of a GSM-based Auto On Main Switch for Power Trips, as well as the results obtained. The actual results of the GSM-based Auto On Main Switch for Power Trips are described in further detail, together with supporting data to substantiate the test results.

#### 3.1 Results



**Figure 3: Overall circuit and project**

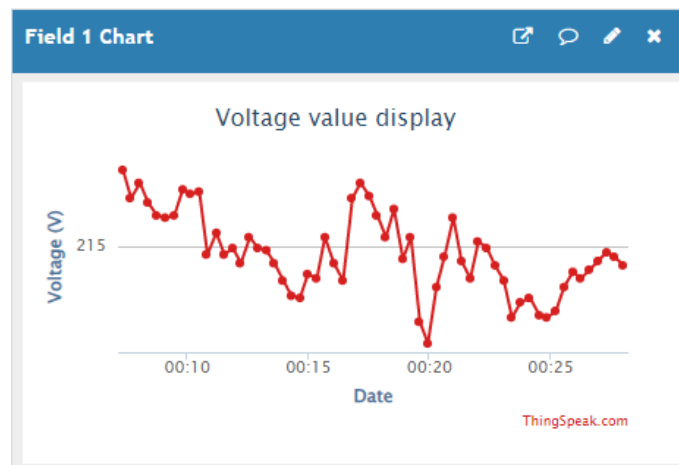
The circuit is function to assist users by switching ON the main switch when the power trips occur and as well to notify the users about the failure when the system failed to switch ON back the main switch through SMS using GSM technology. The main switch is connected to the supply with its input Live (L) and Neutral (N). The output from main switch put the Solid-state relay (SSR). SSR positive output will be connected to IO2 of Arduino Nano board and the ground will ground. The GSM input for positive and negative terminal will be fixed at output of voltage regulator respectively which is less than 5V. The RXD and TXD pins will be connected to IO10 and IO11 of the Arduino Nano board. The input for voltage regulator will be fixed to the positive and negative pins in the board of the Arduino Nano. The input of motor driver L298N will be from Vin and ground. The pins IN1 and IN2 will be connected to IO6 and IO5 and the pin ENA to the IO3 in the board. The output 1 and output 2 will be connected to

the power motor which are OUT 1 with positive terminal while OUT 2 with the negative terminal. The LED and push button is connected to IO1 and IO 4. The Arduino Nano is supply from DC 12V adapter. The circuit continues for voltage sensor to measure the AC voltage output and sends to cloud through IOT. The main switch is connected to the supply with its input Live (L) and Neutral (N). The output live from the main switch will be connected to the input live of MCB and the output from MCB and neutral from main switch will be connected to the input of voltage sensor. The voltage sensor VCC and ground will be powered from the NodeMCU board, and the data cable will connect to the A0 pin.



**Figure 4: SMS notification from GSM**

SMS notification that received from the GSM module in the project. The SMS notification received by the owner/user every time when there is a problem uplifting the main switch at the 3<sup>rd</sup> attempt



**Figure 5: Voltage data at Thingspeak**

The data collected by ESP8266 from voltage sensor is processed and send to ThingSpeak cloud through IOT.

### 3.2 Data Analysis

**Table 1: Data Analysis of GSM based Auto On Main Switch for Power Trips**

<b>Bil</b>	<b>Condition 1</b>	<b>Condition 2</b>	<b>Outcome</b>
1	Power trip	If 1 <sup>st</sup> attempt to switch On the main switch is success	Electricity regains back  Thingspeak keep collecting data  No alert from GSM module to owner
2	Power trip	If 2 <sup>nd</sup> attempt to switch On the main switch is success	Electricity regains back  Thingspeak keep collecting data  No alert from GSM module to owner
3	Power trip	If 3 <sup>rd</sup> attempt to switch On the main switch is success	Electricity regains back  Thingspeak keep collecting data  No alert from GSM module to owner
4	Power trip	After more than 3 attempts to switch	House still blackout  Thingspeak stop collecting data  SMS alert from GSM module to owner.

Table 1 summarises and compares two conditions for four outcomes in the form of a table, making it easy to compare them based on the results obtained. Thus, the analysis has achieved the project's main objectives and scopes because the prototype is operational and functional.

#### 4. Conclusion

In conclusion, Auto On Main Switch for Power Trips switch, which is essentially a main switch with a device attached to it, enables the main switch to be turned ON when a power outage occurs. In addition, the system uses GSM technology to alert users or send short messages (SMS) to their smartphones, and it integrates with Thingspeak so that users may monitor the system via WiFi. We compare the data acquired from results and analysis throughout the project to the objectives and scope specified at the beginning of this report.

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