

Current Sensing in Washing Machine

Team Pentagon

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Problem Statament

- The washing machines in community living places, such as hostels, are generally limited and their usage should be done in an efficient manner.
- By sensing the current the machine draws, we can obtain the information about the state of the machine,i.e, vacant or in use.
- By displaying the state on a website, we can save the hassle of physically going checking the state of the machine.

Device Overview and Explanations

- The components used are : CT Sensor, Arduino UNO WiFi, SMPS Down Converter, Extension board, Audio Jack, PCB, Jumper Wires.
- The Current Transformer(CT) Sensor outputs a certain voltage based on the current in the wire around which it has been clamped.
- This voltage is input to the microcontroller, which samples at a certain rate, digitizes the values and pushes the data collected to Thingspeak cloud, using IEEE 802.11ah WiFi over MQTT protocol.
- The data collected is processed as per the thresholds for on and off stage, and the state of the website, along with the current consumption graphs are displayed in real time on our website.

Device Block Diagram

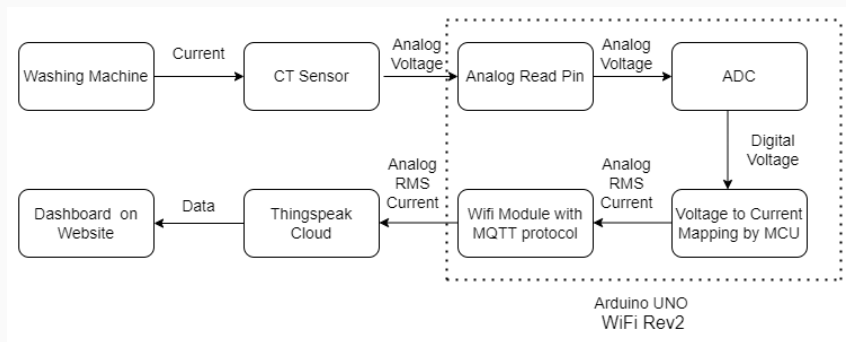


Figure 1: Block Diagram

3-D Model

- A 3-D Model was made for the device in Tinkercad. The Model helps in making the device look compact.
- The Model has been made such that the only thing required to get the device to work is to plug any device(for eg Washing Machine) and turn on the switch.
- The Current consumed by the device will be sent to the cloud(Thingspeak). These are then displayed on a webpage along with on-off status of the device.

3-D Model

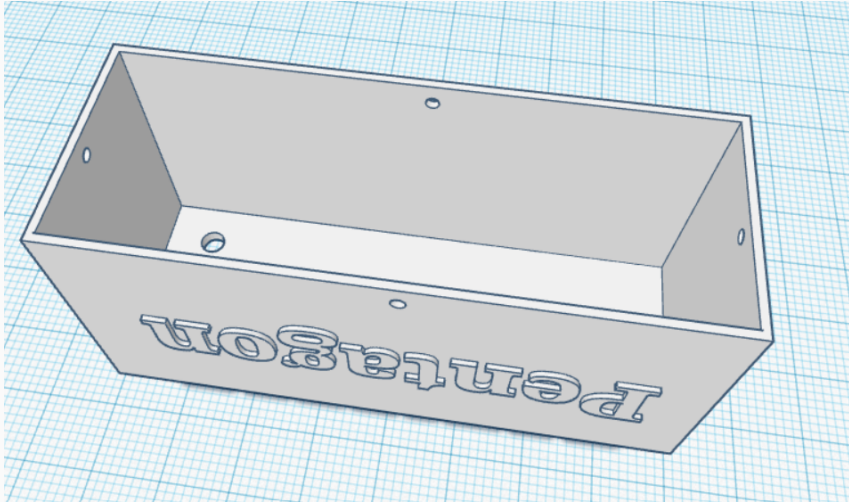


Figure 2: 3D Model

- Using the 3D printed model, a deployable device has been made. In order to power the Arduino, SMPS Step Down Converter is used. It converts 220V AC power supply to 5V DC.
- Circuit has been shifted from Breadboard to PCB and soldering has been done.
- Finally, the switch board has been screwed to the box to make the device compact.

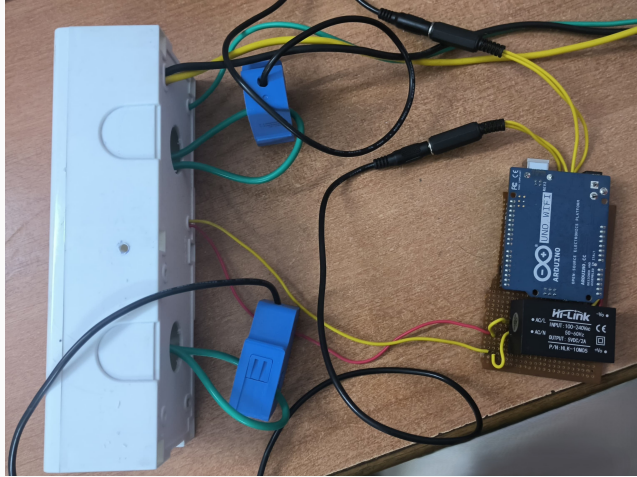


Figure 3: Device Circuit



Figure 4: Internal Arrangement

Deployable Device



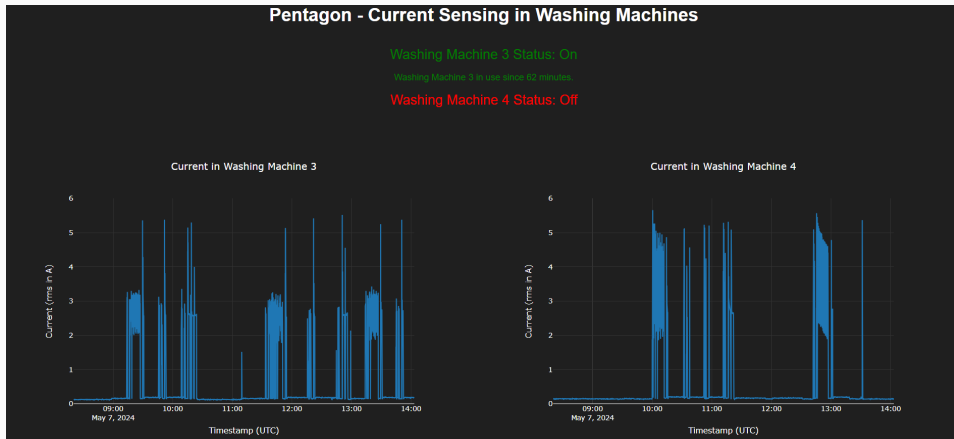


Figure 6: Website

Deployment Details

- Deployed on : 17 April,2024 .
- Deployed at : Washing Machines - 3 and 4 in Bakul Nivas Hostel.
- The user count of the website done using Plausible analytics.
- Constant monitoring of the device was ensured, along with inputs from users of the website.

Deployment Site



Plausible Analytics

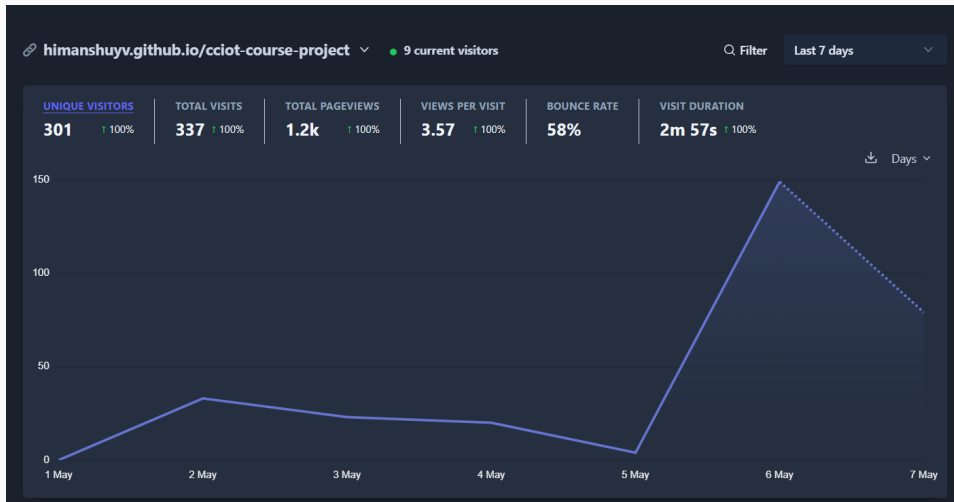


Figure 8: Users

Channel Usage

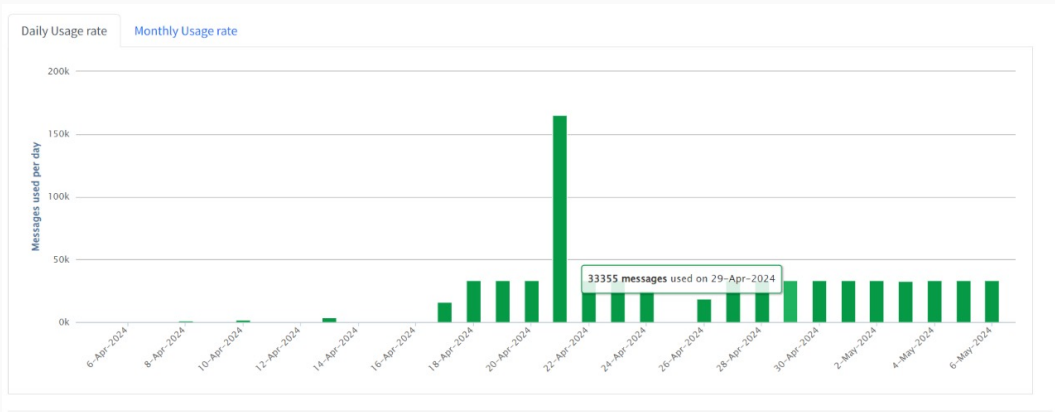


Figure 9: Channel Usage