1. Aravali app

a. Files

i. Control
ii. ControlRoom
iii. CustomExpandableListAdapter
iv. DataForFAQ
v. ExpandableListDataPump
vi. FAQ
vii. Feedback
viii. FeedbackFragment
ix. GridAdapter
x. History
xi. Login
xii. MainActivity
xiii. MainFragment
xiv. Profile
xv. Settings
xvi. Util

b. Dependencies

This app depends on the mongodb at 10.129.23.41.

Glide: The app loads images(graphs) using the glide library. Glide is a fast and efficient open source media management and image loading framework for Android that wraps media decoding, memory and disk caching, and resource pooling into a simple and easy to use interface. The github page has instructions for using this library.

This app was made to show the aravali users their consumption details. It takes data from the smart meters installed in Aravali building.

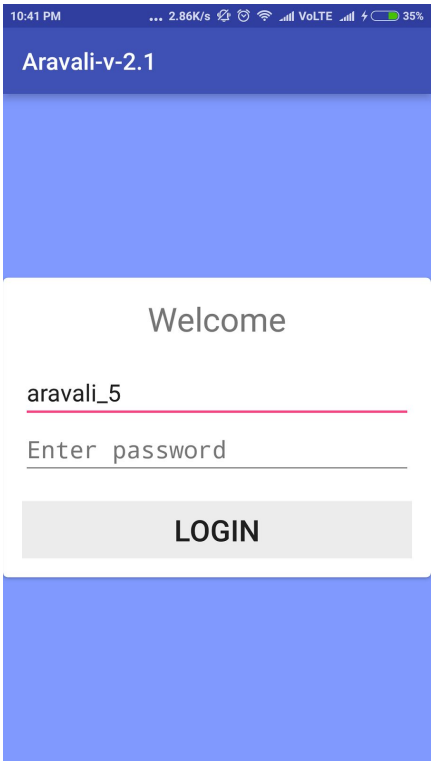


Fig 1. Login Page

The login page takes the meter number and saves it. This meter number should exactly match the number in mongodb. For testing purpose, there is no password, you can login by just entering the username.

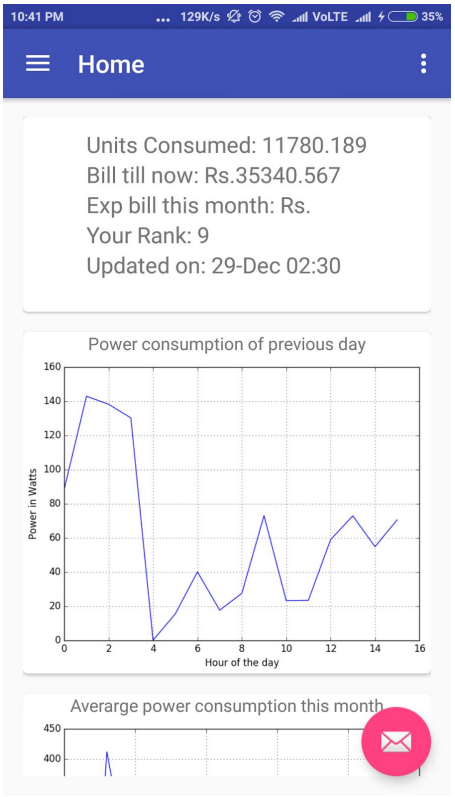


Fig 2. Home Page

The home page displays the information about the consumption of the user. These details include the power consumption graph for previous day, average power consumption this month, expected bill etc. To get this data, the app sends request to the server(django , beast) and the server runs the queries and returns the results.

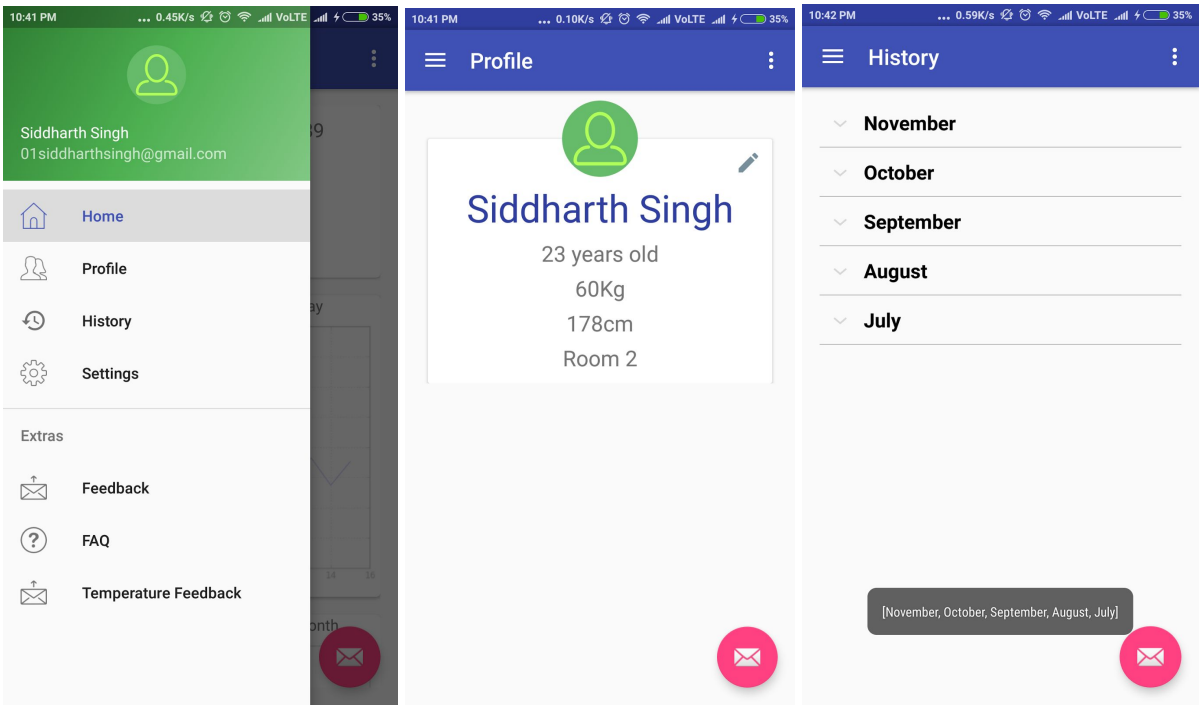


Fig 3. App screenshots(navigation drawer, profile page and history page)

These are static pages a

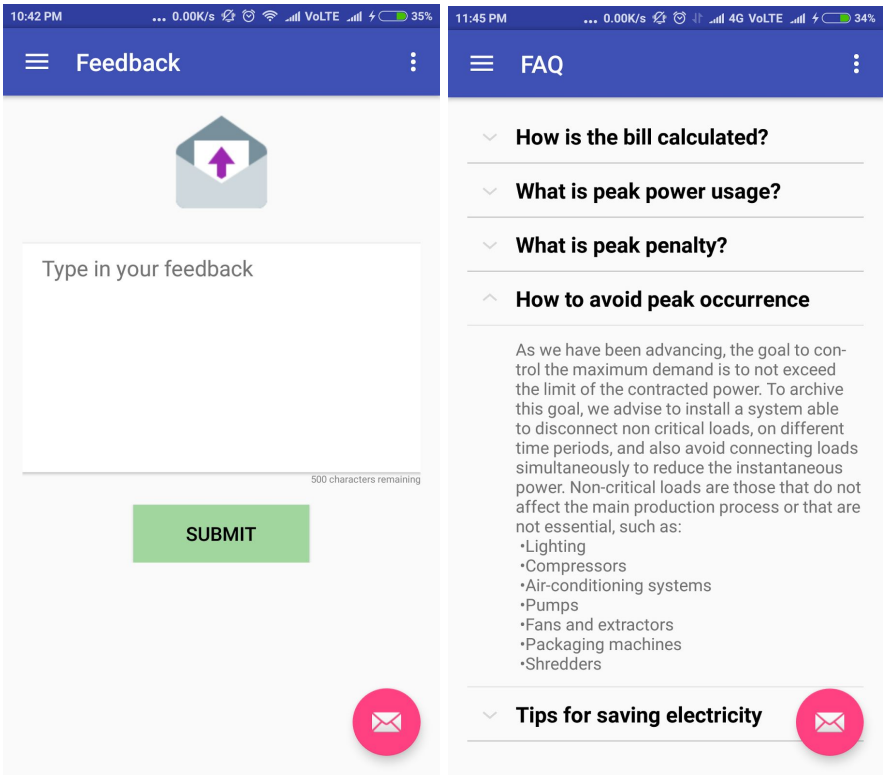


Fig 4. App screenshots(Feedback and FAQ page)

2. A Study on Electricity Consumption in a typical urban residential building in India:

This is a report on the study that we have conducted at Aravali. Understanding the energy usage of buildings is crucial for policy making, energy planning, and achieving sustainable development. Here, we analyze the energy data from smart meters installed in a residential building inside the campus. In doing so, we demonstrate the impact of weather on energy usage, the correlation between different age groups of people and their energy usage. Also, we have presented the results of a survey that we have conducted at the building mentioned above to check the knowledge of people on their electricity usage and a possible way of improving their awareness through an Android application.
The Ipython notebook to create the graphs in this is present at http://10.129.23.101:8888/tree/Siddharth. The graphs are created by me and the writing part is done by me and priyanka. The report is in the same folder as this readme file.

3.Survey:

This folder contains all the data related to the survey done at Aravali. The survey was done to collect the demographic details as well as to measure the residents' energy consumption awareness . During the survey, we went to each apartment and asked them to fill a small form(fig 5). Out of the sixty apartments(approx) in Aravali, we have covered 45 apartments. The result of the survey is present in the file 'survey_data.json'. In the survey questionnaire, we have classified the consumers based on their energy consumption. The code to create the cluster is available at http://10.129.23.101:8888/tree/Siddharth in the file clustering.ipynb. The details of the clusters are present in the file 'clusterDetails.csv'.

Questionnaire

Flat ID:

Q1. Number of people in your flat in the following age groups?

0 to 20	20 to 40	40 to 60	Above 60
0	0	0	0

Q2. What is your average monthly electricity bill (in rupees)?

- ○ Less than 500
- ◉ 500 - 1000
- ○ 1001 - 1500
- ○ 1501 - 2000
- ○ Above 2000

Q3. At what time of the day do you think you consume the energy highest?

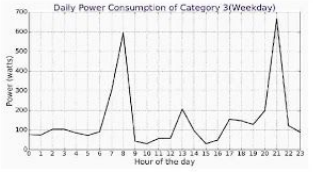
- ○ 6 am to 9 am
- ○ 9 am to 12 pm
- ○ 12 pm to 6 pm
- ○ 6 pm to 10 pm
- ◉ 10 pm to 6 am

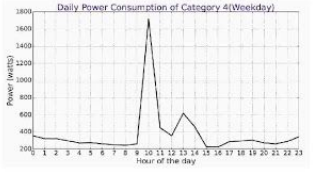
Q4. Which of the following appliances do you use?

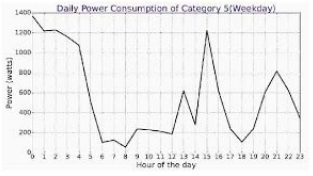
	AC	Fridge	fan	light	Microwave	Geyser	Washing Machine
I Use:	☐	☐	☐	☐	☐	☐	☐
I want to automate:	☐	☐	☐	☐	☐	☐	☐

Q4. Which profile do you think your usage lies in?

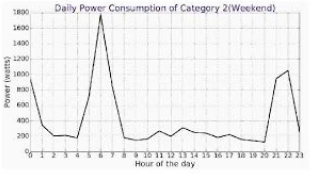
Weekdays:







Weekends:



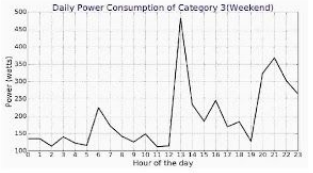


Fig 5. Survey form

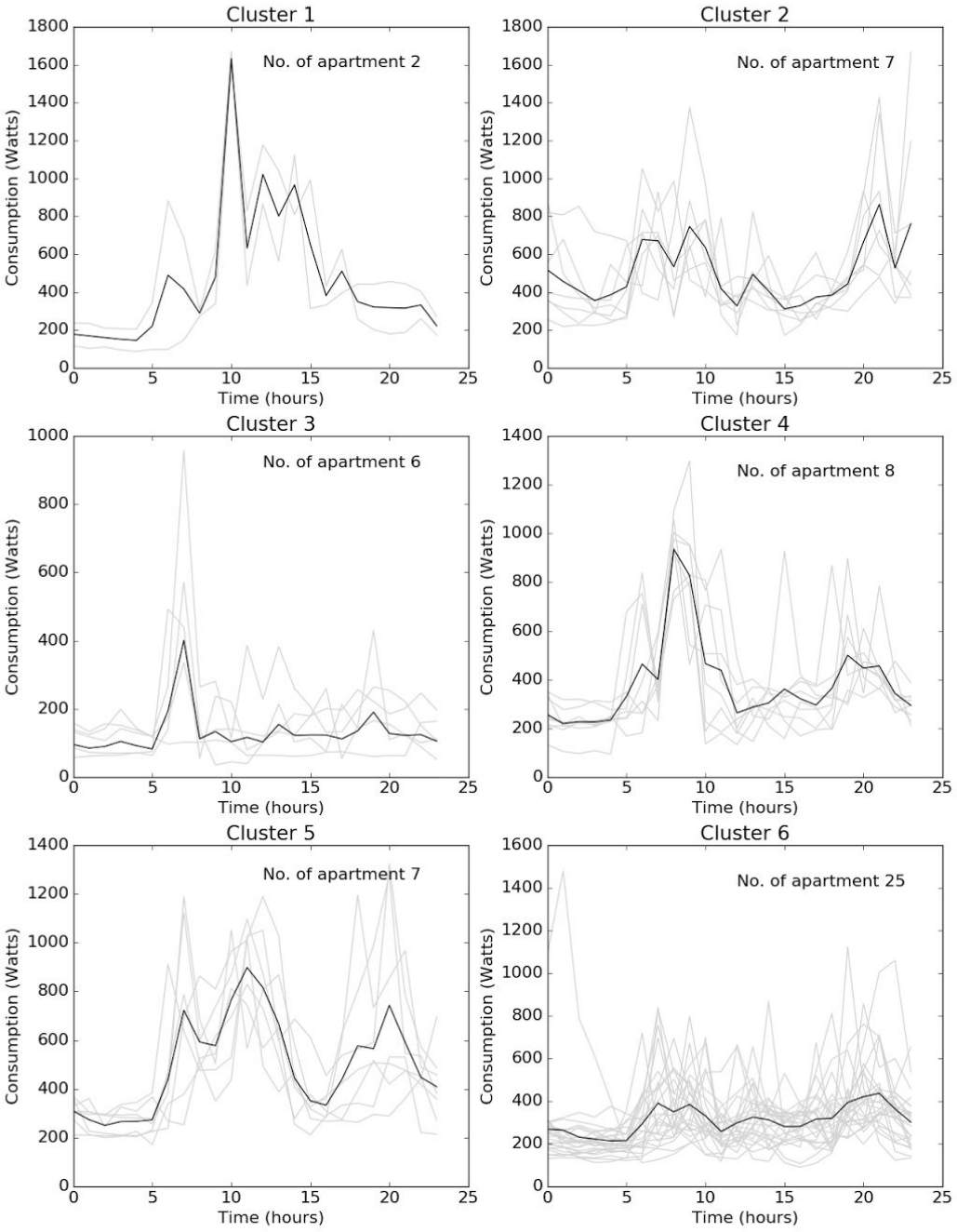


Fig 6. Weekday energy consumption profile

4.Python/shell scripts:

4.1.calculaterank.py: This script uses the data from the aravali smart meters to rank the appartments based on their consumption. Lesser rank indicates lesser consumption. TODO: Gitlab link in each

4.2.checkifprogramsarerunning.sh: This script continuously monitors if django and mongodb are running and restarts them when they get stopped.

4.3.MeterStatus.py: This script records the status of the meter. When the meter logged data last.

4.4.plotallmeterreadings.py: This script plots the of all the apartments.

4.5.plotallpowerreadings.py: This script plots the power readings of all the apartments.

4.6.plotpermontheveragepower.py: This script plots average power per month.

4.7.store.py: This script downsamples the smart meter data from the new Aravali database(10.129.23.41:27017)and stores only the required columns to the local database .

4.8.storeold.py: This script downsamples the data from the old Aravali database(10.129.23.41:27018) and stores only the required columns to the local database.
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5.Data

5.1. CSV Files:

Purpose of files(5.1.1 to 5.1.4): To study the relationship between energy consumption and various parameters such as temperature and humidity.

5.1.1.temperature-humidity-data(folder): This folder contains the temperature and humidity data of Mumbai during different months in CSV format. This data is used in the plotting of temperature-humidity-consumption graph. The Ipython notebook files for creating these graphs are present at http://10.129.23.101:8888/tree/Siddharth.

5.1.2. temperature-humidity data detailed(folder): This folder contains detailed data about temperature and humidity of Mumbai.

5.1.3. temperature-humidity-consumption-details of aravali(folder): This folder contains csv files of variation of consumption with temperature and humidity. This data is used in the plotting of temperature-humidity-consumption graph. The Ipython notebook files for creating these graphs are present at http://10.129.23.101:8888/tree/Siddharth.

5.1.4.temp-humidity-consumption-correlation-matrix(folder): This folder contains the data of correlation matrix between temperature, humidity and consumption.

5.1.5. clusterDetails.csv: This file has the details of clustering(which apartment belongs to which cluster). The code to find cluster is present at http://10.129.23.101:8888/tree/Siddharth in the file named ‘clustering.ipynb’.

5.1.6. DownSampleddata(folder): this folder contains the downsampled data with 1 hour and 5 minutes granularity. The Ipython notebook for downsampling is available at http://10.129.23.101:8888/tree/Siddharth. There are two files to downsample data, one

simply downsamples all the data and the other one downsamples the data between a given time period.