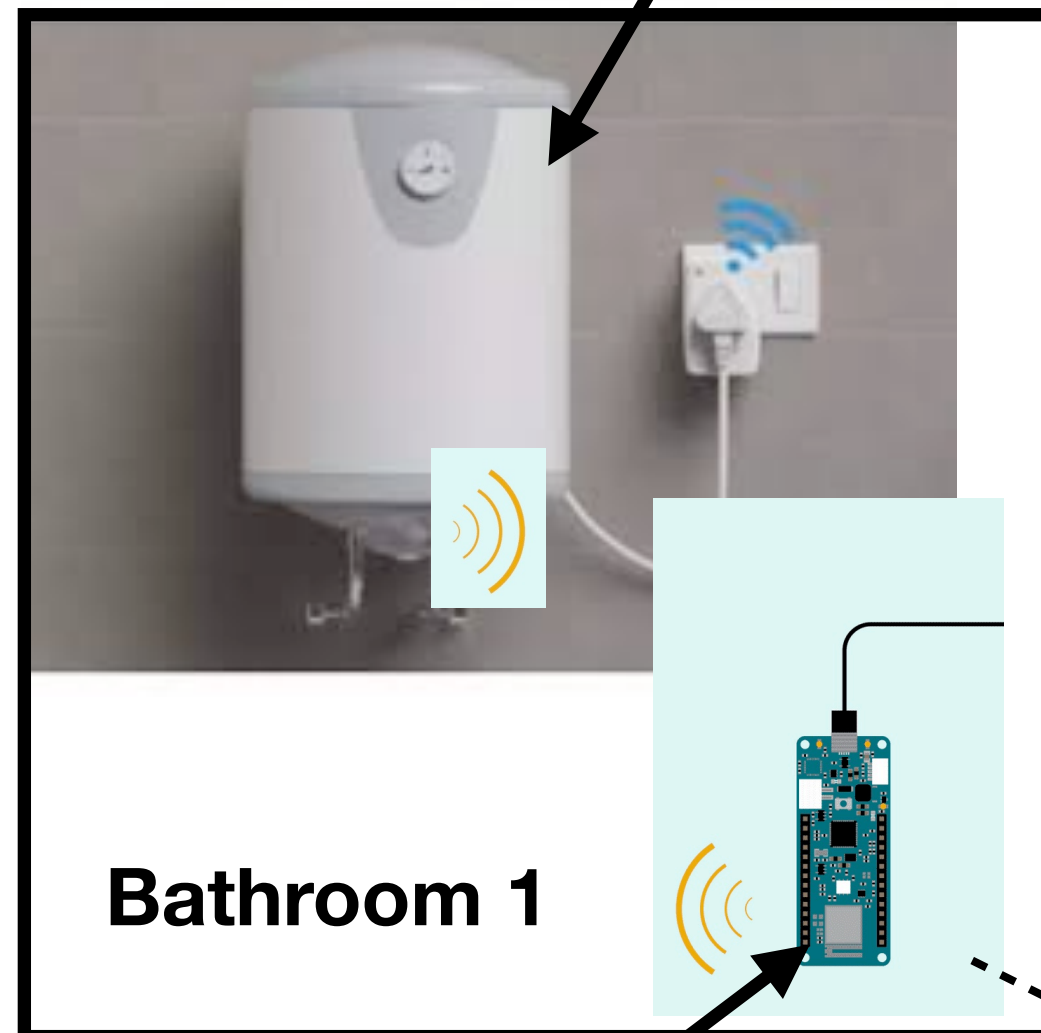


Smart water heater pilot project

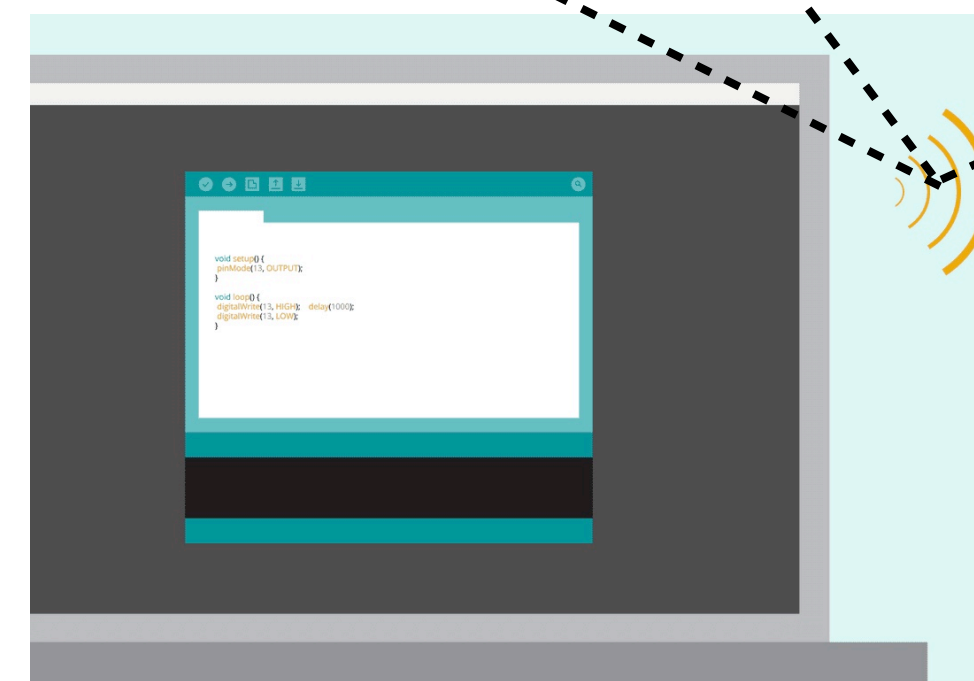
Prabir Barooah, Ph.D.
Professor, Electronics and Electrical Engineering
Indian Institute of Technology, Guwahati

The system: how it will look

Commercially available
wifi enabled water heater



IoT* platform (IIT Guwahati developed)
with algorithm to control a water heater



Central computer (in academic complex)

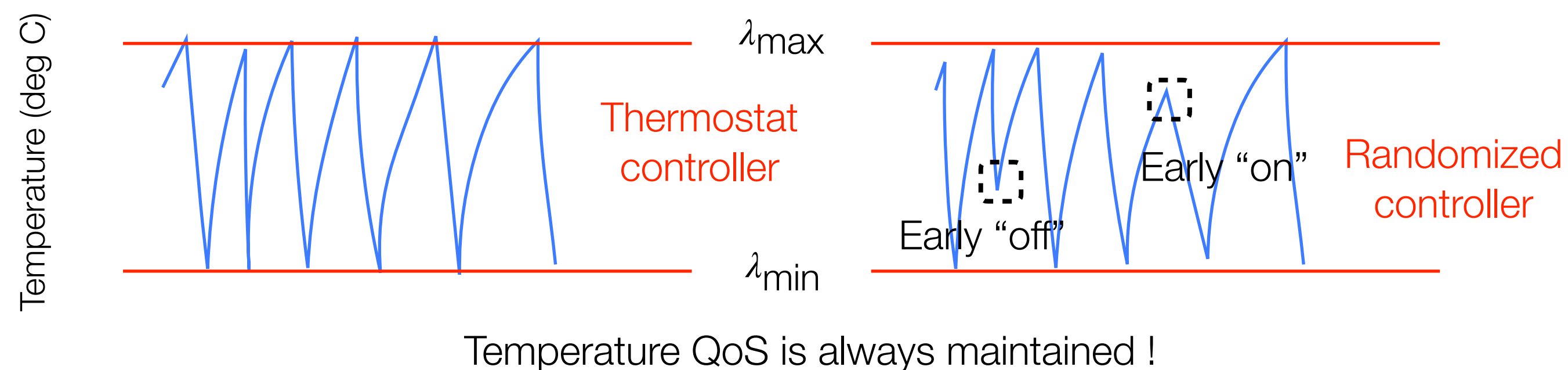
1. Real-time data collection
2. Over The Air software update

*IoT: Internet of Things

The system: algorithms

By intelligent control on/off status of a number of water heaters, it will provide

1. Energy efficiency (reduce wastage by turning off if on for too long, no one is there)
2. Reduce peak demand by randomizing starts**
3. Shape demand (kW vs time) to match variable solar generation**



**

[A unified framework for coordination of thermostatically controlled loads](#)

A Coffman, A Bušić, P Barooah, arXiv preprint arXiv:2108.05840, 2021

[Aggregate capacity of TCLs with cycling constraints](#)

A Coffman, N Cammardella, P Barooah, S Meyn, arXiv preprint arXiv:1909.11497

[Characterizing capacity of flexible loads for providing grid support](#)

AR Coffman, Z Guo, P Barooah, IEEE Transactions on Power Systems 36 (3), 2428-2437, 2020

[A study of virtual energy storage from thermostatically controlled loads under time-varying weather conditions](#)

A Coffman, A Bušić, P Barooah, International High Performance Buildings Conference, 2018

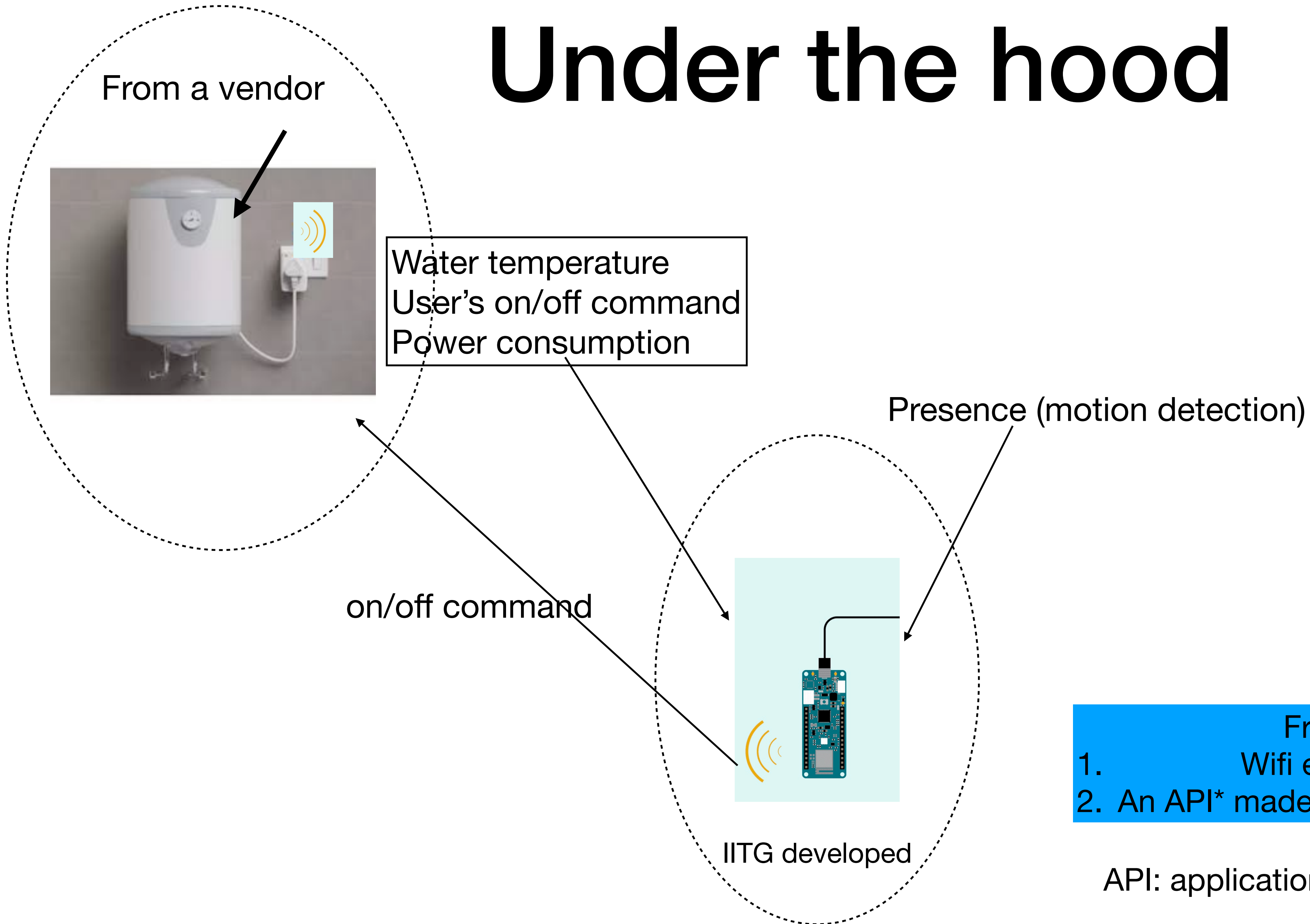
[An energy storage cost comparison: Li-ion batteries vs distributed load control](#)

NJ Cammardella, RW Moyer, Y Chen, SP Meyn, 2018 Clemson University Power Systems Conference (PSC), 1-6

Goals

1. Help the campus grow (defer distribution network upgrade by reducing peak demand)
2. Help the campus become resilient to loss of power supply from APDCL
4. Demonstrate “smart power grid” technology for solar PV integration
6. Help IITG’s teaching and research mission
8. Generate buzz about IIT Guwahati developed technology

Under the hood

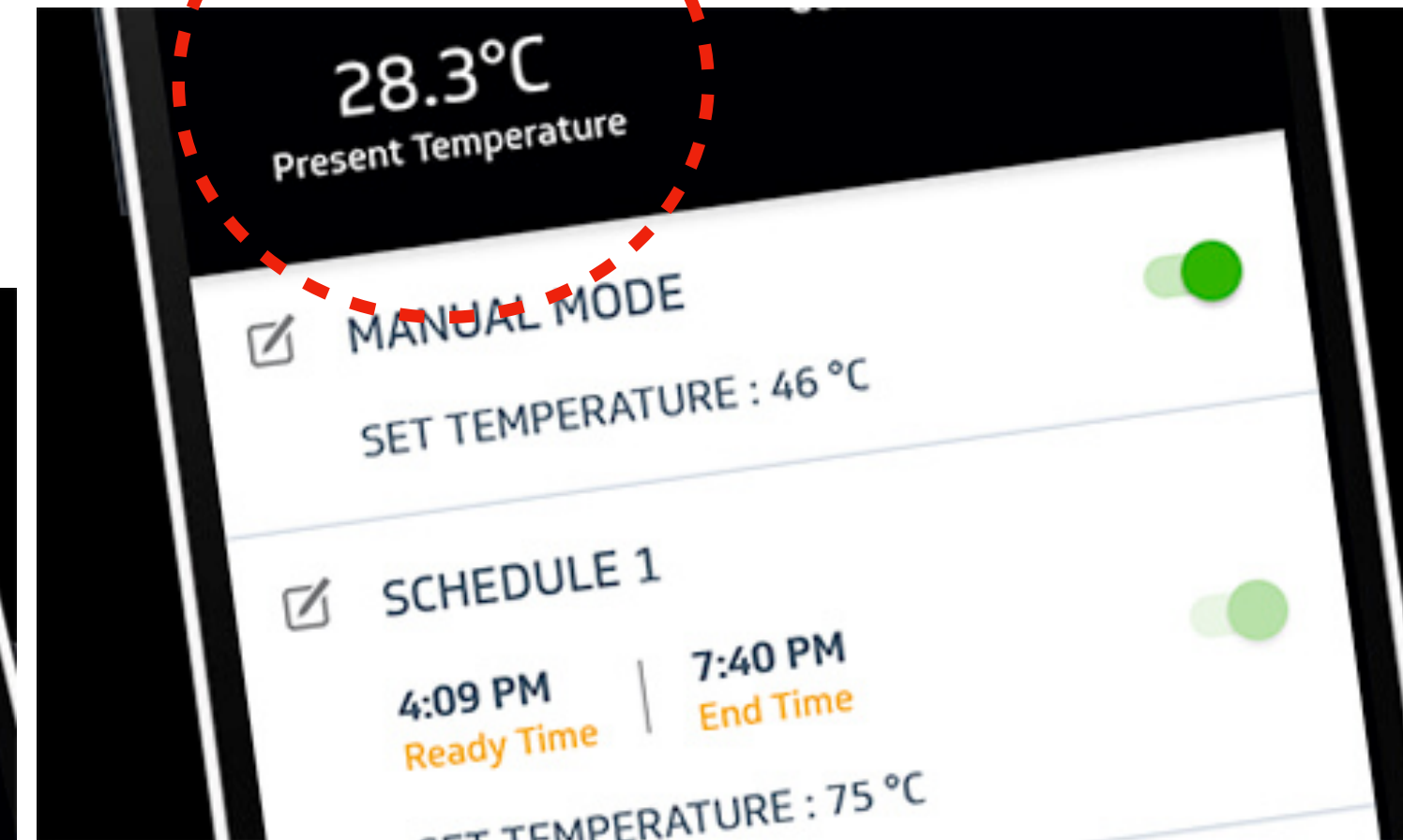
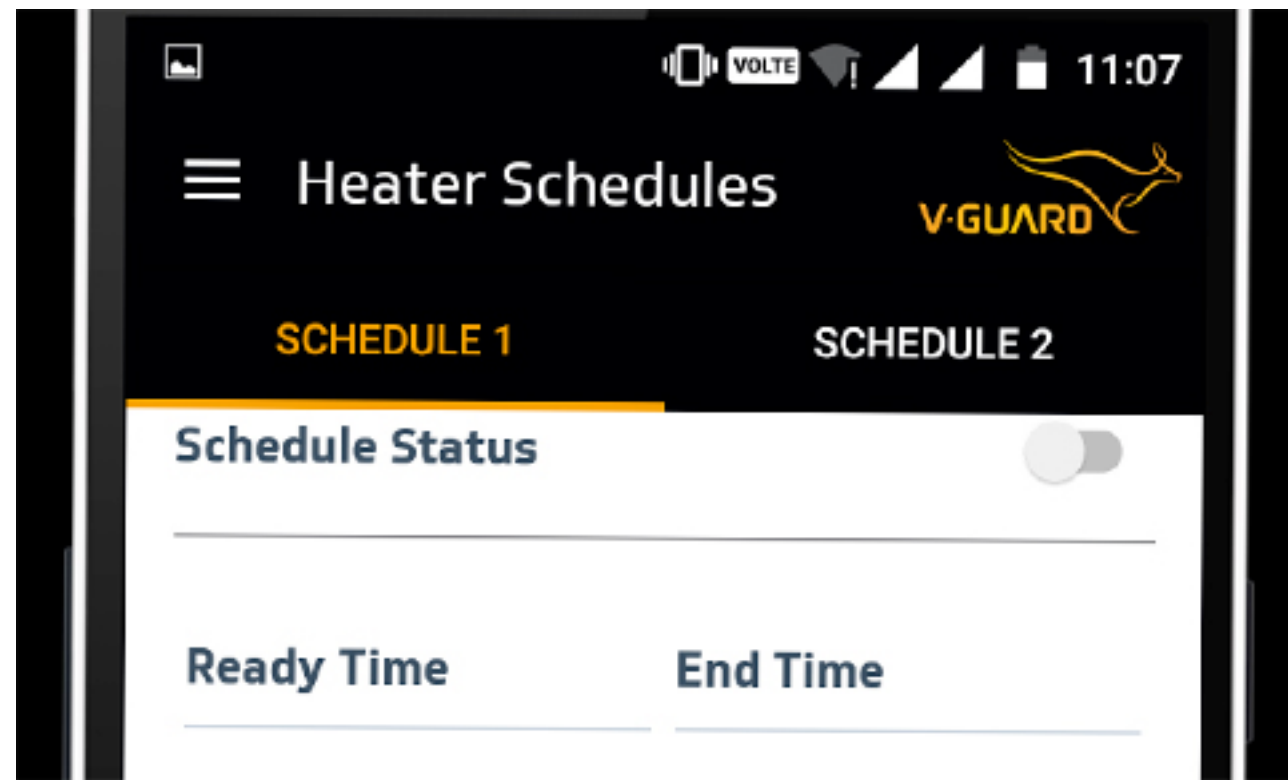


- From the vendor
1. Wifi enabled water heater
 2. An API* made available to IITG researchers

API: application programming interface

The API is necessary for IITG researchers to access the measurements from the water heater and control it.

From V-guard's website about its IoT enabled water heater



An example of such an API: EcoBee smart thermostats
Anyone can download the API software from their website

