

Research works in IIT Hyderabad

2015-02-23,24@UoT-IITH Symposium

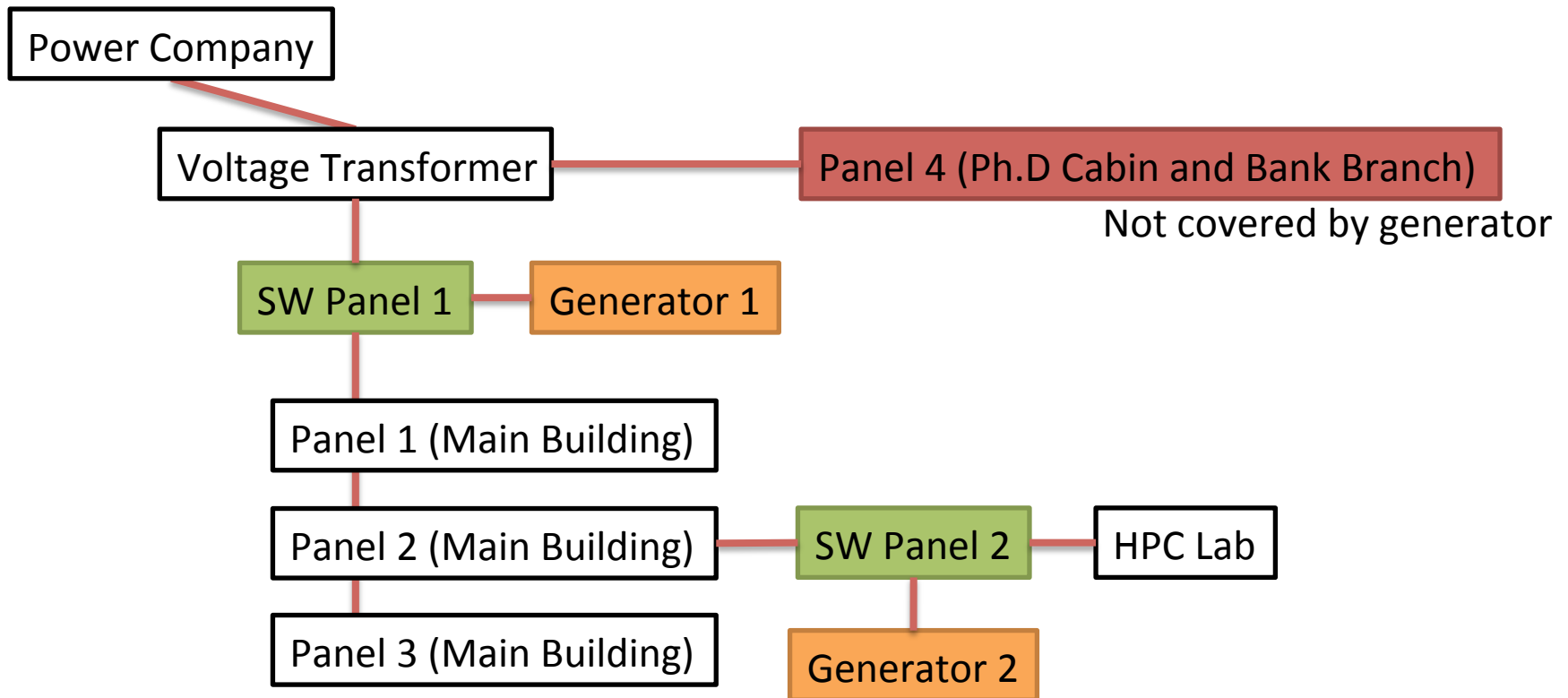
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Overview of the research

- Demand Control with Smart Circuit Breaker, new online component for micro grid, for unstable power supply environment
- Features of SCB (Smart Circuit Breaker)
 - Dynamic Trip Threshold
 - Controllable from Computer Network
 - Current flow metering

Background: What is interesting

- Unstable power supply and local generator operation is interesting for ICT side SmartGrid guy



Background: Events on power outage

1. Power outage of PC
2. Change source*
3. Turn on generator*
4. Resuming
5. Check demand
6. Control breaker (goto 5)
7. Resuming on PC
8. Return source*
9. Short term power outage
10. Resuming

Operated by hand in IIT-H

(*) State-of-the-art generator controls them automatically

Position of proposal

1. Power outage of PC
2. Change source
3. Turn on generator
4. Resuming
5. Check demand
6. Control breaker (goto 5)
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Automatic control with SCB

- Smart Circuit Breaker: Battery backup Online Circuit Breaker
- Changeable trip threshold
- SCB based system changes that these controls are from human knowledge to optimization problem.

Proposed system

- Changes power grid based on SCB and controls current flow in building automatically

Conventional Ways

- Deploying much size generator
- Automatic controlling breaker

	#electrical panels	Target circuit selection	Control Method	Environment
Home Energy Management System (HEMS)	1 or 2	Dynamic	ON/OFF	House
Building power grid system with control wire for circuit breaker	Around 1000	Static	ON/OFF	Commercial Building
Proposal	Around 1000	Dynamic	Control Threshold of Trip state	Commercial Building

Technical Requirements

- Time limitation to resuming power providing: All configuration must be done in some tens seconds
- Awareness of Human Activity: Must have interface to communicate users in building or forecasting system
- No guarantee of network connectivity: SCB must work on standalone, even if it isolated with another SCBs

Milestones

- 1: Launch up the project
 - 1.1: Confirm Feasibility
 - 1.2: Architecture Design
 - 1.3: Developing components
 - 1.4: Experiment
- 2: Publishing Paper
- 3: Experiment w/ Real Building

Progress

- Done
 - Check feasibility roughly by current metering system
 - Prototyping of SCB
 - Draft version of SCB-based power system Architecture
- Ongoing
 - **Check feasibility correctly**
 - **Discussion about Fixing research problem w/ Prasad**
 - (*) these things must be done till 20th March**
- Not bad... just not bad

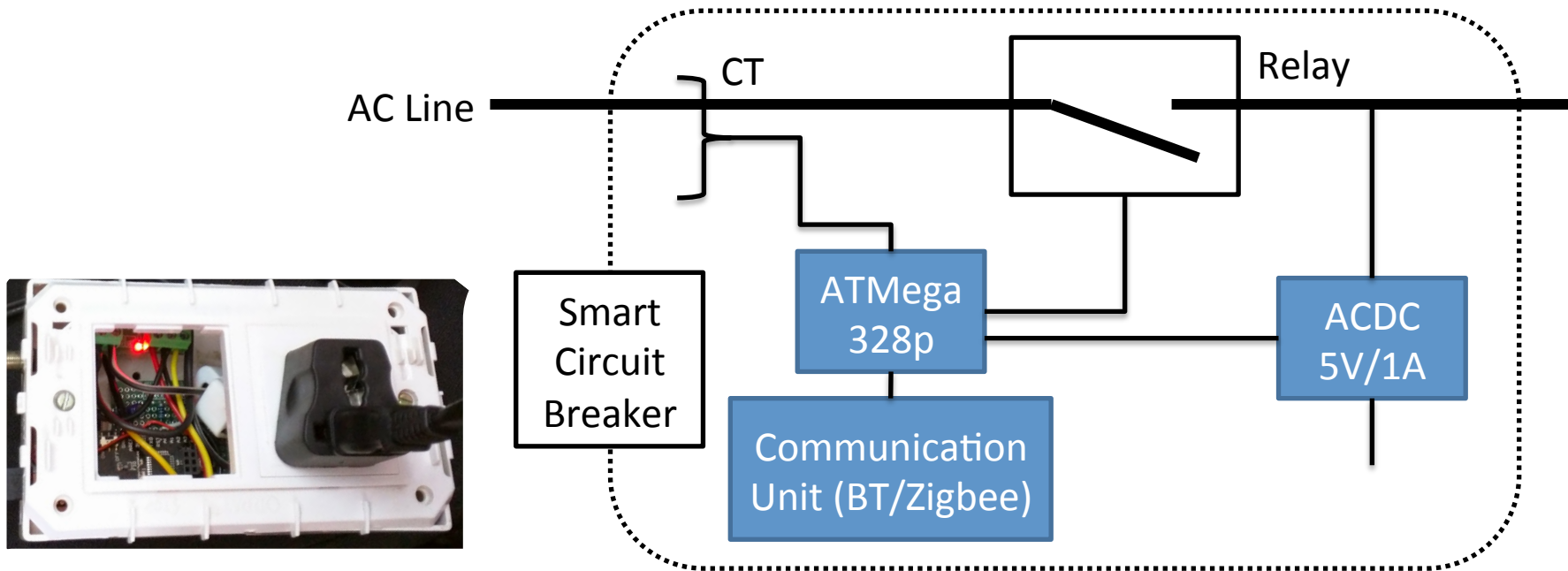
Feasibility Checking: Investigation of IITH Yeddumailaram campus

- Deployed meters to know current flow
- 3 current transfers for 3-phases
- Stored at IITH's server over IEEE1888
- Neutral Line is not measured => Need to fix



Prototyping SCB

- Hardware Part: done (proof of work impl.)
- Software Part: waiting for system design



Collaboration with IITH

- Feedbacks from faculties
- Facilities/Environment support
- From students
 - Prasad (Doctor student under Pr. Raji)
 - Many Idea
 - Mathematical part (model and optimization)
 - Many guys in smart-x-student mailing List

Summary

- Smart Circuit Breaker will give us new way to control power consumption in building
- Finish 1st milestones in this trip
- I can contribute Smart Campus Project