Bandwidth Locators for User Evaluation

Shruti Das

Da Huo

Pranathy Veldandi

Perry Wu

Hairong Wang

Weizhong Kong

Parul Puri

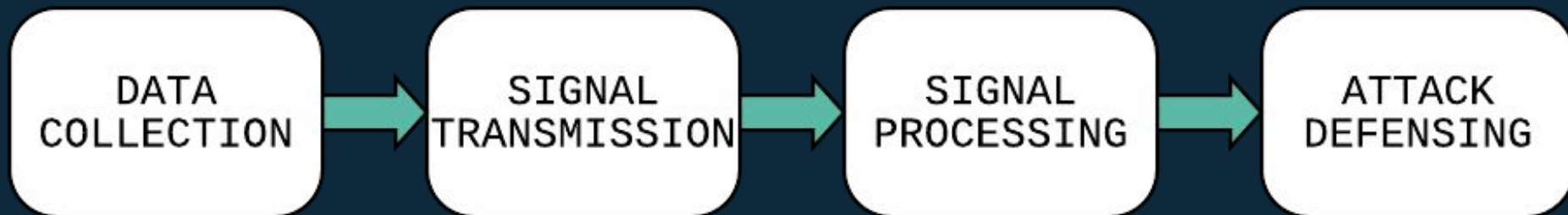Daniel Like

Joshua Guo

WINLAB

OBJECTIVE

To predict behaviors of future events
&
improve success rate under each attack

| DATA COLLECTION | → | SIGNAL TRANSMISSION | → | SIGNAL PROCESSING | → | ATTACK DEFENSING |

WEEKLY SUMMARY

1. caught up 2 new HS interns

2. SSH Tunneling successful!

3. installing openHAB on node

4. Z-Wave configured on openHAB

openHAB
empowering the smart home

← → C ⟳ ① localhost:9001/paperui/index.html#/control ☆ ⊡ ⋮

openHAB
empowering the smart home

Control ⟳

OTHER

■ Control
⊕ Inbox
⚙ Configuration
✱ Add-ons
◆ Preferences

Z-Wave Node 5: ZW096 Smart Switch 6

○ Switch	⚪○
⌁ Electric meter (kWh)	118.9
⌁ Electric meter (amps)	–
⌁ Electric meter (volts)	–
⌁ Electric meter (watts)	–
○ Reset Meter	⚪○
💡 Color	🎨
Brightness	○──
Saturation	○──

Z-Wave Node 6: ZW096 Smart Switch 6

○ Switch	⚪○
⌁ Electric meter (kWh)	86.3
⌁ Electric meter (amps)	0.1
⌁ Electric meter (volts)	116.8
⌁ Electric meter (watts)	2.0
○ Reset Meter	⚪○
💡 Color	🎨
Brightness	○──
Saturation	○──

Z-Wave Node 8: DSC11 Smart Strip

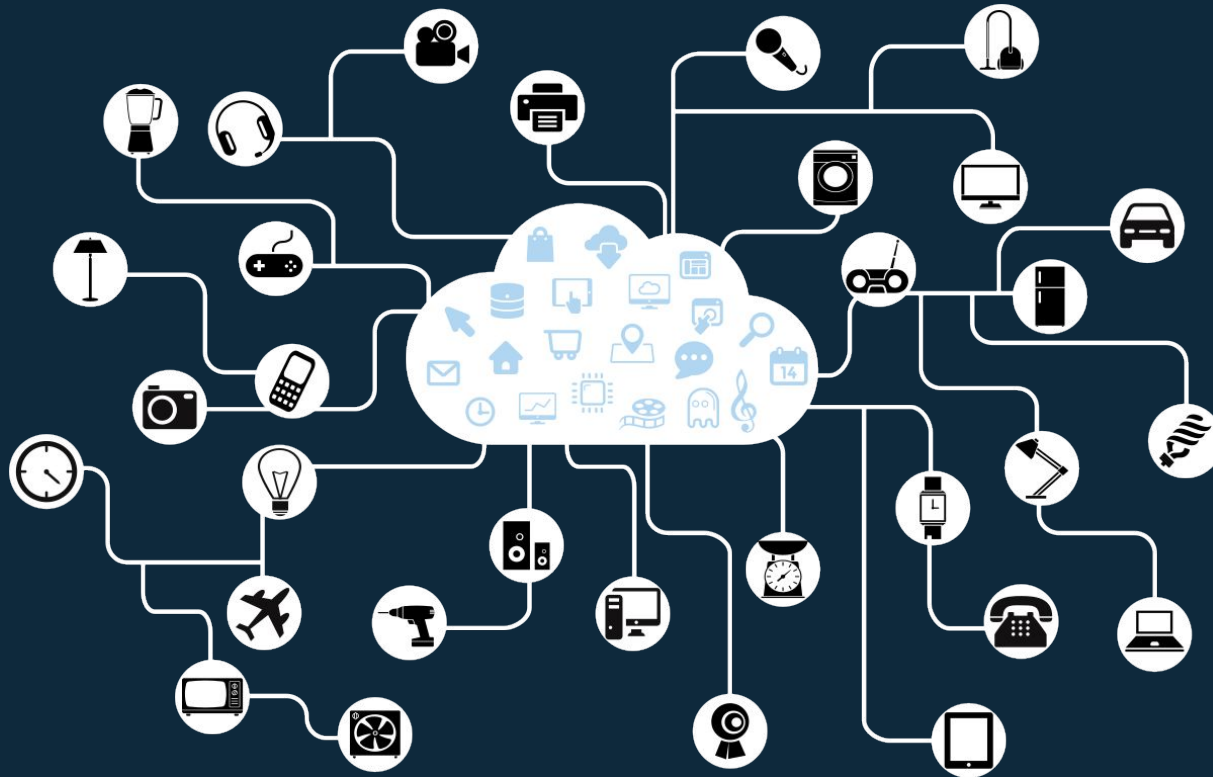| ○ Switch | ○⚫ |
⌁ Electric meter (kWh) entire strip	–
⌁ Electric meter (watts) entire strip	10.2
○ Switch 1	⚪○
⌁ Electric meter (kWh) 1	–
⌁ Electric meter (watts) 1	0.0
○ Switch 2	○⚫
⌁ Electric meter (kWh) 2	–
⌁ Electric meter (watts) 2	0.0

Paper UI

Murphy's Law

"Anything that can go wrong, will go wrong"
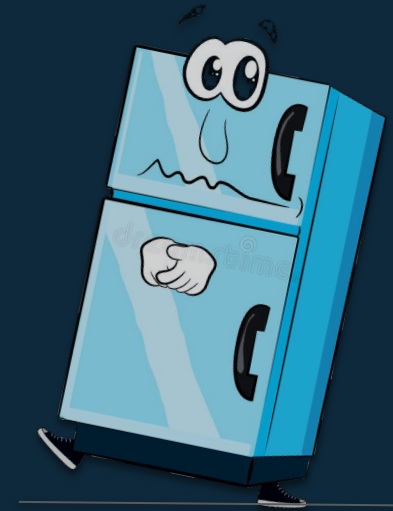
IoT Edition

IoT – Internet of Things

a system of interrelated devices that are provided with unique identifiers (UIDs) and the ability to transfer data over a network

DANGERS OF IoT

! CARELESSNESS

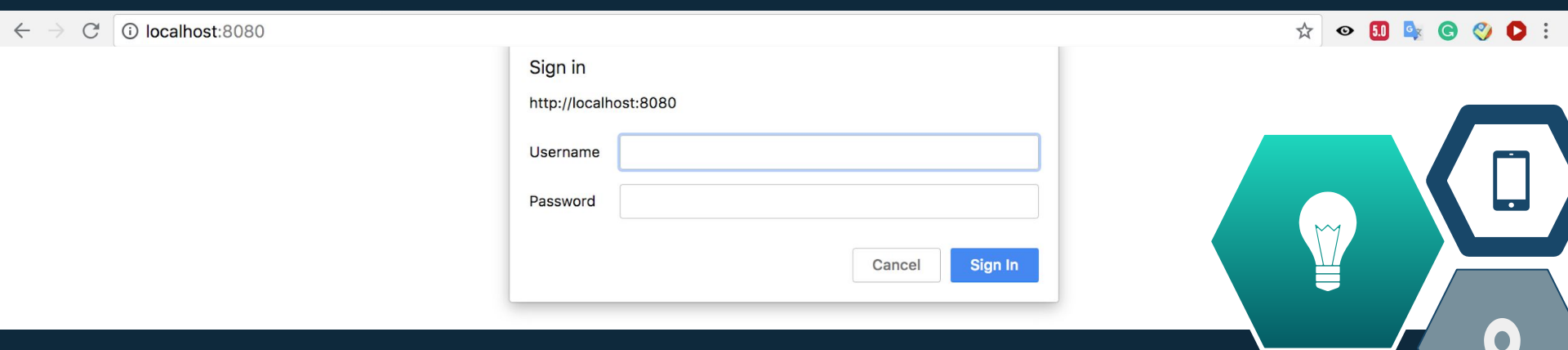→ not being mindful of UIDs leads to big blunders & unintentional side effects

! COMPROMISED SECURITY

→ system can be easily breached by anyone who wants to harm the system - RED TEAM
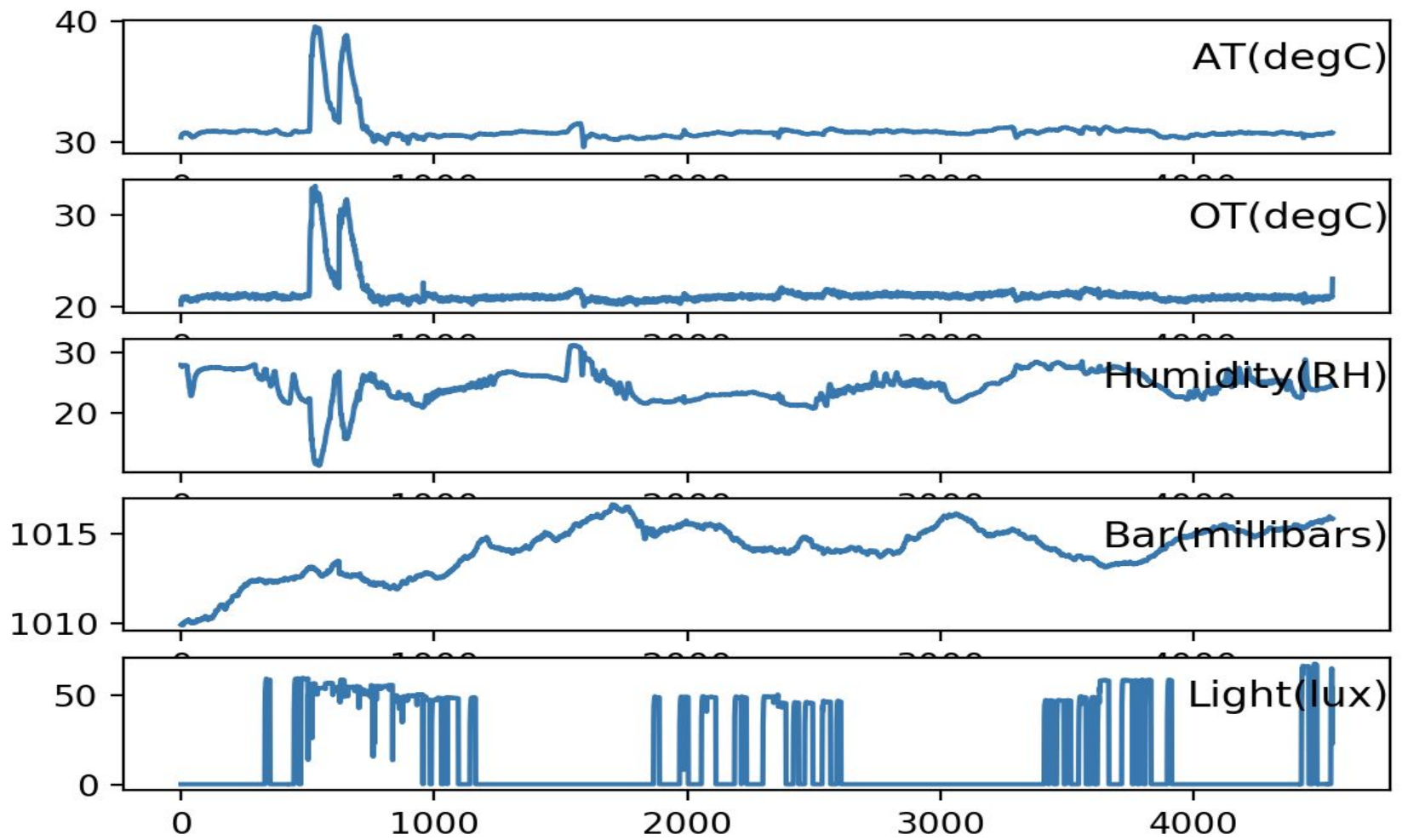
SECURITY MEASURES

○ retrieving ZWAVE mapping corresponding with the UIDs of all active devices

○ added user login page to openHAB UI

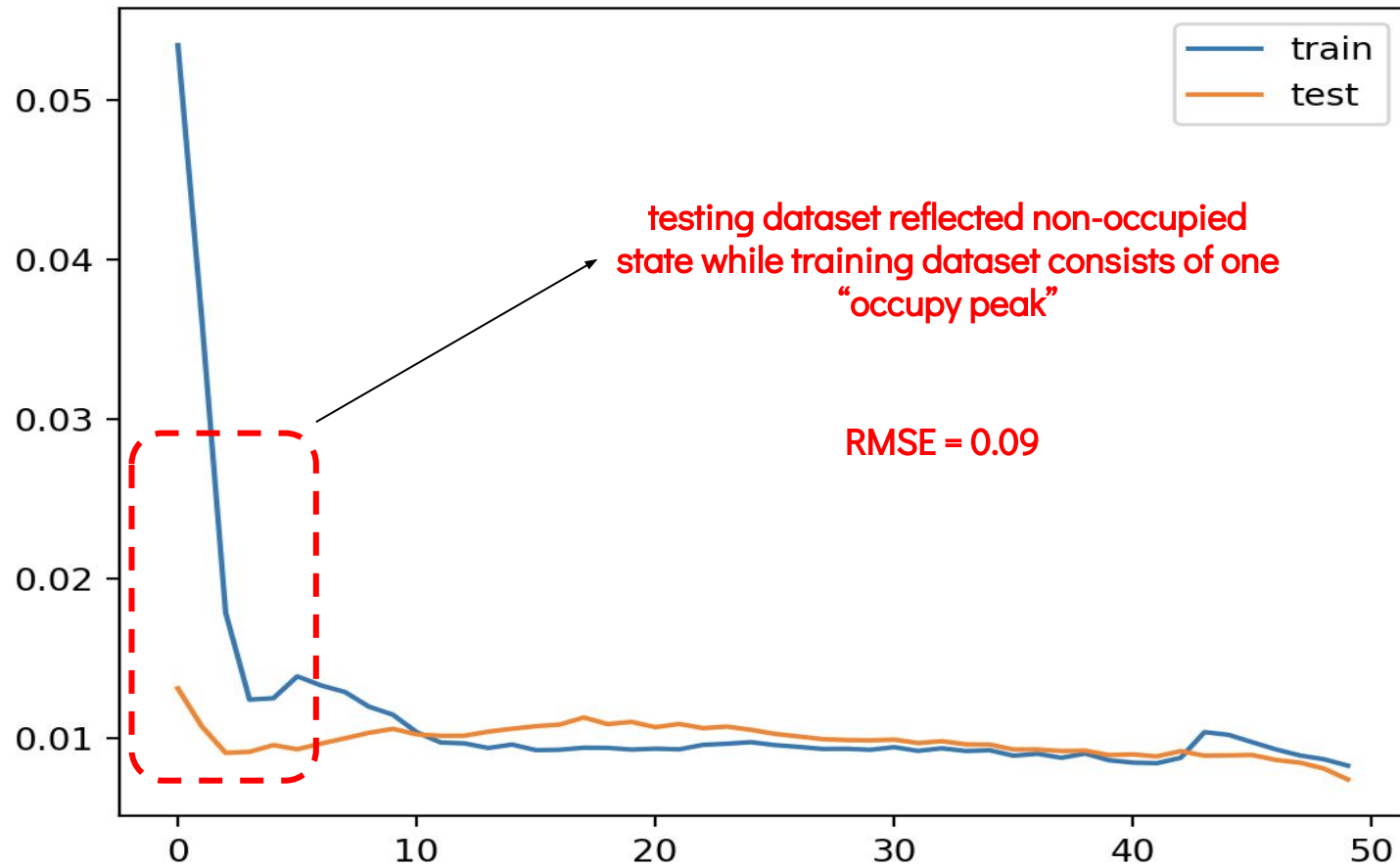○ monitoring daily to check for irregularities

	t	t-1
0	0	NaN
1	1	0.0
2	2	1.0
3	3	2.0
4	4	3.0
5	5	4.0
6	6	5.0
7	7	6.0
8	8	7.0
9	9	8.0

Long Short–Term Memory Algorithm

1. DATA PRE-PROCESSING
   a. unified format
   b. cut off "invalid" period
   c. normalize features
   d. shift ( ) column downwards as "label"
   e. only temperature for now

2. LSTM ALGORITHM
   a. training set : testing set - 2:1
   b. hidden layer - 50 neural units
   c. Adam(Adaptive Moment Estimation) optimizer
      i. convergence faster, better performance

LSTM IMPLEMENTATION

testing dataset reflected non-occupied state while training dataset consists of one "occupy peak"

RMSE = 0.09

FUTURE WORK

1. study anomaly detection algorithms and apply on our model to detect attacks

   a. Jorge Ortiz - IBM, UC Berkeley

2. data persistence in openHAB over prolonged periods of time

3. work on bluetooth bindings on openHAB

4. overcoming potential pitfalls

QUESTIONS?