CPSL
Cyber-Physical Systems Laboratory

Crete House Sensor Network Semester Report

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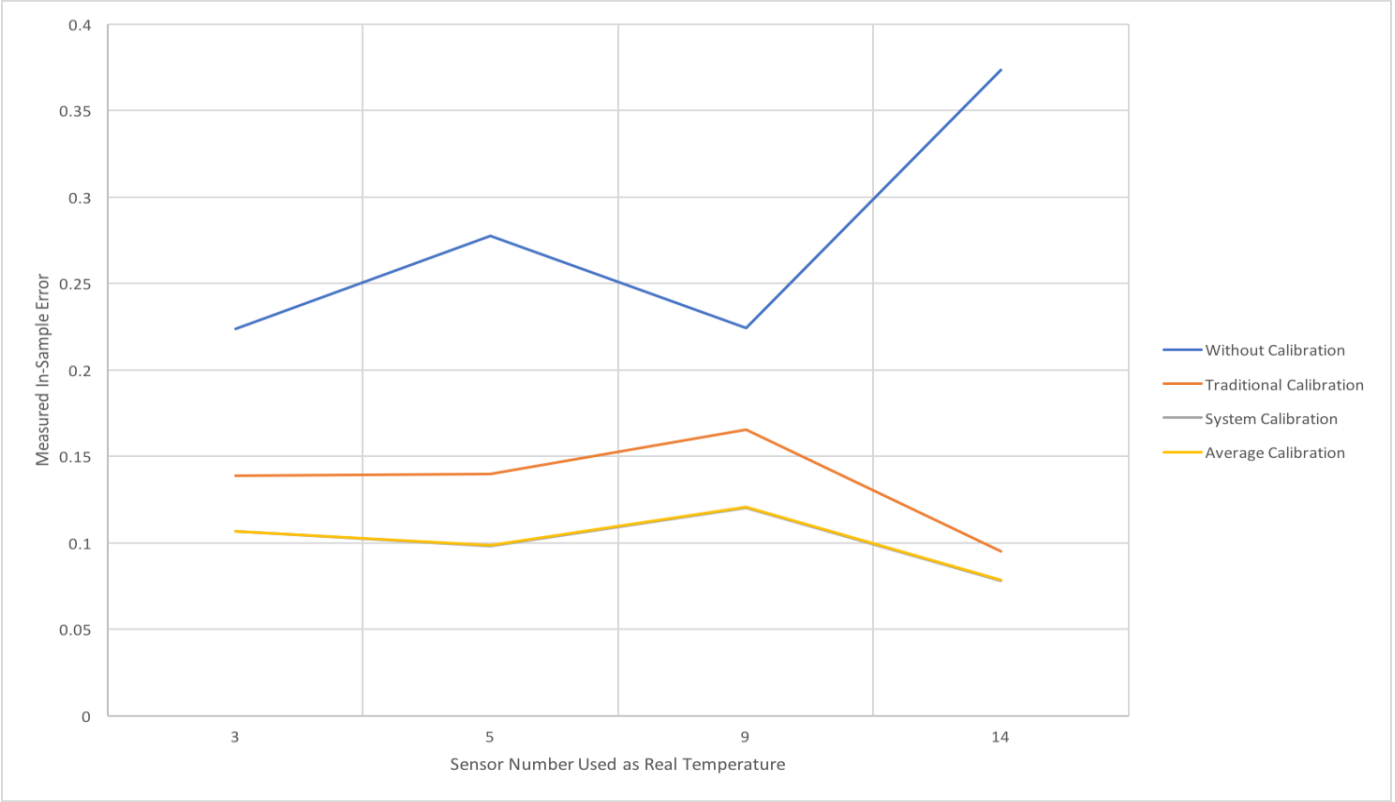
Overview of This Semester

CPSL
Cyber-Physical Systems Laboratory

- Stability
  - CTP
- Accuracy
  - Calibration
- Data Processing
  - Back-end
  - User Interface

Calibration



Before the RTD sensor arrives, it is all about assumption. But to make our assumption more plausible, we did pick every sensor as the real temperature. The results are shown as above.

Calibration

- Researched on Calibration.
- We got our measurements under eight different temperatures. Ranging from 14.35 Celsius Degree to 39.89 Celsius Degree
- With system calibration,
  - k = 0.0100362234052 ,b = -39.5535074677
  - With error = 0.105240537985
  - There is not much difference comparing to original k =0.01, b = -39.5

TinyOS CTP

- Implementation of CTP Protocol in Telosb
  - Basestation(Root)
    - CTP Settings, Serial Setting, Dissemination Setting
    - Receive CTP packets then forward to PC
    - Forward Dissemination Value to the whole Network
  - Mote(Sensor)
    - CTP Settings, Dissemination Setting
    - Sensing Data then send packets to Root
    - Receive Dissemination Value then change period
  - PC
    - Receive Temp. Data then Send to AWS IoT
    - Send Period information to Root

Back-End

- Architecture
  - Raspberry Pi
    - MQTT
    - Json
  - AWS IoT
    - Shadow
    - Insert Rule
  - DynamoDB
  - Software
    - DynamoDB SDK
    - PyQt

Raspberry Pi

AWS IoT

DynamoDB

Software

User Interface

- Using PyQt5
- Input:
  - Start time, End time. Both in the form of YYYY-MM-DD hh-mm-ss
  - Sensor Id
- Three Features:
  - Compute the average temperature for a particular sensor over the specified time period
  - Get the latest temperature reading for a particular sensor over the specified time period
  - Plot temperature for multiple sensors over the specified time period

Summary

- Completion so far
  - Implementation of CTP
    - Experiments of validating its reliability needs to be done
  - Back-end
    - Documentation needs to be done
  - Calibration
    - Finished