ASHRAE

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DRAFT

TC/TG/MTG/TRG MINUTES COVER SHEET

(Minutes of all Meetings are to be distributed to all persons listed below within 60 days following the meeting.)

TC/TG/MTG/TRG No._____TC7.5_____DATE 06/28/2019_____

TC/TG/MTG/TRG TITLE____Smart Building Systems_____

DATE OF MEETING 06/25/2019_____LOCATION GWCC 4TH Floor, Building A, A405

Members Present	Appt	Ex-Officio Members and Additional Attendance
Jin Wen, Chair. (V)	2017	See attached attendance list
David Yuill, Vice Chair (V)	2017	
Zheng O'Neill, Secretary (V)	2017	
Li Song, Research Subc (V)	2017	
Carol Lomonaco, Subc (V)	2015	
Kristen Cetin, Subc (V)	2017	
Peter R Armstrong (V)	2015	
Eric Young, Subc (CM)	2017	
Mike Brambley (CM)	2002	
Bach D Tsan, Subc (CM)	2017	
Gregory S. Pavlak, Subc (CM)	2017	
Xiaohui Zhou, Subc (CM)	2017	
Glenn T Remington (CM)	2012	
Zixiao Shi (P.CM)	2018	
David F Shipley (CM)	2017	
Edward Ka Cheung Tsui (CM)	2011	
Chariti Young, (CM)	2002	
Guanjing Lin (CM)	2017	

(V) = voting member

(CM) = corresponding member

(PCM) = provisional corresponding member

Note: The complete attendance list from TC 7.5 is enclosed.

DISTRIBUTION: *All Members of TC/TG/MTG/TRG plus the following:*	
Larry A Smith	SH7@ashrae.net
Rich M Heiden (Standard Liaison)	rheiden@train.com
David A Ballard (Chapter Technology Transfer Chair)	dballard@tcco.com
Bryan Becker (Handbook Liaison)	beckerb@umkc.edu
Mike Vaughn, Manager Of Research & Technical Services	MORTS@ashrae.net

Note: These draft minutes have not been approved and not the official, approved record until approved by the TC.

<p style="text-align:center">ASHRAE TC 7.5, Smart Building Systems
2019 Winter Meeting
Meeting Minutes
Atlanta, GA</p>

Location: KCCC, 2104A
Date: Tuesday, June 25th, 2019
Time: 3:30 - 6:00 p.m.

1. **Welcome**

2. **Roll Call and Introductions. Review VMs, CMs, and PCMs after July 1, 2019 changes**

   3:35pm Chair Jin called for roll

   - 7 Voting members in room : Kristen Cetin; Zheng O'Neill; Li Song; David Yuill; Jin Wen, Peter Armstrong (late); Carol Lomonaco (late)
   - Current voting member list: Peter Armstrong; Kristen Cetin; Xin Hu; Carol Lomonaco; Zheng O'Neill; Li Song; David Yuill; Jin Wen; Tea Zakula (Non-Quorum)
   - Three VM rolling off: Carol Lomonaco; Peter Armstrong; Xin Hu
   - Five VM rolling on: Srinivas Katipamula; Glenn Remmington; Liping Wang; Eric Young; Joe Zhou

3. **Scope**
   TC 7.5 is concerned with the performance and interactions of smart building systems, the impact of smart systems on the total building performance, methods for achieving more intelligent control and operation of building processes, interactions of smart buildings with utilities, and documentation of the benefits of smart buildings and smart building systems as they relate to energy consumption, cost of operation, maintenance, occupant comfort, building commissioning, operations, and impact of the SBS on utilities and natural resources.

   ASHRAE Code of Ethics Commitment – Chair
   In this and all other ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, integrity and respect for others, and we shall avoid all real or perceived conflicts of interests. (See full Code of Ethics: https://www.ashrae.org/about-ashrae/ashrae-code-of-ethics.)
   Jin read the scope and ASHRAE Code of Ethics Commitment.

4. **Discussion/Approval of Atlanta Minutes**
   - Li made a motion to approve. Dave seconded. 4-0-0 (CNV)

   - Attendees had self introductions and Jin made some announcements
     o How to become corresponding member through ASHRAE website.
     o Sign on sheet.
     o YEA member. TC 75 will establish a YEA subcommittee.

- o If anyone wants to engage with TC activities, he or she needs to come to subcommittee meetings to voice his or her idea.
  - o Encourage YEA members to volunteer.

5. **Announcements**

- Zheng O'Neill and Kristen Cetin announced an ARPA-E SENSOR Workshop on Wednesday, June 26th.

6. **Liaison Reports: TC 1.4, TC 1.5, TC 1.6, TC 7.3, SPC 207P**
   - TC 1.4: Chariti Young
     - o Guideline 13 (specify building automation system).
     - o Guideline 36 (advanced control sequence. Five addendums for public review and 3 more come).
     - o Handbook activities – there will be some crossed interests).
   - TC 1.5: Mike (NIST)
     - o Cyber security subcommittee to form MTG cyber security.
       Carol Lomonaco made a motion for TC 7.5 to support forming MTG cyber security
       Dave seconded.
       6-0-0 (CNV)
   - TC 1.6 No
   - TC 7.3: Mike B (PNNL). No much more from his side.
   - Joe Zhou: Two chapters in Handbook need to be revised and looking for volunteers.
   - SPC 207P: later on.
   - SSPC 135 Carol Lomonaco: BACNet needs to have new members.

7. **Fault Detection and Diagnosis Subcommittee (Liping Wang)**
   - Two seminars in KC, 1 conference paper.
   - Details see subcommittee meeting minutes.

8. **Enabling Technologies Subcommittee (John Wallace)**
   - John: three new ideas (occupancy sensing, IOT impact, low cost sensor
   - Details see subcommittee meeting minute
   - Jin: TC 1.4 was talking about measurement.
     - o What is the best way to design sensor network.
     - o New standard focusing on the sensor system (design).
   - Eric: Best practice for design – listed in program ideas.

9. **Smart Grid Subcommittee (Kristen Cetin)**
   - Guidelines, ASHRAE ongoing guideline project.
     - o Christen on smart grid guideline.
     - o Glenn commented on the new smart grid guideline, and will have a seminar for Austin.
     - o Joe mentioned that the ASHRAE guideline is 75% finished.
     - o TC 1.4 has a similar idea.
   - Details see subcommittee meeting minutes.

10. **Buildings Operations Dynamics Subcommittee (Bach Tsan)**
    - Details see subcommittee meeting minutes.
      - o Alarm seminar for Austin.
      - o BACnet SC related seminar for Orlando.

11. **Research (Li Song)**
    - Li summarized the following topics from the research chair meeting.
      - Accept rate.

- RTAR: plain English abstract of 100 words.
- PTAR: for publication and will need to get the publish committee to approve.
- Jin explained how research ideas move to real project.
- Li song talked about draft RTAR: occupancy aware controls in HVAC system.
  - Joe: stochastic behavior; how do you get this?
  - Li: instead of rules, using a true optimization based control; focus on multiple zone VAV system.
  - Comments: IEA Annex 79 related activities.
  - Li moved to vote and send it to RAC and Carol second; **6:0:0 (CNV)**

- New research ideas:
1> Smart and connected thermostat (from standard 90.2) indeed have some savings: need some evaluations.
  Joe: raised the budget concern; need to get the utility support.
  David Shipley: Utility will be interested (Canada experience).
  Li: shows savings to get some customers.
2> HVAC dynamic modeling using big-data approach from TC 1.5.
3> Method of evaluation of the FDD standard of air-side economizer on RTU (from SPC 207: test things of things of things). Experimental testing

- Jin asked whether there is any other TC member seeking for co-sponsorship.
  - NO
- Jin explained the difference between abstract vs. extended abstract (later on can be turned into journal, only once a year, and it is for summer research summit).
- Details see subcommittee meeting minutes.

12. Program (Eric Yang)
- Eric presented some statistics for the KC meeting program.
- Big data and smart controls –Orlando
- Resilience – Austin
- Scotland (presentation, review, case studies). April 2020 CIBSE/ASHRAE conference
- CEC track: AI/big data track in 2-year cycle.
- Two other TCs co-sponsorship
  - TC 4.10: leverage physical model for smart controls (on data centers, ventilation)
  - TC 1.4: Carol: Alarm Management Series seminar.
- TC 1.4: Phil Haves include new control design language.
- Details see subcommittee meeting minutes.

13. Handbook (Joe Zhou)
- Details see subcommittee meeting minutes.
  - Timeline: just start the new cycle for 2023 publication
  - Seek for volunteer (contribute ideas, writer and reviewers)

14. Standards (David Yuill)
- Two standards:
1> SPC 201:
  Dave moved TC 7.5 to reform Standard 201 Facility Smart Grid Information Model. Jin seconded. It has 387 pages
  6:0:0 (CV)
2> SPC 207
  This standard is ready for public review after standard committee approves
  David is asking members to take this opportunity to give the comments.
  Continue to be a standing standard committee (SSPC). Adrienne Thomle will be be the chair.
  Currently this SSPC is looking for 5 more members.

- Extend from economizer to other components- new standard. Need new members to get involved with such opportunities (Mike Brambley)
- Jin: suggested to split the program time into two: program and standard

15. Web Page (Mike Galler)
- Mike: Basecamp 2 site
- Suggest to move to basecamp 3
- Post agenda and minutes on TC 7.5 ASHRAE website.

16. Old Business
- Working group re-organization
  - Craig from TAC section 7: this re-organization is being slowed down, not a specified number of TC is given now.
  - re-organization committee- not from TAC. TAC reps: Sarah Manson.
  - Section to be in charge of re-organization, tones have been changed
  - Box schedule: TC meetings in afternoon, seminar in morning starting from Orlando.
  - TC 7.5 is not going to be merged, but other small TC could be merged with TC 7.5.
- YEA
- Awards
  - Carol: would like to to organize a committee, so TC 7.5 can have a strategies plan for awards.
  - Jin: need to know the upcoming deadline

- Track Suggestions
- Old Publications (FDD and Dynamic Building Models)

17. New Business
- Vision Statement: welcome comments and suggestions.
- IEEE Webinar
  - Mark Siira
    - Proposed to give TC 7.5 an intro webinar on IEEE (between meetings)
      - Mike B: need background, no deep dive
      - Jin: 1 hr
      - Standard 855 (IEEE) 1635 (IEEE/ASHRAE)
    - IEEE 1547
    - IEEE 2030.5
- Michael Wetter (LBNL):
  - OBC control sequence language.
  - Propose a standard to standardize the control sequence language to modeling, control.
  - Have 3-year funding from DOE and CEC, and is working with TC 1.4 members (Steven Taylor et al.)
  - Will need co-sponsorship from TC 7.5 later on.
- Carol Lomonaco (JCI)
  - BACNET
  - SSPC 135

- o Public review for addendum of 223P – contact standard 223P chair Michael Osborne if anyone wants to be involved.
- Jin: Inter-conference executive committee (to be organized in November)
- Recruit young member (YEA) as vice-chair
- Jin: create a YEA (35 below) subcommittee.

- 7:00pm at yard house.

18. Adjournment
Jin moved to end the meeting. Dave second. **6-0-0 (CNV).**

TC 7.5 Fault Detection and Diagnostics
2:30-3:15 pm, Sunday, June 23, 2019

Prepared by Liping Wang

Subcommittee Scope: explore and develop technologies to detect and diagnose common faults in both commercial and residential buildings. The scope of this subcommittee includes (a) identifying and sponsoring research projects to develop new FDD technologies, evaluate existing FDD technologies; provide recommendations to building operators and practical engineers; and develop supporting tools for researchers in FDD areas; and b) organizing programs to disseminate research findings and advancements in FDD areas among ASHRAE members.

Agenda:

0:00	**Call to Order**	
	Circulate Sign In sheet, self-introduction, announce the subcommittee scope.	
10 min	**Sessions at current ASHARE conference**	
	Seminar 9: Automated Fault Detection and Diagnostics Software for Cx, RCx and MBCx Sunday, June 23 11:00 AM–12:30 PM (Chair: Xiaohui Zhou) Location: KCCC, 1st Floor, 2101	
	Seminar 30: Evaluating Automated Fault Detection and Diagnostics Tools for Commissioning New and Existing Buildings Monday, June 24 9:45 AM–10:45 AM (Chair: Jin Wen) Location: KCCC, 1st Floor, 2104B	National labs (LBNL, PNNL)
	Conference Paper Session 10: Experimental Data and Modeling of Air Distribution Systems Conference Paper Session 10: Presentation 3: Automatic Fault Detection and Diagnosis of Air Handling Unit Using an Online Machine Learning Algorithm (KC-19-A018) Monday, June 24 11:00 AM–12:00 PM Location: KCCC, 1st Floor, 2204	
10 min	**Winter ASHRAE conference seminar ideas 2020** • HVAC fundamental and applications • Systems and equipment • Refrigeration and refrigerants • Cutting edge approaches • High efficiency design and operation • Big data and smart controls • Ventilation, IAQ and air distribution systems • Standards, guidelines and codes proposals due: August 2nd, 2019	

	Users' experiences for FDDs in commercial buildings	Guanjing Lin, New Heaven University for FDD for Rooftop Unit
	Faults for Condenser Fouling	David Yuill
	Big Data Analysis for AFDD	Jin wen has two speakers. Gunay can be another speaker on development and testing of new FDD and anomaly detection algorithms for VAVs and AHUs.
	Potential Seminar Ideas for Austin, TX	
	Possible seminar idea: Automated Alarm Management: DDC alarms used for FDD? Segment the alarm information into useful pieces. Building operator has to go through all the alarms.	Carol Lomonaco, Kim
	FDD in Guideline 36	TC 1.4, co-sponsor 7.5 FDD
	Fault prevalence	Piljae Im
15 min	**Update/Discussion of Active project/RTARs/Work Statement**	
	Methods to evaluate AFDD strategies for air handling unit systems (work statement revision)	Jin Wen, David Yuill
	Development of AFDD for leakage of ground-source heat pumps (submitted to RAC for review)	Zheng O'Neill and Kristen Cetin
	New Research Ideas	
	RTAR idea: collect, clean, and label existing data for FDD research.	Xiwang Li, Liping Wang, Kristen Cetin. Shawn Shi
	Automated Alarm Management: DDC alarms used for FDD? (automated analytics to correct alarms or utilize alarms) – retune the threshold to reduce false alarms in an automated process	Carol Lomonaco; Reinhard Seidl, Li Song, Te Qi, John Wallace
	What research should TC 7.5 provide to support the energy saving requirement for Standard 90.1 and 189.1?	Continuous discussion in Orlando
10 min	**New ideas and discussions**	
Adjourn		

Minute – ASHRAE Annual Meeting Kansas City, MO

TC 7.5 Enabling Technologies Subcommittee
3:15-4:00 pm, Sunday, June 23, 2019
KCCC 2202
Prepared by John Wallace

Objective for this Meeting: Generate ideas for research and program related to Enabling Technologies and assign owners.

Subcommittee Scope: The Enabling Technologies Subcommittee of TC 7.5: Smart Building Systems aims at exploring and developing technologies which will enable the development, implementation and commercialization of smart building applications such as fault detection and diagnostics, model-predictive control and optimization, and smart grid applications such as automated demand response. Three focal points of this subcommittee are i) smart transducers, such as sensors and actuators which provide diagnostic information, ii) communications, such as wireless devices and protocols enabling greater data exchange, and iii) embedded metadata, such as embedded equipment and system information to enable smart building applications. On these topics, the scope of this subcommittee includes identifying and sponsoring research projects, evaluating existing technologies, providing recommendations to building operators and practicing engineers, developing supporting tools for researchers in these areas, and organizing programs to disseminate research findings and advancements among ASHRAE members.

Minutes prepared by John Wallace

Time	Item	
3:15	Call to order; Introductions; Agenda Overview	
3:20	Review/summarize previous idea topics: a) Gas & Water sensing for building monitoring b) New sensing technologies c) Impact of IoT on building control & monitoring	
	Monitoring & Instrumentation We discussed sponsoring a seminar on Monitoring. Focus on 3 key areas: 1) Occupancy 2) Virtual Sensing 3) Metering The discussion should be use case based and involve an end user. Target Orlando meeting. (August 2nd)	Glenn Remmingto[n] Kristen Cetin Nick Guyaski
	Gas & Water sensing for building monitoring (See below)	
	New Sensing Technologies We discussed how we need to educate and advocate for sensing technologie[s] Certain meters and sensors are required to meet code, but there can be ROI additional sensors . Carol proposed a research project which looks at the landscape of sensors and shows the ROI for additional sensors. The results of the project could eventually lead to a guideline on sensors/metering. Zoltan Magyar mentioned a project in Europe called ISERVE that showed a savings just by installing additional monitoring parts. Zoltan agreed to help[p]	Carol Lomonaco

	the project if needed.	
	Impact of IoT on building control & monitoring Discussion about the security implications of IoT and integration with the BMS. We would like to organize a seminar/debate on IoT Security and then Follow up with a seminar on BMS integration with IoT. Carol will champio with help from Glenn.	Carol Lomonaco Glenn Remmingto
3:40	Call for new ideas to investigate & discuss	
	Low Cost Sensors There is a lot of activity at the National Labs related to low cost sensors. We decided to have a seminar to educate everyone on the work in low cost sensors. Target Austin for the seminar. Jin will lead the effort.	Jin Wen
4:00	Wrap Up/Adjourn	

TC 7.5 Smart Grid Subcommittee
4:00-4:45 pm, Sunday, June 26, 2019
Prepared by Kristen S. Cetin

Subcommittee Scope: This subcommittee will explore and develop ideas and research work statements to improve the building and utility interactions (and more specifically the electric grid). The research will focus on developing enabling technologies for seamless interaction of smart building components and utilities and other building services. An important aspect of this work is to identify the information that is necessary to support smart building technologies, and to identify the requirements of communication protocols to support the exchange of this information between different building services buildings and utilities, between multiple buildings, with outside service providers.

The importance of a stable and reliable electric power grid to life and the economy in the 21st century has been underscored by two major events over the last decade: a major black out on the east coast of North America and wildly varying electricity prices in California during an attempt at restructuring the electricity marketplace. In response to these events many organization (DOE, EPRI, and CEC) have started research activities to find ways to modernize the grid. However, there a significant gaps in the research activities, especially as they relate to buildings. Since buildings consume over 70% of the electric in the U.S., they have to part of the solution to modernize the grid. ASHRAE has traditionally developed technologies, standards, and guidelines for buildings. Therefore, this subcommittee can play a major role in continuing this effort.

Agenda:

0:00	**Call to Order**	
	Circulate Sign In sheet, self-introduction, announce the subcommittee scope.	
5 min	**Relevant sessions at current ASHRAE conference**	
	Seminar 59: Energy Systems Integration and Smart Grid-Ready Buildings: All you need to know to be a good grid citizen (Wed, 8-9:30 am)	Janice Means, P.E.; Glenn Remington
	Conference paper session 15: Building Modeling and Controls (Tues 11-12:30 pm) – demand response strategies	Eric Yang
	Conference Paper Session 21: Thermal Energy Storage (Wed 9:45-10:05am) – MPC with different rate structures	Amy Van Asselt
10 min	Discussion on Smart Grid Guide Progress & Proposed Standard/Guideline committee on "A guide for grid-interactive Smart Buildings"	Christie Kjellman (and others)
30 min	**Winter ASHRAE conference seminar ideas**	
	Smart Grid Guide / Guideline (seminar)	Joe Zhou, Glenn Remington, Scott Hackel
	Control of grid-interactive buildings – looking towards the future & Transactive Control/Building/Grid integration	Mike Brambly, many others
	Cybersecurity & Smart Grid	Glenn Remington
	Fundamentals of smart building integration	David Blum
	Smart products for residential and commercial buildings	Kristen Cetin/Zheng O'Neill
	Smart Grid – Building Envelope Interaction/Dynamic	Donghun Kim

	Facades	
	Utility Grid Battery (large scale) Control Strategies and impact on O&M, LCA	Eric Yang
Not Discussed	**RTAR Ideas and Updates**	
	HVAC Cybersecurity best practices	Glenn Gasmen
	Guidance on smart building equipment	
	Models for better peak load predictions	Michael Bobker
	Instantaneous voltage and current load from buildings	Ralph Muehleisen
	Linking building modeling to grid modeling	Donghun Kim
Adjourn		

Meeting Minutes

Call to Order
- Sign in Sheet
- New members – name – affiliation, new member
- Read scope

Sessions at current ASHARE conference
- Seminar 59: Energy Systems Integration and Smart Grid-Ready Buildings: All you need to know to be a good grid citizen (Wed, 8-9:30 am)   Janice Means, P.E.; Glenn Remington
- Conference paper session 15: Building Modeling and Controls (Tues 11-12:30 pm) – demand response strategies   Eric Yang
- Conference Paper Session 21: Thermal Energy Storage (Wed 9:45-10:05am) – MPC with different rate structures   Amy Van Asselt

Discussion on "A guide for grid-interactive Smart Buildings" – Christie
- Christie provided an update on the progress on this
  - o Title Purpose and Scope will be posted on Basecamp
  - o Discussion on the need for consensus on this topic for the development of a guideline and suggestion to complete the guide and get it out to the ASHRAE community and then work on the guideline (Joe)
  - o Discussion on how fast things are advancing in this area Things are advancing fast
- **ASHRAE guide on smart grid for smart buildings**
  - o Background – Shelia (ASHRAE president) asked partners to work with SEPA and OpenADR to develop a smart grid guide for building professionals – board of director approved, guide in development (funded special project)
  - o Joe Zhou/ Scott Hackel/their team working on this – work in progress
  - o 75% completed draft, 90% draft completed soon
  - o Planned to be completed at end of summer and submitted for publications
  - o Likely follow on needs for guidance documents once this guide is published
  - o Likely needs for a more nuts and bolts level discussion rather than high level discussion which will be included in the guide developed/published

ASHRAE conference ideas
Winter 2020 – Orlando, FL, Feb 1-5, 2020
- August 2, 2019 - submission deadline
- Tracks (potentially relevant tracks)
  1. **(4) Cutting edge approaches**
  2. **(5) High efficiency design**
  3. **(6) Big data and smart controls**
  4. **(8) Standards, guidelines and codes**

- Ideas
  - Smart Grid guide intro/information on the published guide - **Joe Zhou, Glenn Remington, Scott Hackel**
    - Goal for Austin 2020 once guide is published
  - Transitive Control/Building-Grid integration –**Mike Brambly, Christie, Greg Pavlok, Joe, Jin, Steve, Zheng O'Neill, Eric Yang, David Blum, Kristen Cetin, Helia Zandi**
    - Kristen will email Mike with list of people interested. Mike will organize a meeting remotely to discuss these efforts and organize seminars
    - Plan to submit at least 2 seminars for Orlando (Christie and Mike)
    - (1) control, (2) modeling, (3) applications – focus on (1 – led by Mike, expressed interest by Dave from NIST) and (3 – Lead by Christie – focus on examples of installations, benefits from rates, problems, benefits to the grid) for Orlando, and potentially (2)
    - Interest in (2) from Jin, Glenn (suggested speaker related to natural gas DR)
    - Suggestion to have a (4) on designing buildings to enable smart grid control (**Greg Pavlok**)
    - Suggestion to cover residential and commercial buildings
    - Suggestion to include utilities
    - Much discussion regarding this topic among many members
    - Suggestion for (5) focus on testbeds seminar discussion places where building-grid interactions can be tested (**Jin Wen**)
  - Cybersecurity & Smart Grid –**Glenn Remington**
    - potential collaboration with TC 1.5
    - Will plan to submit for **Austin** (more appropriate track)
    - Suggestion to integrate with IoT discussion from Enabling Technology subcommittee
  - Smart products for residential and commercial buildings - **Kristen, Zheng?**
    - talk with residential TC – net zero building committee
    - Kristen follow up with Zheng
    -
  - Panel discussion on grid interactive buildings

  - Smart grid and building envelope interaction (from 4.4) - as an energy storage feature –**Donghun Kim (previous interest from Diana Hun, Piljae Im, Jie Cai, Paulo Tabares**)
    - How building envelope can impact or interplay with smart grid contributions from buildings
    - Something discussed at DoE meeting last January in Chicago
    - Dynamic facades
    - Eric will forward information to Kristen about potential speaker
    - Suggestion to follow up with NBI
  - Utility Grid Battery Control Strategies and Impacts on O&M & LCA – **Eric Yang**
    - New idea (Atlanta 2019)
    - Large scale batteries
    - Glenn,

Update/Discussion of RTARs/Work Statement ideas (this was not covered in this meeting due to time constraints)
- Create recommendations for HVACR cyber security best practices and cyber security reference architectures - **Glenn Gasmen**
  - Shared with TC (uploaded on basecamp previously)
- Guidance on smart building equipment / IoT – (something that came up from forum discussion)
  - what are you getting, functionality, products

- what program functions are necessary to work in different environments
- Development of models for better peak load predictions (**Michael Bobker**)
    - City-scale model validation for predicting demand response - some models exist
    - Need an evaluation of the state of the art, perhaps useful for new city planning
    - Need some more research on demand response capacity prediction
    - Existing software – GridLabD – developed to designing rate cases - Snirvas
    - Peaks at annual, monthly, daily, hourly, 15 min, 1 min?
- Instantaneous voltage and current load from buildings **(Ralph Muehleisen)**
- Energy demand prediction of multiple building scale
- Linking building modeling to grid modeling (**Donghun Kim**)
    - Some existing efforts
        - Cider – DOE Sunshot program – linking transmission and building modeling, heavy use of smi
        - CEC – put out public request for comment on possibly funding
        - IEA Annex 60 – electrical and building linking efforts with Modellica
    - End user of this work would be policy recommendations for ISOs
    - How to validate models?

ASHRAE TC 7.5 Smart Building Systems
2019 Annual Conference – Kansas City

Agenda/Minutes of Building Operations Dynamics Subcommittee Meeting

Date: **Monday, June 24, 2019**
Time: **4:15-5:00 p.m.**
Location: **2104A KCCC**

19. Roll Call and Introductions

20. Mission Statement
   - The Building Operations Dynamics Subcommittee of TC 7.5 is concerned with the dynamic characteristics and interactions of comfort conditions, the active components of HVAC systems, the passive components of HVAC systems, control systems and operation strategies and the building. The committee is concerned with the methods of building system operation which minimize energy used through the consideration of dynamics and interactions. It is also concerned with methods which consider dynamic and interactive characteristics in the design or comfort conditioning systems.

21. Announcements

22. Program Proposals

Program	Title	Lead	Newest update – 6/24/2019
1	What to do with optimal control?	Peter Armstrong	
2	Model accuracy impact study on model predictive control	Andreas Athienitis	Complete, conference paper, Plan to organize seminar.
3	Smart products for residential and commercial	Josh and Kristen	On going
4	Training plan for facilities	Zhou Joe	Bach to follow up
New ideas?	*Building Operations for Grow Applications?*	*Glen/Bach Tsan*	*Develop discussion topics/Review Chicago Seminar*

23. Research

Research	Title	Lead	Newest updates
RP-1661	RP- 1661: Development and Validation of Dynamic Models for the Evaluation of Chilled-Water System Control Strategies in the ASHRAE Handbook	TBD	Li Song and Wangda Zuo provided update to the research project, developed 9 different control sequence models and have run 18,000 simulations. Simulations are on-going. Current progress is running debugging of the simulations. Project expected to end April 2019- request PMS / TC 4.7 to extend 1 year. Discuss if extension could be granted.
WS	WS- 1809: Updating reference guide for dynamic models of HVAC equipment	Heejin Cho	Send out to RAC before the RTAR rules changed PTAR (Publication TAR). Co-Sponsored by 1.4

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			Has been reviewed by all voting members. 1/15/2019 – Approved by all.
RTAR?	If you had "perfect information" on occupant's comfort preferences and their location within a conditioned space then how would you optimize control and how much value would you be able to realize	Rich Hackner? Li Song?	RTAR completed but did not submit. Internal TC review, and started to award, but search for co-sponsorship. Should check with occupant behavior group. Coordinate with TC 1.4? Circulate the document again via e-mail and repost by Li Song. Wen to communicate with Rich Hackner Voting Members to review on this RTAR and posted on BaseCamp. Organize electronic voting.
RTAR?	How IoT impacts operators	Carol Liping Wang	Carol working on outline. How to quantify impact – Li Song Dovetailing with enabling technologies. Update the title
RTAR?	Link the productivity with occupancy based control; Occupant in the loop controls	Ivo Martinac	Ivo Martinac – professor developing idea. The idea but need to develop the team.
RTAR?	Smart management of moisture and energy consumption in residential houses, smart ventilation, optimal location for dryer, heat pump water heater, etc.	Andrew Windham; Kristen Cetin	Update from Kristen Cetin
RTAR?	Design guideline to consider unmeasured disturbance for an implementable MPC	Donghun Kim, David Blum	Completed RTAR but has not been voted. Donghun seek assistance to upload. Wen Jin's records show and updated draft between Donghun and David. Wen to forward to Li and process.

24. New Business

25. Other topics:

- Suggestion: Sponsor a program at the next ASHRAE winter conference on EE/DR Building operation dynamics
- Co-sponsor work with
  - Sspc 135 BACnet
  - Effective Energy Management in new and existing Buildings ASHRAE SPEC 100
  - Operations and Maintenance of High Performance Buildings
  - GPC 36P High performance sequence of operations for HVAC Systems

- Occupancy Based Modeling with feedback to control systems - LBNL

26. Adjournment:

Meeting Minutes

Call to Order
- Sign in Sheet
- Read scope

Programs Review-
1. **What to do with optimal control?**
   a. **Review and touch base with Peter Armstrong, Update at 2020 Winter Conference**

2. **Model accuracy impact study on model predictive control**
   a. **This item is complete, conference paper has been written**
   b. **Plan to organize seminar, submit a paper by August 2nd. (Zheng O'neill, David Blum)**
   c. **Determine which track**

3. **Smart products for residential and commercial (Josh/Kristen Cetin)**
   a. **Follow up at 2020 Winter Conference**

4. **Training plan for facilities   (Joe Zhou)**
   a. **Bach to follow up**
   b.

New ideas:
- **Building Operations for Grow Applications? Glen/Bach Tsan**
  - **Develop discussion topics (Bach)**
  - **Review Chicago Seminar (Glen Remington)**

- **Alarm Seminar – Sponsored by TC 7.5 (Carol Lomonaco)**
  - **BAC/Users/Specifications**
  - **Seminar idea for Austin (Summer 2020)**

- **BACNet – CoSponor with SSPC 135 (Carol Lomonaco)**
  - **What resulted and what passed**
  - **Coordinate with Eric Yang**
  - **Seminar Idea for Winter 2020**

Update/Discussion of Research Topic Acceptance Request (RTARs)/Work Statement (WS) ideas
1. RP- 1661: Development and Validation of Dynamic Models for the Evaluation of Chilled-Water System Control Strategies in the ASHRAE Handbook
   - This RTAR is looking for a PMS Project Monitoring Subcommittee (PMS) Chair
   - Project has been granted a 12 month extension
   - Coordinate with Bill Murphy
   - Co-Sponsored with TC 4.7
     - Review with members of TC 4.7

2. WS- 1809: Updating reference guide for dynamic models of HVAC equipment
   - Work Statement approved by voting members on January 15/2019.
   - Work Statement was submitted on May 15, 2019, no feedback or comments received.

- There will be a discussion on Wednesday at Research Administration Committee (RAC) review meeting. Liping will report back after meeting.

3. If you had "perfect information" on occupant's comfort preferences and their location within a conditioned space then how would you optimize control and how much value would you be able to realize
   - RTAR is complete but not submitted
   - Chair of MTG-OBB (Multi-disciplinary Task Group; Occupant Behavior in Buildings) to co-sponsor; review and verify agreement to co-sponsor
   - This document resides in basecamp and ready to circulate.
   - Voting e-mail to be sent out to members (Liping)

4. How IoT impacts operators
   - On-going research to determine how to develop tests of various products
   - Reconnect and update at Winter 2020 meeting

5. Link the productivity with occupancy based control (Change title to: Occupant In the Loop Control)
   - This research idea is to determine how occupancy controls impact the "productivity" of the building occupants.
   - Discussion resulted in the Sensors vs the control. Should there be a focus on improving the controls?
   - Does the Occupancy control improve or negatively impact productivity
   - Are there sufficient methods to determine occupant "productivity?"
   - There are methods that can be described is the research.
   - Jin Wen to meet with Ivo Martinac; report out at next meeting

6. Smart management of moisture and energy consumption in residential houses, smart ventilation, optimal location for dryer, heat pump water heater, etc.
   - Coordinate research with SCE (Kristen Cetin/Christie Kjellman/Bach Tsan)
   - On-going discussion, ,update at winter 2020 meeting

7. Design guideline to consider unmeasured disturbance for an implementable Model predictive control (MPC) (Donghun Kim, David Blum)
   - DRAFT RTAR is complete
   - Document Circulated following January 2019 meeting
   - Comments were not provided back to Donghun
   - Edits will happen, update at the January 2020 meeting

Adjourn at 5:00 pm.

ASHRAE TC 7.5: Smart Building Systems Research Subcommittee Meeting
Monday, June 24, 2019, 5:00 – 6:00 p.m, 2102A(KCCC)
Minutes

1.	Roll Call and Introduction	5:00 - 5:05
2.	Announcements/recap of the research subcommittee chair meeting	5:05 – 5:20
3.	Status of current Research Projects	5:20 –
	3.1 Two ongoing research projects that are co-sponsored by TC75.	5:40

    a. RP 1661 – "Development and validation of dynamic models for the evaluation of chilled water system control strategies in the ASHRAE handbook". The PI has progressed to Task 3, conducting large scale simulation and debugging. The 12 month extension is granted. The PMS chair did not show and did not respond to the meeting inquiry. No progress meeting in Kansas City for the project update.

    b. RP 1756 – "evaluation of low-cost particulate sensors for building". no update since neither PMS liaison, Liping nor Glen. The project team is making good progress. A STBE paper is under review.

   3.2 Four active work statements.

    a. WS 1781 – "Methods to Evaluate AFDD Methods for Air Handling Unit Systems". Jin suggested to park the WS due to similar work carried out by LBNL.

    b. WS 1783 – "Develop cost and performance indices to evaluate effectiveness of virtual sensors in HVAC applications". The WS was submitted in December 2018, but the WS number was changed to 1875. The comments were received, but revised WS is not ready for submission yet.

    c. WS 1809 – "Updating Reference Guide for Dynamic Models of HVAC Equipment". Submitted by the May deadline. The WS is returned with comments. The comments are received from Bill Murphy.

    d. WS 1812 – revision was submitted by the May deadline. The WS is returned with comments. The comments haven't been received.

   3.3 Four active RTAR (one of them is co-sponsor)

   3.4 New WS candidates

   3.5 RTARs/WS underdevelopment

4.	TC 7.5 research new ideas and topics	5:40 – 5:55
5.	New Business	5:55 – 6:00
6.	Adjourn	6:00

ASHRAE TC 7.5: Smart Building Systems Research Plan
Active Project: 0; Co-sponsor Project: 2; Active WS: 3; Active RTAR ideas:15; Co-sponsor WS/RTAR: 2

Subc	Project	Contributors /PI	Status
Co-Sponsor	(TC 4.7) RP 1661-Development and validation of dynamic models for the evaluation of chilled water system control strategies in the ASHRAE handbook	PMS Liaison: Li Song	Co-sponsoring with TC – 4.7 and 1.4 WS is returned with comments. Wangda will provide updated WS for TC review during Orlando. STL: the TC voted Yes and submitted to RAC. RAC conditional approved. Las Vegas – Selected a bidder. Miami is the winner Long Beach – contract is being signed. Project starts on August 1st. Wangda is the PI (will be at Boulder) Chicago: The project has begun, and the PMS met with the contractor. Task 1 is complete. Conference call is complete. Houston: The PI gave a report on the progress. Atlanta Update by Wangda: PMS meeting was on Sunday. Identified 9 sequences rather than 3 sequences. Large scale simulation and debugging is ongoing. 12- month extension is requested.
Co-Sponsor	TC 2.4: RP-1756 evaluation of low-cost particulate sensors for building	Brent Stephens (2.4) 7.5 PMS: Glenn Remington and Liping Wang	ORL: – need co-authorship too – against lab-grade equipment to review their performances… STL: the TC voted YES and submitted to RAC. No feedback yet. Las Vegas – resubmit a WS. Need 1-2 PES volunteers Long Beach – PES met and is selecting winner. Chicago: Project was awarded to Jordan Clark at Ohio State University, and has commenced. There are some initial adjustments to scope requested. Houston: The PMS had their second meeting. Update: Li will follow up with Remington or Li Ping Wang for an update before the main TC meeting. Kansas City update: The PIs made decent progress on the project. They have submitted an STBE paper currently under revision.
WS			
FDD	WS 1781: – Methods to Evaluate AFDD Methods for Air Handling Unit Systems	Jin Wen	CHI – Jin Wen has new version for submission. Atlanta – Voted; submitted to RAC. RAC accepted with comments for WS. ORL – WS in preparation STL – WS in preparation; 7.3 will co-sponsor. Might seek co-sponsorship with 9.1 Las Vegas – WS in development. Will seek a vote in between meetings. Long Beach - WS is ready to be voted. Aim at submitting it by August deadline Chicago: WS was submitted after vote in LB. RAC returned with comments. Jin, Michael, and David met with Chris Wilkins, RAC liaison, and discussed revisions and resubmitting. Houston: No update. It times out within the next year, but we're still interested in pursuing this. Update by Jin in Atlanta: WS was inspired by the difficulties of the evaluation of RTU FDD algorithms. The WS was submitted once and comments were collected. Jin will get it done before the February 2019. Kansas City update: drop from the list and park

Subc	Project	Contributors /PI	Status
FDD	WS-1812 – Detection and Diagnosis of the Circulating Fluid Leakage for Hydronic Systems	Zheng O'Neill Kristen Cetin	STL: RTART discussed in sub-committee. Will be voted in mid-July. Committee voted approval. RAC approved. Need to develop WS. Las Vegas: WS in development. Long Beach: WS is ready to be voted. Aim at August deadline. Chicago: TC 6.8 was approached as co-sponsor. They were initially uncertain, but after a visit, they requested a change in title. TC 6.8 voted 9-1-1-1 CNV. Houston: WS was returned with comments. They aim to revise for August 15th deadline. Update by Zheng: First draft was submitted after Chicago meeting. Received comments in May 2018. TC 6.8 research committee has approved revised version. The WS is revised and is ready for vote. Kansas City update: revised WS is returned with comments.
ET	WS-1875: Develop cost and performance indices to evaluate effectiveness of virtual sensors in HVAC applications	Li Song	Voted in Atlanta; Submitted for RAC to review. RAC accepted with comments. ORL – WS in preparation STL – WS in preparation Las Vegas – no update Long Beach – no update Chicago: there is still an interest in submitting a WS. Houston: Li will submit WS to RAC by August 15. Update in Kansas City: 1783
BOD	WS-1809 – Updating Reference Guide for Dynamic Models of HVAC Equipment	Heejin Cho	SEA --Is this tech transfer? Update of Jean LeBrun's work from 1990's All kinds of tech transfer hurdles to leap over. Would this be better as a tool kit? BOD discussion on toolkit option, changing scope and budget and timing of research. ATL – need to be revised completely. ORL – Heejin will give a revised version tonight. STL: The revised RTAR is ready for committee to review and vote. Committee voted approval. RAC approved. Need to develop WS. Las Vegas: WS in development. Long Beach: WS in development. Aim at Chicago meeting Chicago: a draft WS has been developed and sent to Zheng. It still needs some significant development. Attendees at the meeting were supportive of continuing this topic. Houston: Heejin expects to get a draft to us by mid-July. The Atlanta update by Zeng: WS was voted and submitted. Kansas City update: Carol mentioned the big-data based modeling approach. Jin will take the lead to communicate with Carol. Will be a new RTAR in BOD.
RTAR			

Subc	Project	Contributors /PI	Status
BOD	Draft RTAR: If you had "perfect information" on occupants comfort preferences and their location within a conditioned space then how would you optimize control and how much value would you be able to realized	Rich Hackner Li Song	STL: An RTAR is prepared by Li and will be discussed in the committee meeting for comments. Rich will lead on WS if the RTAR is accepted. Need inputs to improve the RTAR. Two volunteers: James Sweeney and Gary Shamshoian. Las Vegas: In development Long Beach: In development Chicago: No update. Houston: Li plans to submit to RAC by August 15. The chair of MTG.OBB has agreed to cosponsor. We hope to vote at the main meeting to submit the RTAR. Atlanta update by Song: Li will upload the RTAR on basecamp and circulate among the TC. Kansas City update: Li will add the cosponsorship to the RTAR and send it Jin for voting on Tuesday.
ET/FDD	Draft RTAR: Metadata and Taxonomy to Support FDD in Smart Buildings	Nick Gayeski Charity Young	SEA NEW submitted for consideration by Subcomms CHI – Nick discussed wants feedback. Explained purpose ATL- Phil did not think the need and significance to ASHRAE are clear. Had discussion in ET subcommittee. Nick will revise ORL – Nick is continuously updating it. Las Vegas – Nick is continuously updating it. Long Beach – no update Chicago: No update. Houston: Dennis Krieger will pick this up to see if there's potential to move forward. He's unfamiliar with ASHRAE processes. Update from John Wallace: Will follow up with Dennis Krieger. Jin clarified it included two components: Taxonomy and point mapping. It might be good to organize a program before moving forward with RTAR - John.
BOD	Draft RTAR - Design guideline to consider unmeasured disturbance for an implementable MPC	Donghun Kim, David Blum	New at Long Beach Chicago: Still in progress Houston: Still in progress. Update by Zeng: The RTAR draft was prepared by Donghun Kim. David Blum sent the comments back to Donghun Kim January 2019 and no updates since then. Li will follow up. Kansas City update: Donghun Kim will finalize the draft RTAR. Targeted for August 15, 2019 deadline.
SG	RTAR - Development of models for better peak load predictions for building clusters/neighborhood/city	Michael Bobker Kristen Cetin	Long Beach – initiated the idea Houston: No update The Atlanta update by Kristen: still interested in working on. Helps are welcome. Helia Zandi with Oak Ridge will help Kristen work on it. TC4.1 is interested in co-sponsorship. Kansas City update: Kristen is still interested in working on it. Positive to develop a RTAR. Bing Dong and Zhe Wang volunteered to help.

Subc	Project	Contributors /PI	Status
SG	RTAR - - Linking building modeling to grid modeling	Donghun Kim	Long Beach – initiated the idea Chicago: was discussed, there's still interest. Chicago: Not discussed. Update by Kristen: Kristen will follow up with Donghun Kim. Jie Cai volunteer to participate. Ellen Franconi with PNNL will facilitate the project leaning toward to providing simulation capacity for enhancing code. Kansas City update: Kim is still interested in working on it. Li will follow up with Jie Cai to connect with Kim. Bing Dong volunteered to help.
SG	RTAR - continuation of Demand Response guideline	Need Champion	Long Beach – initiated the idea, need to seek 1.4 inputs (there are interests from 1.4-Kim is the contact; Joseph Kilcoyne (joseph@scengineers.net Shadpour Consulting) – Guideline 13 and 36 could be related) Update by Kristen: it was meant to form a working group. Kansas city: Park
BOD	RTAR - How IoT impacts operators	Carol Lomonaco Liping Wang	New at Long Beach Houston: There was discussion about the topic, and there's still interest in it. A written RTAR is not planned before Atlanta. Update by Carol in Atlanta: Carol is still interested in working on this RTAR. Joe and Li are interested to help. No RTAR is developed yet. Kansas City update: Carol will provide an update after the subcommittee meeting.
BOD	RTAR - Link the productivity with occupant-in-loop control	Ivo Martinac	New at Long Beach Houston: Topic was discussed. Ivo was not present, but there is general interest among those present. Update by Zeng: update before Houston meeting "no time to get the work done". Carol added that it was meant for a mini system for local air condition control, personal comfort. Kansas City update: Jin will update the TC after contacting POC.
BOD	RTAR - Smart management of moisture and energy consumption in residential houses, smart ventilation, optimal location for dyer, heat pump water heater, etc.	Andrew Windham; Kristen Cetin	New at Long Beach Houston: Not discussed Update by Kristen: still interested in working on it. Update in Kansas City: Kristen mentioned one discussion with Andrew a year ago. Kristen will clarify the intention with Andrew and update the team.
FDD	RTAR: Self-fixing faults once it is diagnosed	Andrew Windham windhamaw@appstate.edu; Jin Wen will help)	New at Long Beach Houston: no update Kansas City update: an ongoing project is funded by DOE. Park
FDD	RTAR: collect, clean, and label existing data for FDD research	Xiwang Li, Liping Wang, Kristen. Shawn Shi (Carleton)	Las Vegas: new idea Long Beach: no update Houston: No update Kansas City update: Park.
BOD	TC 1.4 RTAR Current title: "Night setback effectiveness" possible change to "Night preconditioning effectiveness"	Peter Armstrong	ORL: Seek co-authorship. Objective: show how to credibly model energy and comfort impacts of night preconditioning. (also effectiveness of simple through MPC controls?) Las Vegas – continue development Long Beach: no update Houston: No update Kansas City update: it is dropped by TC1.4. Peter will lead it.
Co-Sponsor	TC 1.4 RTAR: HVAC Control Loop Performance Diagnosis	Zheng O'Neill	Long Beach: RTAR distributed. Look for co-sponsorship. Houston: No update Kansas City update: drop.

Subc	Project	Contributors/PI	Status
BOD	RTAR: Big data-based approach for HVAC equipment modeling	Carol and Jin	Carol initiated the big data-based modeling approach in Kansas City. Jin will take the lead to communicate with Carol. Will be a new RTAR in BOD.
BOD	How smart/connected thermo impact energy performance?	Li, Jin, Kristen, Glenn, David Shirley, Bing Dong, Han Li (LBNL), Brent Huchuk (Univ. of Toronto), 3 more from 90.2	Volunteers from 90.2: Mike Lubliner, Washington State University, lublinerm@energy.wsu.edu, 360-956-2082, Richard Watson, SSHC, Inc.,rwatson@sshcinc.com,860-399-5434, Matt Vargo, Carrier Corp, Matt.vargo@carrier.utc.com. Kansas City update: Li will explore the study done by EPA and start the draft of the RTAR
FDD	Method of evaluation of the FDD standard of air-side economizer on RTU	David Shirley	Kansas City update: David Shirley initiated the topic and will send the draft of the RTAT to Li for improvement in the TC.
Co-Sponsor	Draft: Low-cost indoor pollutant sensor metrics for data-driven control of ventilation in smart buildings	Jordan Clark, Brent Stephens, Kristen Cetin	Houston: In progress. Update by Kristen: RTAR is ready by Jordan. It is built off their existing project. Comments are welcome after TC review. Jin comments TC needs more time to review and vote. Zheng asked for difference between this project and prior project. Li will forward the questions to Jordan and request Jordan to present and answer the questions. Liping is the PMS of the prior project and should be consulted. Kansas City update: It is designed as the follow up project.
Parking Lot			
FDD	Idea - What is the most effective way to present results to operators- monthly meetings, weekly emails- in a way that they take action. (related to dashboard- 'data and interfaces- RP)		
FDD	Idea - FDD for datacenters		
FDD	Literature Review and Survey of existing FDD methods and data	Nick Gayeski, Jin Wen	ATL - FDD literature review and central location for download data/methods etc. (collection of methods) – existing Not only compiling but assessment of new technologies (indicating last large-scale study is 2005) Characterization (qualitatively) evaluate. IEA 34.
FDD	Idea - Whole Building FDD through smart-meters (champion?)		
ET	Ideas -- Connectivity in the home?	Nick Gayeski	CHI – Much discussion no resolution
SG	Development of models for better peak load predictions	Kristine; Mike, Srinivas will review	CHI—New idea.
SG	Idea – DR guideline related ideas		ATL – estimate thermal response etc.
SG	Idea --Instantaneous voltage and current load from bldgs. For SG	Ralph Muehleisen Argonne NL	CHI – New Idea

Subc	Project	Contributors /PI	Status
Co-Sponsor	Idea -	TC 7.3	ATL – Mike Brambly mentioned an idea about building maintenance and FDD
ET	RTAR -1782: "Learning occupancy presence in residential buildings through smart meter data"	Bing Dong and Zheng O'Neill	Voted in Atlanta; Submitted for RAC to review. RAC rejected. "it is not clear if ASHRAE should lead or others (EPRI, etc.) and how much research is needed to detect or model the occupancy based on smart meter data…" ORL – discussed with Phil and solicited comments (comments on whether available technologies and other literatures have been integrated in the RTAR). Smart thermostat might learn occupancy. Behavior based action from Utility company – if you know occupancy patterns then send messages etc.
SG	Guideline on smart building equipment		Chicago: New idea Houston: Not discussed.

TC 7.5 Smart Building Systems

Program Subcommittee Meeting

Kansas City, MO

Sunday (06/23)   KCCC, 2202

Programs statistic at Kansas City

96 conference papers abstract submitted, 83 approved;
72 extended abstracts submitted, 42 approved;
110 seminars submitted, 73 presented;
5 panels submitted, 3 scheduled;
8 workshops submitted, 4 scheduled;
3 forums submitted, 0 scheduled;
3 debates submitted, 2 scheduled

Programs presented at Kansas City (sequence by time)

Sponsoring Committee	Program Time	Session Chair	Session Title	Co-Sponsoring Committee
7.5 Smart Building Systems	Seminar 9 Sunday, 11:00 AM -12:30 PM, KCCC, 2101	Joe Zhou	Automated Fault Detection and Diagnostics Software for Cx, RCx and MBCx	7.9 Building Commissioning
7.5 Smart Building Systems	Seminar 30 Monday, 9:45 AM -10:45 AM	Jin Wen	Evaluating Automated Fault Detection and Diagnostics Tools for Commissioning New and Existing Buildings	7.9 Building Commissioning
7.5 Smart Building Systems	Seminar 39 Tuesday, 8:00 AM - 09:30 AM	Eric Yang	Model-Predictive Control for HVAC System Optimization	7.6 Building Energy Performance
7.5 Smart Building Systems	Seminar 54 Tuesday 11:00 AM -12:30 PM	Scott Hackel	Optimal Chilled Water Plant Design and Operation: What a "Smart Valve" Can Do for You	1.4 Control Theory and Application; 7.9 Building Commissioning

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6.7 Solar Energy Utilization	Seminar 59 Wednesday, 8:00 AM - 09:30 AM	Janice Means	Energy Systems Integration and Smart Grid-Ready Buildings: All You Need to Know to Be a Good Grid Citizen	7.5 Smart Building Systems, 2.5, 2.8

Program tracks and timelines for Orlando, FL

1. HVAC&R Fundamentals and Applications: Fundamentals are the foundation for understanding applications in engineering. Key components of ASHRAE fundamentals include thermodynamics, psychrometrics, fluid and mass flow. This track provides opportunities for papers and presentations of varying levels across a large topic base. Concepts, design elements and shared experiences for theoretical and applied concepts of HVAC&R design are included.
Track Chair: Maggie Moninski maggie.moninski@gmail.com

2. Systems and Equipment: HVAC&R Systems and Equipment are constantly evolving to address the changing requirements of the built environment. Papers and programs in this track will focus on the development of new systems and equipment, improvements to existing systems and equipment and the proper application and operation of systems and equipment.
Track Chair: Sonya Pouncy sonya.pouncy@gmail.com

3. Refrigeration and Refrigerants: Refrigeration is a critical element of modern life, from preserving food and medicine to maintaining comfort. With significant changes on the horizon for refrigerant regulations, along with new applications for refrigeration systems being frequently applied, there is more need than ever to understand both the fundamental and advanced concepts and issues related to refrigeration. Papers and programs in this track will focus on refrigerants, refrigerant regulation, refrigeration cycles and refrigeration applications. **Track Chair:** Stephen Idem sidem@tntech.edu

4. Cutting Edge Approaches: This track focuses on novel approaches to HVAC&R systems and buildings due to changing energy, economic, and environmental concerns. Papers and programs will focus on emerging approaches such as the critical Water-Energy nexus, natural/emerging refrigerants and other cutting edge approaches pertaining to HVAC&R systems and buildings.
Track Chair: Marianna Vallejo marianna.vallejo@jacobs.com

5. High Efficiency Design and Operation: Submissions are requested regarding high efficiency design and operation of commercial and residential buildings, including specialty building types.
Track Chair: Ryan MacGillivray ryan.macgillivray@dwel.com

6. Big Data and Smart Controls: This track examines the use of big data, advanced algorithms, occupancy-based control strategies, data mining and other analytical techniques to economically automate buildings. Given the intersection with the larger world of IT, cybersecurity is also a topic of interest in this track. **Track Chair:** Leticia De Oliveira Neves leneves@gmail.com

7. Ventilation, IAQ and Air Distribution Systems: This track solicits submissions pertaining to the design, operation and study of ventilation and air distribution systems in residential and commercial buildings. The intersection of these systems with respect to indoor air quality and health effects are also of significant interest for this track. **Track Chair:** Robert Cox, bob.cox@jacobs.com

8. Standards, Guidelines and Codes: ASHRAE is a leader in the development of standards and guidelines pertaining to the indoor environment; these standards and guidelines are used to shape codes. This track invites submissions pertaining to standards for buildings, HVAC&R systems and IAQ
Track Chair: Lee Riback, lee.riback@gmail.com

Deadlines:
Friday, August 2, 2019: Seminar, Workshop, Forum, Debate, and Panel Proposals Due
Friday, October 4, 2019: Seminar, Workshop, Forum, Debate, and Panel Accept/Reject Notifications

Program ideas for Orlando, FL and the future

Type	Session Chair / Speakers	Proposed Title	Status	Updates
Seminar	Guanjing Lin, New Heaven University for FDD for Rooftop Unit	Users' experiences for FDDs in commercial buildings	For Orlando	
Seminar	David Yuill	Faults for Condenser Fouling	For Orlando	
Seminar	Jin wen	Big Data Analysis for AFDD	For Orlando	
Seminar	Michael Brambly	Control – Look toward to the future -Smart Grid three series: 1. Control (Led by Michael) 2. Modeling (led by Jin Wen- Austin) 3. Application (led by Kristen Cetin)	Control and Application for Orlando; Modeling for Austin	
Seminar	Joe Zhou, Glenn Remington, Scott Hackel	Smart Grid Guide / Guideline (seminar)	For Orlando	
Seminar	Mike Brambly, many others	Control of grid-interactive buildings – looking towards the future & Transactive Control/Building/Grid integration	For Orlando	
Seminar	Glenn Remington	Cybersecurity & Smart Grid	For Orlando	
Seminar	David Blum	Fundamentals of smart building integration	For Orlando	
Seminar	Kristen Cetin/Zheng O'Neill	Smart products for residential and commercial buildings	For Orlando	
Seminar	Donghun Kim	Smart Grid – Building Envelope Interaction/Dynamic Facades	For Orlando	

Seminar	Eric Yang	Utility Grid Battery (large scale) Control Strategies and impact on O&M, LCA	For Orlando	
Seminar/Debate	Carol Lomonaco	LoT Security		
Seminar	Carol Lomonaco	BMS integration with IoT		
Seminar		California Requirement of FDD		
Seminar	Edward Tsui	Best practice of monitoring and instrumentation		Glenn Remington; TC 7.6 and 1.2 will sponsor
	Jin Wen	Low cost sensors	For Austin, Tx	
	Joe Zhou	What the smart valve can do		
Seminar	Jin Wen	Transactive Control – speakers from NREL, PNNL		
Seminar	Eric Yang	Battery Control Strategies and its impact to life cycle cost	Christie Kjellman, Glenn Remington, Srinivas Katipamula	
Seminar	Peter Armstrong	What to do with optimal control?		
Seminar	Andreas Athienitis	Model accuracy impact study on model predictive control		Complete, conference paper, Plan to organize seminar.
Seminar	Josh and Kristen	Smart products for residential and commercial		On going
Seminar	Zhou Joe	Training plan for facilities		Bach to follow up
Seminar	Glen/Bach Tsan	*Building Operations for Grow Applications?*		Develop discussion topics/Review Chicago Seminar
Seminar	Carlos/David	Fundamentals of smart building integration		
Seminar	Smart products for residential and commercial buildings	Josh Rhodes, Kristen Cetin, Zheng O'Neill		
Seminar	Smart Grid – Building Envelope Interaction/Dynamic Facades	Jie Cai, Donghun Kim, Paulo Tabares		
Seminar	Carol Lomonaco /	The role of cloud-based		What the

	Sherry Hu	communication on smart meter technology.		procedure to get the data and what people can do with the data. Sherry Hu can be a speaker. To find more speakers.
Seminar		IOT sensor/calibration		
TBD	Carol Lomonaco	Strong password for BAS		
TBD	TBD	What data the lawyer would like to know –needs to define scope	In future	
Seminar	Peter Armstrong& Li Song	Building optimal / predictive control	For Future	
Seminar,co-sponsor TC 7.9	Li Song& Carol Lomonaco	How BAS can Enhance Existing Building Commissioning	For Future	
Seminar	Srinivas Katipamula	Improving Energy Efficiency of Commercial Buildings thru Data Analytics	For future	
Seminar	Armstrong	Edge computing, Cloud Analytics, and On-Premise Systems – Architectures for Smart Building Systems	For future	
Seminar	Nick Gayeski / Speakers from Armstrong	Smart Transducers with Embedded Diagnostics	For future	
Seminar	Kristin Heinemeier / Kristin &Jon Douglas, someone from TC 7.9?	Fault Detection and Retro-commissioning: Where is the Line and Does it Matter?	For future	
Workshop	Kristin Heinemeier	Lab Methods for verifying that FDD tools for RTUs really work: Will Standard 2007 really work?	For future	
Seminar	Glenn Remington	Case Studies: Using FDD for smarter facility operations / Lessons Learned from FDD implementation	For future	The project has been done for a while
Seminar	Chris Kinney/Michael Munroe/Glenn Remington	FDD and Clouds?	For future	
Seminar	Jin Wen / Zheng O'Neil	Occupancy-based control sensor	For Future	To invite speakers
Seminar	Xiaohui Zhou/Srinivas Katipamula/Jin Wen	Open source platforms for HVAC,VOLTRON	For future	

Any new CEC tracks to propose in 2021?

NEXT IN-PERSON MEETING: Feb., 2020 – Orlando, FL

TC 7.5 Handbook Subcommittee

June 23, 2019 / 4:45 PM~5:30 PM
KCCC, 2202

1. **Web meeting info:**

   Join Microsoft Team Meeting

   Conference #: +1 312-667-7145 (U.S.)
   Conference ID: 389 036 42#

2. **Call to order** (5 min)

   - Meeting called to order at 4:52 PM;
   - One remote participant - Orvil Dillenbeck.

   Report from TC 7.5 handbook Co-Chair (Joe Zhou & Greg Pavlak) (10 min)

   2.1. Status of the current version (Greg)

   - 2019 Applications is available for digital download. Print versions should be out or coming soon;

   2.2. Status of the next version (Greg)

   - Document files for editing were not yet available in the authoring portal. Greg will follow up on this;

   2.3. Schedule for the next version (Joe)

   - We are at the beginning of the new handbook cycle for both Chapter 43 and Chapter 63. We will start holding bi-monthly meetings to start coordinating reviewers and revisions;
   - Zheng O'Neill will lead/organize the revision for Chapter 42, and Greg Pavlak will lead/organize for Chapter 61;

   2.4. Recruit new reviewers/editors for the next version (Joe)

   - Still recruiting more reviewers/editors. Please contact Joe Zhou (jzhou@slipstreaminc.org) or Greg Pavlak (gxp93@psu.edu)

3. **Discussion on Chapter 42 Supervisory Control Strategies and Optimization (Zheng)** (8 min)

   3.1. Plan for review/revise – will start by-monthly web meeting/conf. calls.

   3.2. New section(s) – will add an introduction section at the beginning of the chapter.

4. **Discussion on Chapter 61 Smart Building Systems (Greg)** (8 min)

   4.1. Plan for review/revise

   - Possibly needing to develop an expanded overview/introduction section for connecting more detailed follow-on sections;
   - Comment from Mike Brambley to avoid trying to define "smart buildings." Some discussion on "smart systems" vs "smart buildings".

5. **New chapters needed? (Jin)** (4 min)

- The possibility of a stand-alone FDD chapter as well as a stand-alone Smart Grid chapter were mentioned, but no time for discussion.

6. **New business** (5 min)

   - No time to discuss at the meeting;
   - Joe Zhou went to TC 1.4 and TC 7.3 handbook sub-committee meetings afterwards, and recruited additional reviewers/editors for the two chapters; One new volunteer signed up;
   - TC 7.3 handbook subcommittee chair Orvil Dillenbeck is also recruiting volunteers from TC 7.5 members for handbook chapters related to building operation and management.

7. **Next handbook subcommittee meeting** (5 min)

   7.1. Setup bi-monthly check-in web-meeting, including a web meeting to demo how to edit ASHRAE handbook online (Joe)

   - Joe Zhou will coordinate scheduling of these meetings – please let Joe know if you are interested in participating.

   7.2. Next in-person meeting: 4:45 PM~5:30 PM, Sunday, February 2, 2020, ASHRAE Annual meeting in Orlando, FL.

8. Adjourn

   - Adjourned at 5:30 PM.