

**ABJ50(1) Sensing Technologies Subcommittee Meeting Agenda & Minutes – Tuesday, Jan. 9<sup>th</sup>, 2018, 8:00 am – 9:45 am.**

*Co-sponsored by ABJ50, Information Systems and Technology and ABJ60, Geographic Information Science and Applications.*

1. Held on Tuesday, Jan. 9<sup>th</sup>, 2018, 8 am – 9:45 am in Marriott Marquis Gallaudet U. room (M1)
2. Past year activities:
  - a. 11<sup>th</sup> Sensing Technologies for Transportation workshop organized – held on Thursday, January 12<sup>th</sup>, 2017, 8 am – 12 noon, 103B Convention Center. 8 presentations, including topics: UAS, smart rocks, bridge inspection, lessons learned, imaging radar, railroad bridges, fine scale damage, post-disaster access restoration.
  - b. TRB 2018: Co-sponsored (with ABJ-60) and led Monday 8 am lectern session on “Applications of Unmanned Aerial Systems to Help with Infrastructure”. Good attendance (see Fig. 1). Four presentations:
    - i. Talk 1: “Improving Quality of Bridge Inspections Using Unmanned Aircraft Systems (UAS)” – Barritt Lovelace (Collins Engineers, Inc.)
    - ii. Talk 2: “UAS for pavement and markings and other infrastructure at airports” – Basil Yap (North Carolina DOT)
    - iii. Talk 3: “UAV Studies – TxDOT Experience: Safety protocols and Applications in Transportation Pavement and Bridge Infrastructure” – Joe Adams (Texas DOT) and Surya Sarat Chandra Congress (University of Texas at Arlington)
    - iv. Talk 4: “Implementing UAV applications at the Michigan Department of Transportation” – Colin Brooks (Michigan Tech Research Institute)
  - c. Call for papers submitted with help from Richard Li (U.Louisville) & Co-Chair Zhong-Ren Peng (UFL) – “Sensing Technology Applications to Meet Transportation Data Collection Needs.” Guohui Zhang, U.Hawaii (formerly UNM) – “We have 47 papers (45 for presentation and 41 for publication) received in our committee. 23 out of 45 papers are considered for presentation, and 8 papers are considered for publication” (Last year we had 46 papers submitted).
  - d. Submitted Research Needs Statement on UAS capabilities – submitted & posted July, 2016.
    - i. Need transportation agency input & buy-in when putting together RNS
    - ii. It takes a while to turn a RNS into an RFP... not just a one-year process
  - e. 74 members in Google Group (75 in Jan. 2017, 62 in Jan. 2016, 47 in Jan. 2015, and 32 in Jan. 2014). Used to discuss call for papers, share info on lectern session & sub-committee meeting.
  - f. Web page continued to be updated (workshop presenters listed) at <http://www.abj50.org/subcommittees/sensing-technologies/>
3. This year’s Sensing Technologies Subcommittee meeting – # attendees: 6
4. Priorities for the next year?
  - a. Research Needs Statements. Submitted one on “Increasing Understanding of Unmanned Aerial System (UAS) Capabilities to Address Transportation Infrastructure Issues” but didn’t move forward to becoming a RFP. Need buy-in from one or more transportation agencies!
    - i. RNS – “Guidelines for non-destructive sensing for traffic management” - Richard Li (U.Louisville) – comparison of different available technologies – Bluetooth, Wifi, radar, LiDAR, video, CAV – which one(s) are most appropriate
    - ii. Update the 2016 UAS one with input & buy-in from transportation agencies – “Increasing Understanding of Unmanned Aerial System (UAS) Capabilities to Address Transportation Infrastructure Issues” at <https://rns.trb.org/dproject.asp?n=40981> (C.Brooks – MTU)  
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- iii. Will query subcommittee email list as well
- b. Workshop – UAS subcommittee AVA60(1) led by Daniel Friedenzoh (ERAU) is looking to organize a UAS-focused “double” workshop on UAS applications & regulations on Sunday of TRB AM 2019. I’ve volunteered to help along with Qassim Abdullah of Woolpert.
  - i. Co-sponsoring committees beyond ABJ50?
  - ii. Possibility of working with:
    1. AFB80 (Geospatial Data Acquisition Technologies in Design & Construction)
    2. AHD30 – Structures Maintenance – two UAS for bridge inspection talks at Monday afternoon lectern session
    3. AHD35 – Bridge Management
    4. ABJ60 – Geographic Information Science and Applications
    5. Environmental assessment? ADC10 – Environmental Analysis in Transportation
    6. Construction applications – AFH30 – Standing Committee on Emerging Design & Construction Technologies
    7. AFS00 (Geotechnical Engineering) & AFP00 (Geological & Geoenvironmental Engineering) also looking to host a UAS for geoinfrastructure workshop.
  - iii. Involve private sector, transportation agencies, academia, others
  - iv. Interest from Elsevier Transportation (Tom Stover) in putting out a book focused on UAS applications
- c. Call for papers – did one in 2017, 2016; not in 2015. Demand seems strong. Continue? Many thanks to Guohui Zhang of U.Hawaii for organizing reviews for the past two years!
  - i. Yes!
- d. Webinar? Discussed for past two years, but need someone to take the lead. New topics?
  - i. Focused topic?
  - ii. Sensing technologies that impact certain areas – sensing technologies are tools, tools can impact policy
  - iii. Next year? How to integrate & synthesize data from different sensing technologies – J.Corey
- e. Help with committee attendance / input by having web conferencing capabilities?
  - i. More outreach for subcommittee & what topics we can help with
  - ii. Explain the role of sensing technologies to multiple areas
  - iii. Have a mid-year web meeting to help with subcommittee activity?
- f. Interest from ABJ20 {Statewide Transportation Data and Information Systems} – Jonathan Corey (U.Cincinnati) - new subcommittee? Interest in collaboration & coordination –
  - i. Connected & Automated Vehicle data, smart cities - policy aspects
  - ii. what are people doing to handle CAV data?
  - iii. How do cities work with CAVs – exchange data (“Where is parking in Cincinnati?” – communicate to/from CAVs)
  - iv. Getting data to central repository
  - v. How to handle smart city data?
  - vi. CAVs as weather probes – getting data exchanged
  - vii. Create some new RNS once subcommittee up & running
- g. Vehicles as sensors topic
  - i. How do you route data to centralized system & get data back out to other drivers/vehicles
  - ii. Access to CAV data to evaluate road condition, whether things have changed
  - iii. Need for data standardization (policies & standards) to make data usable

- iv. Data standards need to be adaptable (3-5 year technology cycles)
- v. Role of transportation agencies in being able to use CAV data
- h. New leadership in 2020/2021? C.Brooks – done this since 2011, enable new leadership after 10 years?



**Fig. 1: Surya Congress from UT-Arlington presents on TxDOT-sponsored UAS research, Jan. 9<sup>th</sup>, 2018 at Monday morning “Applications of Unmanned Aerial Systems to help with Infrastructure Inspection” lectern session**

As a reference from Jan. 2017 subcommittee meeting minutes:

- 5. “What next?” for the sub-committee discussion:
  - a. Do we want to do another call for papers vs. having a gap year to let “demand” build up? Helps provide opportunities to submit papers (always looking for reviewer help!). Agreement was to do another one, not wait.
  - b. Research Needs Statement (RNS) generation discussion
    - i. Agreement on doing another one. Our way as a research community to get RFPs generated to be issued by NCHRP, ACRP, etc.!
    - ii. Submitted Research Needs Statement on UAS capabilities – submitted & posted July, 2016. <https://rns.trb.org/dproject.asp?n=40981> “Increasing Understanding of Unmanned Aerial System (UAS) Capabilities to Address Transportation Infrastructure Issues”.
    - iii. Agreed to discuss topics and then decide if they fit best as a RNS vs. webinar vs. workshop
  - c. Webinar – topic - examples of sensing technologies made available through UAS. Discussed in 2016 with Jarlath O’Neil-Dunne UVM & Keith Cunningham Mobile Mapping/MTRI. Topic submissions in March.
  - d. 11 workshops, 10 organized by me... – time for something new! I suggested for ABJ-50 to co-sponsor a lectern session with a call for papers for the 2018 TRB Annual Meeting on implementing sensing

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technologies into day-to-day transportation agency operations. Shorter presentations, more time for a panel discussion.

- e. Discussed topics for RNS or webinar or workshop. Topics could be:
  - i. Other sensors & platforms (not just UAS)
  - ii. InSAR (interferometric synthetic aperture radar) for condition / pavement / construction monitoring
  - iii. Sensing tech for pavement condition monitoring – saving money – big focus for DOTs
  - iv. Bridging the gap between sensors & data visualization – communicating for risk management
  - v. Going from collection to organization to analysis (cost-efficiently) – using data within decision making process – opportunities to work together with other committees/subcommittees – AFH10(1)
  - vi. Applications of UAS (Unmanned aerial systems)
  - vii. New technologies about to start getting implemented
  - viii. Barriers to adoption in DOTs (involves social science) – what are these?
    - 1. Data volume
    - 2. Clarity of regulations
    - 3. Resistance to new technologies
    - 4. Consistent with legacy data – quality, processes, workflows
    - 5. Cost-effectiveness – studies are rare
    - 6. Need better understanding on how data will be used
    - 7. Comparison with other new technologies that have been adopted – mobile LiDAR, 3D GPR as example that have gone from research to implementation in recent years.
- f. We should have more focus if we're going to move to a lectern session – for example, have a focus on one main topic, such as UAS applications. If so, we need to find appropriate co-sponsorship, such as Aviation Committee – Co-Sponsor with ABJ50 & ABJ60, UAS Subcommittee (and more)
- g. Volunteers for organizing actions –
  - i. Call for papers (that would become a lectern session) – Richard Li (U.Louisville) & Zhong-Ren Peng (UFL) – will work together. Possible focus: sensing technologies for traffic data collection. Try to get more “best practice” papers.
  - ii. RNS – I'll work with Amlan Mukherjee (Michigan Tech) – Possible focus: collection to organization to analysis on a cost-efficient basis (getting data used for analysis efficiently) - work with AFH10(1) subcommittee. Other RNS topics & volunteers are very welcome!!
  - iii. Webinar topics –
    - 1. Sensing technologies made available through UAS for transportation agency applications (J.O'Neill-Dunne – U.Vermont - will take the lead)
    - 2. InSAR for condition / pavement / construction monitoring – Brian Bruckno (VDOT), Linbing Wang (Virginia Tech), Ed Hoppe (Virginia Tech) have materials that can be adapted to a TRB Webinar