**S1069 Annual Meeting**

**February 27 – 28, 2019**

**Mississippi State University Franklin Furniture Center**

**Wednesday, Feb 27**

Welcome, logistics, and meeting overview

* Dr. Wes Burger – Associate Director, Mississippi Agricultural and Forestry Experiment Station and Forest and Wildlife Research Center
* Dr. Eric Young – Administrative Advisor of S1069
* Dr. Joby Czarnecki – Host and Chair of S1069

University updates

Participating members had informal presentation of the specific, targeted projects and results from each university as relates to our four objectives. For each objective summarized was the past or current research and findings.

Objective Tasks Breakout Session 1 - Publications

Each group collated available publications specific to their chosen objective. The purpose of this effort is begin compiling information for a database identified in the project’s long-term outputs.

* Objective 1: Collate publications/materials on best practices information for resolution
* Objective 2: Collate publications/materials on current methods for calibration
* Objective 3: Collate publications/materials on problem specific literature
* Objective 4: Collate available extension materials on UAVs developed by member universities

Objective Tasks Breakout Session 2 - Results

Each group crafted an annotated bibliography for publications identified in the first breakout session. Time permitting, groups also engaged in scientific discussion related to issues within the objective and identified where publications could be authored to fill gaps.

* Objective 1: Create annotated bibliography with any findings (group or otherwise) on appropriate resolutions for tasks

Significant discussion about what parameters should be reported in UAV-based journal articles. Many parameters are likely dependent on the specific journal. However, the point was also made that worrying if someone reports their flight speed is meaningless if more critical factors such as calibration practices are not reported. Ultimately it was decided that we can begin to affect change only as reviewers, editors, and authors by reporting the necessary information to adequately portray good data collection practices, and asking the same of others.

* Objective 2: Create annotated bibliography with any findings (group or otherwise) on acceptable min/max for calibration

Due to flux of people in and out of the objective groups, group 2 joined with group 1 for this activity.

* Objective 3: Group created annotated bibliography with any findings (group or otherwise) for specific problems. Group also identified and discussed some specific issues as below.

1. Neal

* Drainage tiles
* Thermal imaging: eBee, Pix4D stitching
* Fixing problems: eye in this sky
* Will lose less (N2O) nitrous oxide

1. Glenn

* 3DR & Sequoia
* Cotton nitrogen status (NDVI, NDRE) vs leaf, nitrogen status map
* Agrisoft vs Pix4D comparison

1. Joe

* Water stress: Ornamental plants
* Canon, MAPIR

1. Dharmendra

* Temperature of boiling water
* Modeling approach to estimate canopy cover (instead of Satellite Data) 🡪 rate change 🡪 instead of stress mapping for HTP 🡪 tested corn & soybean (V8/V9 stage or earlier) 🡪 MicaSense RedEdge vs Parrot Sequoia vs Sentara

1. Rohit

* Headwall Photonics Nanospec (bad sensor)
* Wind damage on corn crop 🡪 RGB (90% overlap) 🡪 Near Infrared image (not so go)

1. Lav

* Discussed our efforts in terms of UAS imagery based grapevine and irrigated row crop physiology sensing; crop ET estimation methods modifications.
* Objective 4: Capture the outreach impact of the group (number of meetings, presentations)

The group discussed that the goal of Extension would be to make UAV a “convenient tool.” The group has been successful individually in producing a large amount of Extension materials, including information videos, newsletters, and webpages. More information is needed on state and local laws and restrictions for UAV operations.

Federal Update via Zoom by Dr. Steven J. Thomson, National Program Leader, USDA NIFA

* NIFA AE program 100 proposals submitted for RFP call?
* AE panel (done), Bioengineering (not)
* NSF/NRI
* NSF/CPS: Do Transition to Practices (on original budget, 400K)
* CPS 17% funding rate (**Medium**) discourage Large one, Small’s are okay
* Seed grants: $300K (talked about separately) Don’t get lot of this applications (5 in AE)
* Strengthening funds
* Conference grant
* Equipment grant (50 K for Strengthens institutions only)
* International CAP collaborations (Palo Gonzales, International Programs)

Q&A about the Micasense Altum via Zoom by Mr. Justin McAllister, CTO MicaSense

* M200 integration possible
* Open API for variety of drone integrations
* TIF, DMG, getHUB
* Pixel classifier mask
* Chlorophyll maps
* DEMs
* Vine row measurement
* San Fier Valley, Chile
* Calibration of Altum: Lepton 3.5 radiometric (Surface temperature): 80 cm/pixel thermal; 5 cm/pixel multispectral

Updates to FAA regulations for UAS by Mr. Madison Dixon, UAS Program Manager and Chief Safety Officer, MSU Raspet Flight Lab

Madison discussed current policies and made attendees aware of updates on the FAA side of things. Some important changes were mentioned such as the abolishment of the “education” clause in the regulation, and the addition of a general knowledge test that will be a requirement for ALL UAV operators, even hobbyists. Timeline however, is unknown.

**February 28, 2018**

Welcome message from Dr. George Hooper – Dean and Director, Mississippi State University

UAV User Panel

An informal Q&A period with real world UAV users. During this time panelist shared their experiences with UAVs in operation, their thoughts on benefits and limitations, and their desires for university research and extension efforts to support them as users. Panel participants: Mr. Zach Reynolds, Precision Ag Data Manager, Southern Ag Consulting, LLC and Mr. Joshua Skidmore, Mississippi Forestry Commission.

Mr. Zach Reynolds

* MS, AL, LS 16 consultants
* Yield monitors, Prescription maps
* Data analytics to drive yield/profit once we hit the glass bottom
* Matrice 100 with RGB, multispectral Imagery, can it make me money?
* 2018 season:
  + lot of flights, water end of the rows, Deere eating, drainage (bad spots) 🡪 NDVI maps
  + Corn stand count🡪 challenging, precision ag data mapper, 6-8” leaf keep or replant decisions; Soybean, wheat, Peanuts
  + Plane imagery: directed scouting (resolution?)
  + More precision ag related class When, where, how?

Mr. Joshua Skidmore

* State forestry Agency, GIS
* Drone pilot
* Drone Deploy
* Tree tops create a challenge
* Timber, wood logs (2-6” resolution), video footage for marking
* Southern fire milt outbreak?
* Airplanes (twice a year in a grid pattern)
* BMP violations (need higher quality images)
* Hanger360: not good experience with the company; data sharing/ownership issues; 360-degree panorama from 1 height spot & do multigrid missions;
  + Forest health issues: needle cast pine trees, browning under the canopy, didn’t work
  + Tree count: need solutions
* Forest fire: other air traffic, not so useful
* Tree species ID: need\*\*\*
* Elevation model: planting decisions

Objective Tasks Breakout Session 3 – Future Plans

* Objective 1:
  + Cody/Joby: Ideal spectral resolution, flight speed
  + Editorial Piece: minimal and optimal standards writing requirements
  + ASABE standards committee (MS60)
* Objective 2: Calibration
  + Thermal targets
  + Optimal number of GCPs and thermal targets
* Objective 3:
* Standardize data collection (UAS user logs 2018) V2.0 is coming out, google spreadsheet group
* Proposal writing:
  + Glenn: USDA NIFA grants (lot of variables to get funding)
  + Need to come up with Thermal Imagery calibration (George Valdés, Georgia)
  + DOE: ARPA-E
  + National weather forecast: Flood forest real-time; **On the flight processing**; (Rohit)
  + Glenn: Combine drone data with NWS
  + Extension: **A common platform for data/image analysis** (?) (Rohit): Tool related projects? Existing software’s need learning curve.
  + Neal: Producer need driven practical solutions, pore sampling
  + Crowdsource datasets: have algorithm that can be tested on such dataset (Rohit)
  + Khot:
    - Factsheets/publications/technical notes on ‘Data Quality’ [calibration and SOPs for thermal, multi-spectral, hyperspectral imagery data collection]
  + Educational challenge grants (Dharmendra as lead PI, Luis?): whom to reach out,
    - Train-the-trainer
    - Coursework material, sourced for user groups, webinars at central location

* Objective 4:

Wasson:

* Extension education (1/2 day) agents
* Webpages/ Publications/Newsletters/webpages

Impacts: Specialty crops, livestock, forestry

Multi-state: eXtension share efforts between state

Roberson (Lead), Wason, Khot

Meeting summary, next steps, elections

Secretary elect: Dr. Ganesh Bora, MSU

Chair elect: Lav Khot, WSU

2019 Meeting Location: Host-Washington State University (Khot), Potential Location: WSU Tri-cities, WA (PSC)/WSU Prosser, WA. Target: Mid-May to Mid-June.