

FREEDM Industry Advisory Board Minutes

August 3, 2017

10:00 am – 11:30 am US eastern



Attendees

Company	Name	Membership Level
ABB	Sandeep Bala	Full
Duke Energy	John Gajda	Full
EPRI	Bruce Rogers	Associate
Florida Power and Light	Paul Taylor	Associate
NYPA	Atena Darvishi	Full
Schneider Electric	Kenny Aron	Associate
Total	Wente Zeng	Full
FREEDM	Ken Dulaney Iqbal Husain	

The meeting began with attendance and reading the antitrust statement. Minutes from June were approved via voice vote. Ken thanked John Shea and John Gajda for representing the IAB during the recent NSF ERC ILO Summit held at NC State. There are several conferences coming up where FREEDM will be represented including PAC World here in Raleigh and ECCE in Cincinnati. Ken pointed members to the website to access posters from the recent PES General Meeting and from the NSF Site Visit. Member access is available after logging in and navigating here: <https://www.freedm.ncsu.edu/projects/>

The main topic of discussion was a review of the Industry Innovation Grant Proposals. Seven members submitted the review forms. Several attendees noted a preference for Google Forms to submit feedback in the future. Ken shared the table below during the meeting. Dr. Husain asked for reviews from three faculty members who did not submit proposals. Most comments from reviewers are copied and pasted as Appendix A to these minutes. The goal of sharing the scores was to allow members to see priorities of other members. There was some discussion on how members can stay involved in approved projects. We noted that approved projects will provide regular research updates to the IAB and that all project results are available to all IAB members.

	ABB	Duke	Eaton	EPRI	Schneider	Total	Weidmann	Faculty A	Faculty B	Faculty C
Bhattacharya	4	4	2.75	2.75	2.75	3	3.5	3	2.75	2.75
Chakraborty	2.75	3	2.5	3.25	2.25	2.5	2	2.25	2	2
DeCarolis	2.75	4	1	3.5	3.5	3.5	3	2.75	2.25	2.75
Li	4	3.75	2.75	3.5	4	2.75	3.75	3.25	2.5	3.5
Yu	3.25	4	2.5	3	2.75	2.75	2.5	3	0.6	2.75

We clarified that the above scores are just a part of the review process. There was some discussion over project duration and total number of projects. The IAB has approved up to \$60k per project per year. It turns out that all the proposals were for one year efforts.

To approve funding the projects, it is necessary for an official IAB vote. That process will be completed via email. During the meeting, we noted that members can allocate their votes across multiple projects. We also agreed that a proposal should receive a minimum number of votes to be considered for funding but we did not establish this minimum.

We also discussed other Year 10 Budget requests. These include the Admin and Marketing accounts and one core project that will support the Total Fellowship. Ken explained the University limits on funding amounts and the approval procedures. Approval will occur via email voting. Ken explained the background of the Full Member Fellowship option and later sent an email with complete details. We also noted changes to expenses allocated to the Admin account. This led to some discussion of overall Center budget, sustainability planning, and how to present to the IAB.

The Annual Industry Conference is being planned for late May or early June as a replacement for the NSF Site Visit. There is also a planned face to face meeting in early December to discuss research ideas among faculty and industry. There was general agreement with the plan and meeting timing.

The meeting adjourned at 11:30 am. Our next meeting will be September 7, 2017 at 10 am US eastern time.

Action Items

1. Ken: Send email to vote on the IIG proposals.
2. Ken: Send email to vote on the core project funding to support Total Fellowship.
3. Ken: Send email with budget details for Admin and Marketing requests.
4. Ken and Iqbal: Prepare Center budget summary to share with IAB.
5. Ken: Survey IAB for December meeting dates and proposed location.

Appendix A: Reviewer Comments on the Industry Innovation Grant Proposals

Bhattacharya: CHIL Demonstration for DC Microgrids

- Not sure of the scalability of the platform to larger systems. Scope needs project schedule.
- There does seem to be a need for this platform in evaluating these topologies. Controller hardware-in-the-loop will provide a flexible test platform to cover full range of testing scenarios without damaging the power devices
- This is a good direction to support visionary research for the FREEDM System – imagining what the future grid could be. Setting up this platform would be especially useful considering that it would have a life beyond NSF funding.
- Good to see utility and vendor support.
- DC architecture is not commonly accepted. This will be another example of a one-off microgrid. Need a standard microgrid design that is accepted by the market. Each manufacturers' equipment may behave differently, so need to make a controller for each type of component and combinations of various components which seems too unwieldy.
- No innovation in the proposal. A Centralized DC Microgrid controller is proposed, an area which is saturated in the literature. Only CHIL evaluation is proposed where similar CHIL demonstration has already taken place in FREEDM. Has support from NYPA, but their letter using PMUs does not link with the proposal. PI is well experienced and the proposal is very well-written.
- Assuming close collaboration with the industry members, i.e. ABB and NYPA, this project could promote the applications of DC microgrid for enhanced reliability and security of utility grid. But DC microgrid controller designs have been thoroughly studied and similar demonstration platforms are available in several academic and research centers. Due to its limited applications (currently), DC microgrids may need a relatively long time to be commercialized.
- The novelty of the proposed project is relatively weak. Not enough details are provided in the work plan.

Chakraborty: Damping of Wind Integrated Power

- Modeling part is standard but may be useful for NYPA. Problem is well identified, but the controller solution is not presented and the innovation cannot be judged. Not connected with FREEDM. PI has good expertise in Power System controls area.
- It seems a specific problem where other commercial companies are already dealing. No information about the plan and the team are presented.
- The idea of using aggregated models instead of full-order model for slow oscillation damping control design in DFIG and SVC is quite innovative and could obviously reduce the complexity of damping control design. The developed damping control of wind turbines could promote the proliferation of wind energy, and allow higher wind penetration.
- Poor proposal with no funding or time commitment. Little confidence in the PI to deliver with any degree of timeliness or budget control with no thought towards program management.

DeCarolis: Microgrid Financial Model

- Economic models of microgrids are needed. But there is no validation of the resulting model, other than with another model.
- While the intent is good, the actual implementation and capturing of all the relevant details that determine the overall cost and maintenance of a microgrid may not be able to be captured and realized with the limited resources made available. Good starting point with DER-CAM.
- With the current development of microgrids, the need for high quality, easy to use and accurate microgrid modelling and optimization tools is increasing, which makes the project valuable. In addition, collaborating with LBNL and Microgrid Labs, the developed enhanced DER-CAM model and new open source model (if successful) could allow future commercialization and attract more funding opportunities.
- Not within the scope of the FREEDM charter, no technical merit, too broad of a subject for the requested funding and time-line. A similar project is already teed-up in NEMA, it is funded at \$150k, and there is still uncertainty regarding the deliverables this project could provide.
- It appears that the industry partner is loosely connected and there is no collaboration with another university and no collaboration with power engineering.

Li: SST Fault Scenario Testbed

- Project addressing the protection of FREEDM system. May be of value to Industry where a comparison on breaker based protection or an intelligent breakerless can be obtained. One year of work should be enough for the project.
- A very challenging topic, which I followed since '90 for DC traction power supply high speed circuit breaker. So far, no commercial solution and reliable proposal surged up. Right to go on with study!
- Very relevant and important topic of system protection that needs to be studied. This would be a great way to show the types of protection needed to develop the necessary standards.
- Microgrid and other power systems all still ill-defined with no standards, making certain protection requirements an unknown target.
- This project explores different architectures for addressing faults in a power-electronics architecture. This work appears to be related to the FID of FREEDM which has been a significant thrust, so how does it leverage that work?
- More quantified requirements should be added to make the milestones measurable. What are the design targets of the SSCB? What test scenarios will be likely involved in the experiments and which performance metrics will be utilized for comparison study? What are the targets of improved SST design under fault conditions?
- It is good to see academia finally recognizing that these devices are integrated into SYSTEMS and the application needs to help to move them beyond the laboratory. If this project will produce a scaleable assessment model vs. just for a single rating and topology, I would increase my rating to 4.

Yu: High Efficiency Modular UPS

- Is useful work on GaN, but lacks relevance to FREEDM. May be of value to Eaton.
- FREEDM's expertise in advanced power electronics is being leveraged, but it's not a direct relationship with FREEDM.
- UPS development seems apart from FREEDM work. What is the connection?
- In my opinion, if this UPS has the possibility to manage also a DC micro or nanogrid would be Good or Outstanding.
- Need to insure that solution needs to be universal rather than specific to one manufacturer.
- Good demonstration of applicability of GaN devices, but scope of product application is limited in the FREEDM charter.