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anoelectronics RESEARCH INITIATIVE

NRI Technical Program Group Meeting

May. 03, 2017

Outline

- IP discussion (from provisional to full patent application): A Concatenable Magnetoelectric Magnetic Tunneling Junction Computational Device
  - 20min presentation by GeorgiaTech team
- Upcoming NRI activities
- nCORE update: E2CDA
- Open mic

4 Provisional IPs Will Need Decisions

	IP	IP Filing	Center	Title	University	Inventors	Type	Status
Patent Issued	IP1384N	P1448	INDEX	Graphene Device Including Angular Split Gate	University of Virginia	Avik Ghosh and Redwan Sajjad	Utility	Congratulations!!! Patent# 9,570,559 Issued 2/14/2017
NEW	IP1626N		INDEX	PRism Geometries in Graphene	University of Virginia	Avik Ghosh, Mirza Elahi and Yaohua Tan		PENDING: UVA is determining whether Prior Art exists
Needs to be reviewed for Conversion to Utility App at **May 2017 TPG**; Due	IP1560N	P1613	NRI / STARnet Benchmarking	A Contencatable Magnetoelectric Magnetic Tunneling Junction Computational Device.	GA Tech	Azad Naeemi, Sourav Dutta and Chenyun Pan	Provsional	Provisional Application filed 7/19/2016
Needs to be reviewed for Conversion to Utility App at **August 2017 TPG**; Due 11/8/2017	IP1593N	P1650	CNFD	Magnetoelectric Memory Cell with Domain-Wall-Mediated Switching	University of Nebraska/Lincoln	Krill Belashchenko, Oleg Tchemyshyov and Alexander Kovalev	Provsional	Provisional Application filed 11/8/2016
Needs to be reviewed for Conversion to Utility App at **Oct 2017 TPG**; Due	IP1586N	P1668	CNFD	UMMTJ (Unipolar Magnetoelectric Magnetic Tunnel Junction)	UT Dallas	Nishtha Sharma and Andrew Marshall	Provsional	Provisional Application filed 1/23/2017
reviewed for Conversion to Utility App at **November 2017 TPG**; Due 2/17/2018	IP1603N	P1676	CNFD	Anti-Ferromagnetic Magneto-electric Spin-Orbit Read Logic	University of Nebraska/Lincoln	Peter Dowben, Christian Binek, Xia Hong, Jonathan Bird and Kang Wang	Provsional	Provisional Application filed 2/17/2017

- Be prepared to evaluate provisional IPs for full filing decisions.

GC Decision on Budget Adjustment

- GC decided to choose scenario 2 to minimize impact on research funding
- Apr. 12 GC meeting is the last regular NRI GC meeting. TPG will continue monthly meetings to the end of 2017.

Centers	Issued patents	Pending applications	Scenario 1	Scenario 2	Scenario 3
INDEX	2	2	$50K	$30K	$35K
SWAN	8	5	$100K	$40K	$50K
CNFD	4	5	$126K*	$75K*	$85K*
WIN	7	0	0	0	0
MIND	4	1	0	0	0

- Scenario 1: based on the expenses required to: (1) pay for all pending applications, and (2) pay for partial maintenance fees (the 1st maintenance fee of 100% patents, the 2nd maintenance fee of 60% patents, and the 3rd maintenance fee of 25% patents.
- Scenario 2: based on the expenses required to pay for all pending applications without paying maintenance fees.
- Scenario 3: adjusted from scenario 2 numbers, considering the possibility of higher filing expenses on some pending applications and the possibility of paying some maintenance of selected patents.
- * CNFD numbers assume that we will file full patents on the 3 provisional applications.

NRI Center Reviews and Annual Review

- E2CDA on-site reviews
  - Penn State University project review (May 12)
  - **E2CDA EXCEL on-site review (May 31 – June 1)**
  - MIT project review (July 20)
  - UIUC project review (July 25)
  - ENIGMA review (August 14)

- INDEX review: Jul. 18-19, Columbia U.
- CNFD review: Aug. 29-30, U. Nebraska at Lincoln
- SWAN review: Sep. 13-14, Austin, TX

- NRI Annual Review: Gaithersburg, MD
  - NRI Final Annual Review: Oct. 17
  - NRI/STARnet Benchmarking Workshop: Oct. 18
  - E2CDA Annual Review: Oct. 19-20

EXCEL Center Review

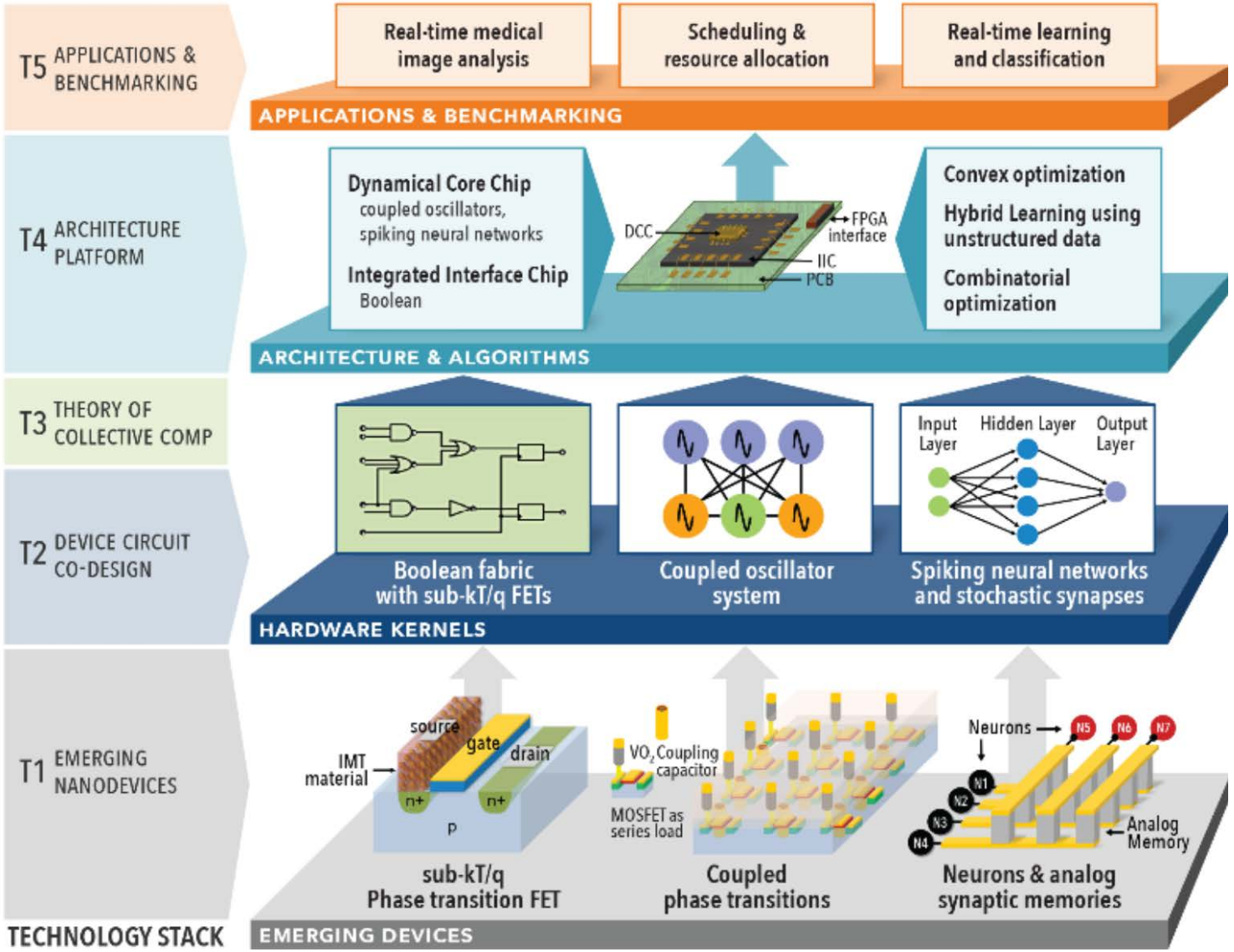
Wednesday, May 31, 2017

Time	Title	Speaker
7:30 am	Light Breakfast & Registration	
8:30 am	NRI Overview	An Chen / NRI
8:45 am	Welcome & EXCEL Overview	Suman Datta / Notre Dame
9:15 am	**Theme 1**: Emerging Nanodevices	Supratik Guha/U-Chicago
9:45 am	Deep Dive: Computing with Coupled Oscillators	Wolfgang Porod/Notre Dame
10:15 am	Break	All
10:45 am	**Theme 2**: Circuit-Device Co-Design	Arjit Raychowdhury / Georgia Tech
11:15 am	**Theme 3**: Theory of Collective Computing	Zoltan Toroczkai / Notre Dame
11:45 am	Deep Dive: Online learning algorithm	Emre Neftci/UC Irvine
12:15 pm	Lunch (Lower Level)	All
1:15 pm	**Theme 4**: Non-Boolean Architecture Platform	X. Sharon Hu / Notre Dame
1:45 pm	**Theme 5**: Applications and Benchmarking	Michael Niemier / Notre Dame
2:15 pm	Deep Dive: neural nets for glial cell detection	Danny Chen/Notre Dame
2:45 pm	Group Photo	All
3:00 pm	Break/Ballroom - Morris Inn	All
3:30 pm	Poster Session / Member-Student Networking - Ballroom - Morris Inn	All
5:45 pm	Adjourn	All

Thursday, June 1, 2017

Time	Title	Speaker
7:30 am	Continental Breakfast	All
8:00 am	Industry Caucus Meets - Auditorium	Industry
8:00 am	PI Meeting (Room 200)	PIs
10:30 am	Industry Feedback - Auditorium	All
11:00 am	Adjourn - Lab Tours	All

EXCEL Research Structure



nCORE Update: E2CDA Panels

Type I: $1-1.5M/yr, multi-university proposals
Type II: $100-200K/yr small proposals

E2CDA	Total funding	SRC $	NSF $	Total proposals	Type I proposals	Type II proposals	Funded type I	Funded type II
Round 1: 2016 (NRI+GRC/EP3C)	$7.2M	$2.4M	$4.8M	100	39	61	6	3
Round 2: 2017 (nCORE)	$6.0M	$2.0M	$4.0M	64	31	33	TBD	TBD

- E2CDA panels:
  - May 1-2: mixed device and architecture type II proposals
  - May 4-5: architecture-oriented proposals
  - May 10-11: device-oriented proposals
- First panel is finished: panel recommended 11 proposals

Open Microphone