ALAKESH KALITA

Research Fellow ECE Dept ◇ National University of Singapore, Singapore
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EDUCATION

Indian Institute of Technology Guwahati, India *January 2018–May, 2022*
***Ph.D.**, Computer Science and Engineering*
Supervisor: **Dr. Manas Khatua**, Dept. of CSE, IIT Guwahati.

Assam Central University, India *July 2014 - May 2016*
***Master of Technology**, Computer Science and Engineering,*
CGPA: 8.34/10 (83.4%)

Assam Don Bosco University, India *July 2008 - June 2012*
***Bachelor of Technology**, Computer Science and Engineering,*
CGPA: 7.26/10 (72.6%)

Abheshwari H.S and M.P. School *2006 - 2008*
*Class: (**10+2**), Percentage: 73%*

Manikpur H.S. School, Assam, India *2005 - 2006*
*Class: **10**, Percentage: 76.83%*

WORK EXPERIENCE

National University of Singapore, Singapore *April 2022 - till now*
Research Fellow
Supervisor: **Prof. Mohan Gurusamy**, Dept. of ECE, NUS, Singapore.

Indian Institute of Technology Guwahati, India *January 2018 - April 2022*
Senior Research Fellow: 2020-April 2022
Junior Research Fellow: January 2018-2020

Indian Institute of Information Technology Guwahati, India *July 2017 - December 2017*
Research Scholar & Junior Research Fellow

Nalbari Polytechnic, Assam, India *April 2017 - June 2017*
Lecturer

North-Eastern Hill University, Shillong, India *August 2016 - June 2017*
Project Scientist

Shriram Transport Finance Company Ltd. *September 2012 - October 2013*
Management Trainee

TEACHING ASSISTANTSHIP

Indian Institute of Technology Guwahati, India *2018 - Till*

- CS101: Introduction to Computing Lab (C Programming), January - July, 2018
- CS343: Data Communication, July - December, 2018
- CS348: Computer Networks, January - July, 2019, 2020
- CS578: Internet of Things, July - December, 2019, 2020, 2021
- CS558: Computer Networks and Operating System Lab, January - July, 2021, 2022

Assam Central University, India *2015 - 2016*

- C Programming Lab

PUBLICATIONS

Journals

J8. **A. Kalita**,and M. Khatua "Time–Variant RGB Model for Minimal Cell Allocation and Scheduling in 6TiSCH Networks," in IEEE Transactions on Mobile Computing, (**Under Review**)

J7. **A. Kalita** and M. Khatua, "6TiSCH – IPv6 Enabled Open Stack IoT Network Formation: A Review," in ACM Transactions on Internet of Things, (**Accepted**), 2022, Link

J6. **A. Kalita**, A. Brighente, M. Khatua, and M. Conti "Effect of DIS Attack on 6TiSCH Network Formation," in IEEE Communications Letters, IF-3.436, vol. 26, no. 5, pp. 1190-1193, May, 2022 Link

J5. **A. Kalita** and M. Khatua, "A Non-cooperative Gaming Approach for Control Packet Transmission in 6TiSCH Network," in IEEE Internet of Things Journal, IF-11.7, vol. 9, no. 5, pp. 3954-3961, 2022 Link

J4. **A. Kalita** and M. Khatua, "Adaptive Control Packet Broadcasting Scheme for Faster 6TiSCH Network Bootstrapping," in IEEE Internet of Things Journal, IF-11.7, vol. 8, no. 24, pp. 17395–17402, 2021 Link

J3. **A. Kalita** and M. Khatua, "Autonomous Allocation and Scheduling of Minimal Cell in 6TiSCH Network," in IEEE Internet of Things Journal, IF-11.7, vol. 8, no. 15, pp. 12242-12250, 2021 Link,

J2. **A. Kalita** and M. Khatua, "Opportunistic Transmission of Control Packets for Faster Formation of 6TiSCH Network," in ACM Transactions on Internet of Things, IF-NA, vol. 2, no. 1, pp. 1-29, 2021, Link

J1. **A. Kalita** and M. Khatua, "Channel Condition Based Dynamic Beacon Interval for Faster Formation of 6TiSCH Network," in IEEE Transactions on Mobile Computing, IF-5.57, vol. 20, no. 7, pp. 2326–2337, 2021 Link

Conferences

C6. **A. Kalita** and M. Khatua, "Opportunistic Priority Alternation Scheme for Faster Formation of 6TiSCH Network," in Proc. of $21st$ International Conference on Distributed Computing and Networking (ICDCN), Jan 2020, pp. 1-5. Link

C5. **A. Kalita** and M. Khatua, "Faster Joining in 6TiSCH Network using Dynamic Beacon Interval," in Proc. of $11th$ International Conference on Communication Systems Networks (COMSNETS), Jan 2019, pp. 454–457. Link

C4. **A. Kalita**, N. Ahmed, H. Rahman, and M. I. Hussain, "A QoS-aware MAC protocol for large-scale networks in Internet of Things," in Proc. of International Conference on Advanced Networks and Telecommunications Systems (ANTS), Dec 2017, pp. 1–6. Link

C3. **A. Kalita**, K. Ray, A. Biswas, and M. A. Hussain, "A topology for network-on-chip," in Proc. of International Conference on Information Communication and Embedded Systems (ICICES), Feb 2016, pp. 1–7. Link

C2. K. Ray, **A. Kalita**, A. Biswas, and M. A. Hussain, "A multipath networkon-chip topology," in Proc. of International Conference on Information Communication and Embedded Systems (ICICES), Feb 2016, pp. 1–7. Link

C1. A. Biswas, M. A. Hussain, and **A. Kalita**, "An improved congestion free modified fat tree network," in Proc. of International Conference on Signal Processing, Communication, Power and Embedded System (SCOPES), Oct 2016, pp. 759-763. Link

WORKSHOP & TRAINING

- An active volunteer of the INDICON'2021 conference held in IIT Guwahati from 19 Dec - 21 Dec 2021
- An active volunteer of the $3rd$ ISEA International Conference on Security and Privacy (ISEA-ISAP 2020) in IIT Guwahati from 27 Feb - 1 Mar 2020
- An active member of organizing committee in two days workshop on "Internet of Things: It's Inside Out" at NEHU, Shillong, Meghalaya from 12 May - 13 May, 2017
- Attended faculty development programme (FDP) in "Cloud Computing with AWS" in association with IIIT Guwahati, oraganized by E&ICT Academy at IIIT Guwahati from 05 Dec - 10 Dec, 2016
- Attended two days workshop on "Internet of Things: A Gateway to Smart and Intelligent Future" at NIT Meghalaya, organized by E&ICT Academy in 2016
- Attended fifteen days summer training on Computer Network at IOCL-Bongaigaon, India in 2011

ACHIEVEMENTS & AWARDS

- Received travel grant to attend ICDCN'2020 conference from IIT Guwahati, India
- Qualified UGC-NET (National Eligibility Test) for Assistant Professor (India)
- Received travel grant to attend COMSNETS'2019 conference from the conference organizer
- Received MHRD scholarship during Ph.D. (2018-2022)
- Bagged second prize in regional innovators conclave conducted by Government of Meghalaya for "Smart Lighting Model", Meghalaya, India 2017
- Qualified GATE'2017
- Secured First Class 2nd position with distinction in Master of Technology
- Received TEQIP-II scholarship during M-Tech (2014-2016)
- Bagged first prize in line follower robotics competition in Assam University, India 2016

- Awarded with Anandaram Boruah Student Award, 2006 for performance of $10th$ standard board examination by State Government of Assam

DOCTORAL THESIS

Title: *Adaptive Resource Allocation for Faster Formation of 6TiSCH IoT Network*
Objectives: Improve the performance of multi-hop 6TiSCH network formation in terms of nodes' joining time, energy consumption, and network stability while following the resource allocation policy made by IETF 6TiSCH-MC standard. The main contributions of the thesis are listed below,

- A Markov Chain model is proposed to show the demerits of fixed beacon interval scheme during the formation of multi-hop 6TiSCH network.
- A *channel condition based dynamic beacon interval* (C2DBI) scheme is proposed to reduce congestion in shared cell, which, in turn, improves the performance of 6TiSCH network formation.
- An *opportunistic priority alternation and rate control* (OPR) scheme is proposed to deal with the demerits of EB's highest priority and to provide sufficient DIO packet quickly.
- An *opportunistic channel access* (OCA) scheme is proposed to transmit urgent control packets with minimum delay.
- A Markov Chain based analytical model is proposed for analyzing the effect of Trickle parameters on 6TiSCH network formation.
- A *dynamic Trickle algorithm* is proposed to reduce congestion in minimal cell and to provide fair DIO transmission opportunity to all the nodes.
- A *slotframe window (SW) based adaptive control packet transmission* scheme is proposed to restrict the nodes from transmitting several control packets within a short period in order to reduce congestion in shared cell.
- Design a non-cooperative game to find optimal control packet transmission probability in a shared cell to alleviate congestion.
- A *game theory based congestion control* (GTCC) scheme is proposed by which nodes can efficiently transmit their control packets.
- An *autonomous minimal cell allocation scheme* (ALLOT) is proposed to utilize all the available channels at a time, and so, to increase the number of shared cells per slotframe.
- A *hierarchical odd-even minimal cell scheduling scheme* (CHOICE) is proposed to schedule the shared cells allocated by ALLOT efficiently.
- Finally, the proposed schemes are evaluated using one or more of the following methods: Markov Chain based theoretical analysis, Contiki-NG OS based Cooja simulator, and FIT IoT-LAB Testbed.

MASTER'S THESIS

Title: *A Fault Tolerant Topology For Network-on-Chip*
Objectives: The main objective of this work was to design a new topology for NoC by keeping in mind various factors such as minimum chip area, high throughput, minimum latency and path diversity. Some of the other tasks were to design an adaptive routing algorithm for the proposed topology and to make it fault tolerant.

- A novel topology was designed for NoC, which provides low latency, better throughput and high path diversity by consuming less chip area.
- An adaptive routing algorithm was proposed for the proposed topology, which changes the routing path depending on loads in each IP core.
- Few spare routers were used dynamically during run time to make the proposed topology fault tolerant.

R & D PROJECT

Title: *QoS Provisioning in Internet of Things*
Role: *Project Scientist*
Funding Agency: Department of Electronics & Information Technology (DeitY), Govt. of India
The main contribution are as follows,

- Implemented IoT based smart lighting application
  - Bagged second prize (of cash 25000 INR) in regional innovators conclave, Government of Meghalaya, India.
- Designed and implemented 6LowPAN-based IoT Prototype
  - Deployed smart street light in NEHU campus, controlled from multi-hop distance.
- Proposed and designed A QoS-aware MAC protocol for large-scale networks in Internet of Things.

– Accepted in IEEE ANTS'2017 conference.

INTERNATIONAL COLLABORATORS

- Prof. Mohan Gurusamy, National University of Singapore, Singapore
- Prof. Mauro Conti, IEEE Fellow, University of Padua, Italy
- Dr. Alessandro Brighente, University of Padua, Italy
- Dr. Nurzaman Ahmed, Dartmouth College, USA

TECHNICAL SKILLS

Technical Skill:	Testbed setup
Programming:	C, C++
Documentation language:	LaTeX, Microsoft Word
Databases:	MySQL
Software & Tools:	**Operating System:** Windows, Linux **Network Simulator:** Contiki OS (Cooja), OMNeT++, NS-3 **IDE:** NetBeans, Arduino, MATLAB, VB
English proficiency:	Duolingo English Test (120/160)

PROFESSIONAL MEMBERSHIP

- IEEE student membership since October 2021 (ID: 96688131)
- ACM student membership since November 2019 (ID: 9926691)

REVIEWER

- IEEE Transactions on Mobile Computing
- IEEE Internet of Things Journal
- IEEE Transactions on Vehicular Technology
- Wireless Communication and Networking (Springer)

Date: 28/05/2022
Place: IIT Guwahati

Signature