ALAKESH KALITA

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EDUCATION

Indian Institute of Technology Guwahati, India   *January 2018– Till*
QS rank 2022: Overall: #395, as Research Institute: #41
***Pursuing Ph.D.(Final Year)**, Industrial Internet of Things,*

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

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

WORK EXPERIENCE

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

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

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**, A. Brighente, M. Khatua, and M. Conti "Effect of DIS atatck on 6TiSCH Network Formation," in IEEE Communication Letter, (**Under Review**)

J6. **A. Kalita** and M. Khatua, "6TiSCH – IPv6 Enabled Open Stack IoT Network Formation: A Review," in ACM Transactions on Internet of Things, (**Under Review**)

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, Early Access, 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, Early Access, 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, Code

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 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 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 2017 IEEE 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 2016 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 2016 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 2016 International Conference on Signal Processing, Communication, Power and Embedded System (SCOPES), Oct 2016, pp. 759-763. Link

WORKSHOP & TRAINING

- An active volunteer of in the organizing committee 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

- Faculty Development Programme (FDP) in "Cloud Computing with AWS" in association with IIIT Guwahati , oragonized by E&ICT Academy at IIIT Guwahati from 05 Dec - 10 Dec, 2016

- Two days workshop on "Internet of Things: A Gateway to Smart and Intelligent Future" at NIT Meghalaya, organized by E&ICT Academy in 2016

- Fifteen days Summer Training on Networking at IOCL, Bongaigaon 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

- MHRD scholarship for Ph.D. (2018-till)

- Bagged second prize in Regional Innovators Conclave conducted by Government of Meghalaya for the "Smart Lighting Model", Meghalaya, India 2017

- Qualified GATE'2017

- TEQIP-II scholarship during M-Tech (2014-2016)

- Bagged first prize in line follower robotics competition, was held in Assam University, India 2016

DOCTORAL THESIS

Title: *Adaptive Resource Allocation for Faster Formation of 6TiSCH Network*
Objectives: The main objective of this work is to make the 6TiSCH network formation process faster by providing various resources such as bandwidth, transmission opportunity, transmission rate of various control packets depending on network situation. The main contributions 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. The SW-based scheme also provides fair control packet transmission opportunity to the nodes.

- Design a non-cooperative game to find out optimal control packet transmission probability of the nodes to alleviate congestion in shared cell.

- 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 cell allocated by ALLOT efficiently.

- Finally, the proposed schemes are evaluated through Markov Chain based theoretically analysis, simulation, and real testbed experiments.

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.

RESEARCH AND DEVELOPMENT PROJECT

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

- Implemented IoT based smart lighting application

  - Bagged second prize (of cash 25000 INR) in Regional Innovators Conclave conducted by Government of Meghalaya.

- 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. Mauro Conti, University of Padua, Italy

- Dr. Alessandro Brighente, University of Padua, Italy

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

REFERENCES

- Dr. Manas Khatua (PhD supervisor)
  manaskhatua@iitg.ac.in

- Prof. Diganta Goswami
  dgoswami@iitg.ac.in

Date: 15/12/2021
Place: IIT Guwahati

Signature