Kheeran K. Naidu

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Education

2020 – present **PhD in Computer Science** at University of Bristol
Researching streaming algorithms and communication lower bounds for graph problems under the supervision of Christian Konrad in the Algorithms and Complexity Theory group.

2016 – 2020 **Integrated Master's in Mathematics and Computer Science *(First-Class Honours)*** at University of Bristol
– Master's Thesis: Probabilistic Machine Learning under the supervision of Carl Henrik Ek.
– Bachelor's Project: Group Theory under the supervision of Francesco Mezzadri.

Publications (by convention, authors are ordered alphabetically by last name)

STOC 2024 **O(log log n) Passes is Optimal for Semi-Streaming Maximal Independent Set**
with Sepehr Assadi, Christian Konrad, and Janani Sundaresan
One of the first optimal multi-pass semi-streaming lower bounds. Proved via round-elimination and message compression arguments with a RS graph-like combinatorial structure.

SODA 2024 **An Unconditional Lower Bound for Two-Pass Streaming Algorithms for Maximum Matching Approximation**
with Christian Konrad
The first unconditional two-pass semi-streaming lower bound, ruling out $(8/9+\varepsilon)$ approximations. Proved via the information-cost tradeoff result for Index with a novel RS graph embedding.

STACS 2023 **Maximum Matching via Maximal Matching Queries**
with Christian Konrad and Arun Steward
Designed a $(5/8)$-approximate greedy-only three-pass semi-streaming matching algorithm. Proved that this is optimal among the class of deterministic greedy-only algorithms.

STACS 2023 **Improved Weighted Matching in the Sliding Window Model**
with Cezar-Mihail Alexandru, Pavel Dvořák, and Christian Konrad
Closed the gap between weighted and unweighted maximum matching for sliding window streams, achieving a $(3+\varepsilon)$-approximate weighted matching in semi-streaming space.

APPROX 2022 **Space Optimal Vertex Cover in Dynamic Streams**
with Vihan Shah (a student-only paper)
Designed an insertion-deletion/sketching algorithm for minimum vertex cover that is optimal up to constant factors, i.e., the space complexity for any α approximation is $\Theta(n^2/\alpha^2)$ bits.

APPROX 2021 **On Two-Pass Streaming Algorithms for Maximum Bipartite Matching**
with Christian Konrad
Proved a restricted semi-streaming lower bound, ruling out $(2/3+\varepsilon)$ approximations for algorithms with a greedy-only first pass (and an arbitrary second pass).

Funding Awards

Sep 2020 – Mar 2024 **EPSRC Doctoral Training Partnership Award for Computer Science** ($\approx$ GBP $80,000$)
PhD funding for full tuition fees, living expenses, and travel provided by EPSRC.

Jan 2024 **SIAM Travel Award for SODA24** (USD 1100)
Conference registration, travel, and expenses support provided by ACM and IBM.

Jan 2021 **SIAM Travel Award for virtual SODA21** (USD 100)
Conference registration support provided by Microsoft Research and Google LLC.

Jul 2016 – Jun 2020 **Astro Scholarship Award** ($\approx$ GBP $120,000$)
Master's funding for full tuition fees and living expenses provided by Astro Holdings Berhad.

Sep 2016 **Barry Thomas Scholarship in Computer Science** (GBP 1000)
A one-off payment for outstanding overseas students provided by University of Bristol.

Work Experience

Sep 2020 – Aug 2023	**Lead Teaching Assistant** at University of Bristol Delivered lectures & problems classes, managed teaching assistants, and prepared & marked exams for undergraduate and postgraduate taught units for *Algorithms*.
Sep 2018 – Aug 2021	**Teaching Assistant** at University of Bristol Delivered problems classes for undergraduate units including *Mathematical Methods for Computer Scientists* and *Communication, Complexity and Number Theory*.
Jul 2021 – Nov 2021	**Head of Technology** at Ma-Kasih Led a tech team of volunteer professional developers over 2 months to re-develop an online platform (https://makasih.care/) for communities struggling during the pandemic.
Jul 2020 – Jul 2022	**Consultant** at Qworky Provided technical knowledge on Algorithms and Machine Learning, and organised an industry-based seminar to improve clients' awareness of AI and technology.
Oct 2018 – present	**Director & Chief Developer** at The Pangean Founded, developed, and managed a non-profit magazine (https://thepangean.com/) with 500+ published articles. In 2023, it received 4000+ visitors per month on average.
Jul 2017 – Aug 2017	**Intern** at Astro Holdings Berhad Shadowed a team manager in the Product and Technology department during the company's shift to a cloud-based system and digitised workplace.

Others

Research Talks (more details at https://kheerannaidu.com/)

SODA (Jan 2024), STACS (Mar 2023), APPROX (Sep 2022, *Virtual*), SACT Seminar (Aug 2022, *Virtual*), IRIF Seminar (Jul 2022), APPROX (Aug 2021, *Virtual*), SCEEM PGR (May 2021, *Virtual*) BCTCS (Mar 2021, *Virtual*).

Languages

English (native), Malay (native), French (proficient with DELF B2).

References

Available on request.