

# SUTIRTHA CHAKRABORTY

RESEARCHER IN COMPUTER SCIENCE

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## RESEARCH INTEREST

Audio Signal Processing, Music technologies, Mathematical modelling, Deep Learning, Pose estimation

## LINKS

[GitHub](#)  
[LinkedIn](#)  
[Google Scholar](#)  
[YouTube](#)

## SKILLS

Fast Learner  
Time Management  
Leadership  
Ability to Work in a Team  
Public Speaking

## TECHNICAL COMPETENCIES

Coding : C, C++, Java, Python,  
Embedded C, Visual Basic Web  
Development : HTML, CSS, C# .NET  
Documentation : Latex, MS Word  
Other tools: SonicPy, Chuck, FL-  
Studio, Mixcraft, Serato

## PROFILE

I am an PhD researcher that is highly passionate about science. I strive for excellence in my contributions. Since I started my undergraduate studies, my interests have always included **Artificial Intelligence**, **Robotics**, **Audio Processing**, and **Music Technology**. I am an active member of our 6-person lab team in Music Tech and AI. I have 5 peer-reviewed publications including one in a Springer Nature journal. I also have experience working with hardware and sensors using the Arduino and Raspberry Pi platforms. Additionally, I am a part-time Computer Science, lecturer, tutor, and demonstrator at school, undergraduate and postgraduate levels.

My thesis is to investigate problems of **human-robot synchronization** in a **musical context** where **the robot** will **react with** and **engage** in **time** and in **phase** to the **rhythm** of **human** musicians. To observe the beat pattern generated by the human musicians I am using a combination of signal analysis and video processing, bolstered by AI techniques to improve the accuracy. I have created as leader-follower tempo analysis system, that has built upon what I have discovered about *rhythmic sway* and *bodily pose* and exploiting this to identify *beat patterns* from video data.

Alongside my academic activities, I have been **designing and developing software solutions** at various levels adopting different programming languages, technologies and methodologies. I have created several interfaces for creative music-making and met the public at the Dublin Maker Fair in 2019. Prior to coming to Ireland I have taken the roles of **software engineer** and **technology leader** in a **start-up** building **home automation technologies**.

## EMPLOYMENT HISTORY

### Part-Time Lecturer at Prudence College, Dublin

August 2020 — Present

- Working as a part-time lecturer for two semesters teaching 'Machine Learning with Python'.
- Worked with diverse cohort of 20 students and helped each student to grow and learn as an academic scholar.
- Worked with a team to research and develop new learning material for incoming students.

### Part-Time Tutor at Adult Education, Scoil Mhuire, Clane

August 2019 — July 2020

- Teaching coding with JAVA.
- Developing logical thinking skills for students from different background and age.
- Developing Android app using AI App Inventor and deploy them in real-time.

### Assistant Professor at Bhagalpur College of Engineering, Bhagalpur, India

January 2018 — January 2019

- Teaching modules for bachelor courses including C/C++, and Data Structures and Algorithms with JAVA, Web Application Design and Development, Object-Oriented Analysis and Design.
- Performed additional duties of subject coordinator, project coordinator, college website coordinator and member of the college NBA Accreditation Committee

#### Co-Founder and Engineer at Amplitech Automation, India

July 2017 — April 2019

- A start-up launched under the **Start-Up India** initiative funded by the Government of India. I chaired the **Board of Directors** for one year.
- Our mission was to design and build innovative home automation products which are easy to use.
- Careful consideration was made to keep the cost of the products to be affordable so that they were easily within reach of the ordinary Indian consumer.

#### Web Developer intern at IBM, Kolkata

June 2012 — August 2012

- Assist in writing well designed, testable, efficient code by using best software development practices.
- Assist in creating website layout/user interface by using standard HTML/CSS practices.
- Assist in integrating data from various back-end services and databases.
- Assist in gathering and refining specifications and requirements based on technical needs.

## 🎓 EDUCATION

#### Doctoral Research, National University of Ireland, Maynooth,

February 2019 — Present

Currently a third-year PhD research on Human-Robot Synchronization for Musical Ensembles. Working with mathematical modelling and machine learning techniques to achieve synchronization between multiple humans and robots in a *'human-like'* manner.

#### Master in Technology, National Institute of Technology Meghalaya

August 2015 — July 2017

- Thesis: "Integrity Checking using Third-Party Auditor on Cloud Storage"
- This work was published. The thesis addressed the challenging task of data integrity verification. This is difficult in cases where the user doesn't possess the data locally. The proposed scheme checks the integrity of data stored at remote locations through a third-party auditor technology using bilinear pairing.

#### Bachelor of Technology, Siliguri Institute of Technology

August 2011 — June 2015

## ★ PUBLICATION

- "Beat Estimation from Musician Visual Cues", **Chakraborty, S.**, Aktaş, S., Clifford, W., and Timoney, J., 2021 18th Sound and Music Computing Conference.
- "The Cyborg Philharmonic: Synchronizing interactive musical performances between humans and machines", **Chakraborty, S.**, Dutta, S. & Timoney, J. Humanities Soc Sci Commun 8, 74. <https://doi.org/10.1057/s41599-021-00751-8>. (2021)

- “Robot Human Synchronization for Musical Performance: Progress and Challenges” , **Chakraborty, S.**, Timoney, J. ,2020 5th International Conference on Robotics and Automation Engineering (ICRAE 2020).
- “LeaderSTeM-A LSTM model for dynamic leader identification within musical streams” , **Chakraborty, S.**, Kishor, S., Patil, S., & Timoney, J. , In Proceedings of the 1st Joint Conference on AI Music Creativity (p. 6). Stockholm, Sweden: AIMC. <http://doi.org/10.5281/zenodo.4285378> . (2020).
- “Integrity checking using third party auditor in cloud storage.” **Chakraborty, S.**, Singh, S., and Thokchom, S., 2018 Eleventh International Conference on Contemporary Computing (IC3). , IEEE, 2018.

## ★ ADDITIONAL RESPONSIBILITIES AND OUTREACH

- Research Assistant (Cryptography exercises in python), Supervisor - Dr. Tom Dowling, Maynooth University
- Summer Camp in Computer Science tutor at Maynooth University 2019-2020
- Subject Coordinator, BCE Bhagalpur
- Project Coordinator, BCE Bhagalpur
- College Website Coordinator, BCE Bhagalpur
- Member in College NBA Committee, BCE Bhagalpur
- Lab Demonstration, NIT Meghalaya
- Captain, Men’s Football Team, NIT Meghalaya

## 🔊 WORKSHOP ATTENDED

- Feb 2020 : HackAccess 2020 Dublin, Organized by Google, Dublin City Council
- June 2018 : Summer Faculty Development Training on Active Learning , IIT Hyderabad, India.
- Feb 2018 : Faculty Development Programme on Machine Intelligence and Internet of Things , Tezpur University, Assam.
- Feb 2018: Workshop on Python Programming Language, Bhagalpur College of Engineering, Bhagalpur, Bihar.
- Jan 2018: Faculty Induction Programme on Teaching Pedagogy, IIT Gandhinagar, Gujarat, India.
- Jan 2018: Workshop on FPGA Based Digital System Design, IIST Shibpur, Howrah, West Bengal, India.
- June 2017: Workshop on Creation and Promotion of Online Teaching Resources, NIT Meghalaya.
- Nov 2016: Internet of Things: A Gateway to Smart and Intelligent Future, NIT Meghalaya
- Aug 2015: Security Issues in Cloud and Machine to Machine Communication, St. Anthony’s College, Shillong, Meghalaya

## 🔊 SEMINARS DELIVERED

- Mar 2021: Hamilton Student Seminar Series on topic ‘*Human Robot Sync for Musical Performance*’, Maynooth University
- Sept 2020: Invited Speaker Student’s personal development in the field of academics. COGNITia
- Demo of ‘Sync Baton’ at Dublin Makers Fair,2019, Dublin
- July 2017: Invited Speaker Scope of Research after Bachelors, Siliguri Institute of Technology.

## 🔊 PROJECTS SUPERVISED

- Optical Character Recognition(2 Students)
- Online Tourism Website (4 students)
- Smart Mirror using Raspberry Pi (2 Students)
- LAN based attendance system (3 students)

## 🔊 REFERENCES

**Dr Joseph Timoney , Associate Professor, Maynooth University**  
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