

# ANIK KUMAR SAMANTA

Advanced Technology Development Centre

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## Research Interests

Signal Processing, instantaneous frequency estimation, spectral estimation, noise characterization.

Estimation theory, detection theory, hypothesis testing.

Supervised machine-learning (interest in multivariate regression analysis)

Condition monitoring, automated feature detection, motor signature analysis, embedded system development.

## Research Experience

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June 2016 – present: Ph.D. Research Scholar, Advanced Technology Development Centre, IIT Kharagpur.

Synopsis seminar delivered on January 28, 2020.

Oct 2012 – June 2016: Research Engineer, Centre for Railway Research, IIT Kharagpur.

June 2011 – Oct 2012: Project Engineer, Real-Time Embedded System Lab, IIT Kharagpur.

Teaching Assistance: Embedded Systems Lab (3 semesters), Real-Time Signal Processing Lab (2 Semester),

Statistical Signal Processing (2 semesters)

## List of Publication

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### Patents Filed:

1. A. Routray, A. Naha, **A. K. Samanta**, Amey Pawar, Chandrasekhar Sakpal, "A system for assessment of multiple faults in induction motors", WO2019167086A1, 2019

### Journal Publication:

1. **A. K. Samanta**, A. Routray, S.R. Khare, & A. Naha, "Minimum Distance-based Detection of Incipient Induction Motor Faults using Rayleigh Quotient Spectrum of Conditioned Vibration Signal," in *IEEE Transactions on Instrumentation and Measurement*, vol. 70, pp. 1-11, 2021.
2. **A. K. Samanta**, A. Routray, S.R. Khare, & A. Naha, "Direct Estimation of Multiple Time-varying Frequencies of Non-stationary Signals". *Signal Processing*, vol. 169, pp. April 2020
3. **A. K. Samanta**, A Naha, A Routray, AK Deb "Fast and accurate spectral estimation for online detection of partial broken bar in induction motors", *Mechanical Systems and Signal Processing*, vol. 98, January 2018
4. A. Naha, **A. K. Samanta**, A. Routray and A. K. Deb, "Low Complexity Motor Current Signature Analysis Using Sub-Nyquist Strategy With Reduced Data Length," in *IEEE Transactions on Instrumentation and Measurement*, vol. 66, no. 12, pp. 3249 – 3259, December 2016.
5. A. Naha, **A. K. Samanta**, A. Routray and A. K. Deb, "A Method for Detecting Half-Broken Rotor Bar in Lightly Loaded Induction Motors Using Current," in *IEEE Transactions on Instrumentation and Measurement*, vol. 65, no. 7, pp. 1614-1625, July 2016.
6. A. Naha, K. R. Thammayyabbabu, **A. K. Samanta**, A. Routray and A. K. Deb, "Mobile Application to Detect Induction Motor Faults," *IEEE Embedded Systems Letters*, vol. 9, no. 4, pp. 117 – 120, Dec 2017.
7. C. Pradhan, C. N. Bhende, and **A. K. Samanta**. "Adaptive Virtual Inertia-Based Frequency Regulation in Wind Power Systems." *Renewable Energy*, vol. 115, pp. 558-574, 2018.

8. A. Naha, **A. K. Samanta**, A. Routray, and A. K. Deb "Determining Autocorrelation Matrix Size and Sampling Frequency for MUSIC Algorithm," *IEEE Signal Processing Letters*, vol.22, no.8, pp.1016-1020, Aug. 2015.
9. A. Mukherjee, A. Routray, and **A. K. Samanta**, "Method for On-line Detection of Arcing in Low Voltage Distribution Systems", *IEEE Transactions on Power Delivery*, vol. 32, no. 3, pp. 1244 - 1252. June 2017.
10. **A. K. Samanta**, A. Naha, D. Basu, A. Routray, and A. K. Deb, "Online Condition Monitoring of Traction Motor", Book chapter in *Handbook of Research on Emerging Innovations in Rail Transportation Engineering*, IGI Global.

## Academic Qualification

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- Pursuing Doctor of Philosophy in signal processing from IIT Kharagpur, CGPA (till coursework): 8.67  
Thesis Title: *Frequency Estimation under Stationary and Non-stationary Conditions - A Case Study of Induction Motor Fault Diagnosis*
- Completed Master of Science (by Research) from IIT Kharagpur, CGPA: 9.69/10.  
Thesis Title: *Designing Real-Time Diagnostics for Squirrel Cage Induction Motors*  
(a) Setting up 22-kW squirrel cage induction motor fault experimental test bed. (b) Development of low-complexity, high-resolution spectral estimator. (c) Development of a real-time SCIM fault simulator.
- Passed B. Tech from Dr. B. C. Roy Engineering College (W.B.U.T) in Electronics and Communication Engineering with a GPA of (8.19/10) in 2011.  
Thesis Title: *An Intelligent Direction Monitoring Wireless System for Moving Objects.*
- (10+2) from South Eastern Railway Mixed Higher Secondary School (CISCE) with 78.8% in 2006.
- 10th from Sacred Heart High School (CISCE) with 80.6% in 2004.

## Mentoring and Supervision

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- 2019: Supervised a team of five interns for development of IoT-based fault detector, portable fault simulator, implementation of spectral estimators, and explored graph signal processing for earthquake epicenter estimation.
- 2018: Supervised two interns for non-stationary frequency estimation and detection of stationarity.
- 2017: Development of Wi-Fi current sensor, Internet based fault detection, and modification of Android based fault detection with four interns.
- 2016: Development of Android based fault detection system with one intern.
- 2015: Modification of the SCIM simulator with .mat initialization with one intern.
- 2014: Supervised a team of six interns for ARM implementation of the fault detection algorithm, efficient solvers for matrix inversion, and fast implementation of matrix multiplication.
- 2013: Mentored three interns in developing the SCIM fault simulation platform using SIMULINK real-time.
- 2012: Mentored a team of two interns in developing ARM-based signal processing application using CMSIS.

## Hardware/Software Proficiency

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- Hardware Platforms: Intel-based SBC, STM Discovery boards, and Raspberry Pi.
- Software Packages: MATLAB, Simulink, Simulink Real-time, Python, Google Colabs, Tensorflow, LaTeX.

## Achievements

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- Secured **All India Rank** of **225**, with a rank of **35 in chemistry** nationwide in National Science Talent Search Examination '05.
- An active member of organizing committee of Entrepreneurship Week '09, (champion's runners up.)
- Won the second prize for exhibiting '**Burning but not burning**' at S. E. Rly. Boys High School in 2006.

## Extra-Curricular Activities

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### Professional Activities:

- Chair, IEEE Signal Processing Society Student Branch Chapter, IIT Kharagpur (2017-2019).
- Founding member and Treasurer of IEEE Signal Processing Society Student Branch Chapter, IIT Kharagpur (2016-2017).
- Graduate Student Member IEEE, and IEEE Signal Processing Society.
- Reviewer of
  - IEEE Transaction on Instrumentation and Measurement
  - IEEE Transaction on Industrial Applications
  - IEEE PES Transactions on Sustainable Energy
  - Elsevier Measurement
  - Elsevier Shock and Vibration
  - International Journal of Electrical and Computer Engineering (IJECE)
  - IEEE Engineering in Medicine Biology Conference
  - International Conference on Systems in Medicine and Biology 2016
- Hobbies:
  - Swimming
  - Numismatics.
  - Reading novels.

## Personal Details

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- Date of Birth: January 10, 1988.
- Father's Name: Pankaj Kumar Samanta.
- Languages Known: English, Hindi, and Bengali.

I hereby declare that the above information is true to the best of my knowledge.

Regards

*Anik Kumar Samanta*

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(ANIK KUMAR SAMANTA)

Date: February 22, 2021

Place: Kharagpur, WB.