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**Dr. Butta Singh**  
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**Dept. of Engineering and Technology**  
**Guru Nanak Dev University Regional Campus**  
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## **EDUCATION**

**B.Tech** (Electronics & Communication Engineering), Guru Nanak Dev Engineering College, GNE Ludhiana, Punjab.

**M.Tech** (Instrumentation & Control Engineering) Sant Longowal Institute of Engineering and Technology, SLIET Longowal, Punjab.

**PhD**, National Institute of Technology, NIT Jalandhar, Punjab.

## **RESEARCH INTERESTS**

Heart Rate Variability, Signal Processing with Applications to Biomedical Engineering, Image Processing, Control Systems

## **ACADEMIC EXPERIENCE**

**CURRICULAR TEACHING:** UG and PG- 13 Years

**RESEARCH SUPERVISION:**

**PhD Theses** : 1 awarded + 2 in progress

**M.Tech Dissertations** : 13 completed

## **INSTITUTE RESPONSIBILITIES**

**Current and Past:**

Member, Campus Mess and Canteen Committee

Incharge, Training and Placement (Electronics and Communication Engineering)

Member, Department Board of Control

Member, Campus Sports Committee

Class Coordinator

Lab In-charge

## **PROFESSIONAL ACTIVITIES**

### **SHORT TERM COURSES/WORKSHOP ATTENDED**

1. Training on “Autonomic Function Testing” Department of Physiology, All India Institute of Medical Sciences, AIIMS, New Delhi, June 10 – June 25, 2009
2. Short Term Course on “Biomedical Signal Processing”, Department of Electrical Engineering, Indian Institute of Technology, IIT Roorkee, June 29 - July 3, 2009
3. Workshop on “Medical Imaging: Techniques and Image Processing” Indian Institute of Technology, IIT Delhi, March 25, 2016- March 27, 2016

4. Workshop on “Virtual Labs” Indian Institute of Technology, IIT Roorkee, April 24, 2015- April 25, 2015
5. QIP workshop on “Bioelectrical Signals and Fields” Department of Electrical Engineering, Indian Institute of Technology, IIT Roorkee, October 12 - October 13, 2009
6. Short Term Course on “Modern Practices in Measurement and Instrumentation Engineering”, Department of Instrumentation and Control Engineering, National Institute of Technology, NIT Jalandhar, July 13 – July 17, 2009
7. UGC Sponsored Orientation Course, HRDC Guru Nanak Dev University, GNDU Amritsar, June 7 - July 4, 2012
8. Short Term Course on “Instrumentation and Signal Processing”, National Institute of Technology, NIT Jalandhar, January 11 – January 15, 2010
9. UGC sponsored STC on “Research Methodology and Statistics” HRDC Guru Nanak Dev University , GNDU Amritsar from Feb 10, 2014 to Feb 12, 2014
10. Short Term Programme on “Optical Fiber and its Applications”, National Institute of Technical Teachers Training and Research, NITTTR Chandigarh, January 9 – January 13, 2006
11. Short Term Course on “Instrumentation and Signal Processing”, National Institute of Technology, NIT Srinagar, June 21 – June 25, 2010
12. Short Term Course on “Signal Processing and Artificial Intelligence with Applications in Biomedical Engineering” National Institute of Technology, NIT Hamirpur, June 16 – June 27, 2008
13. UGC Sponsored Special Summer School HRDC Guru Nanak Dev University, GNDU Amritsar, May 30 - June 19, 2013
14. Short Term Course on “Medical Signal Processing” National Institute of Technology, NIT Jalandhar, December 23, 2013- December 27, 2013
15. Short Term Training on “Digital Signal Processing: Concepts and Applications”, Guru Nanak Dev Engineering College Ludhiana, December 18 – December 22, 2006
16. Workshop on “Statistical Techniques in Biological and Medical Sciences” Jaypee University of Information Technology, JUIT Waknaghat , June 04-09, 2018

### **SHORT TERM COURSES ORGANISED**

1. Coordinator STC on “Intellectual property rights and patenting” at GNDU RC Jalandhar from April 21, 2014 to April 25, 2014
2. Coordinator STC on “E-governance in Technical institute” at GNDU RC Jalandhar from July 27, 2015 to July 31, 2015

### **Patent**

<b>Patent</b>	<b>Detail</b>
Automotive Adaptive Electrocardiogram QRS Pattern Design for Data Compression	Intellectual Property India Application Number: 201931041139 Publication Number: 50/2019 Publication Date: 13/12/2019 Status: Published

## **PUBLICATIONS**

### **JOURNALS:**

1. "Quality controlled ECG data compression based on 2D discrete cosine coefficient filtering and iterative JPEG2000 encoding", *Measurement*, 152, 2020.
2. "A hybrid algorithm for robust image steganography", *Multidimensional Systems and Signal Processing*, 2020.
3. "A novel fused coupled chaotic map based confidential data embedding-then-encryption of electrocardiogram signal", *Biocybernetics and Biomedical Engineering*, 39(2), pp. 282-300, 2019.
4. "Complexity sorting and coupled chaotic map based on 2D ECG data compression-then-encryption and its OFDM transmission with impair sample correction", *Multimedia Tools and Applications*, 78 (9), pp.11223–11261, 2019.
5. "A morphologically robust chaotic map based approach to embed patient's confidential data securely in non-QRS regions of ECG signal", *Australasian Physical & Engineering Sciences in Medicine*, 42(1), pp. 111–135, 2019.
6. "An integrated approach using chaotic map & sample value difference method for electrocardiogram steganography and OFDM based secured patient information transmission", *Journal of Medical Systems*, 41(187), 2017.
7. "A 2D electrocardiogram data compression method using a sample entropy-based complexity sorting approach", *Computers & Electrical Engineering*, 56, 2016.
8. "A joint application of optimal threshold based discrete cosine transform and ASCII encoding for ECG data compression with its inherent encryption", *Australasian Physical & Engineering Sciences in Medicine*, 39, pp. 833–855, 2016.
9. "Ectopic beats in approximate entropy and sample entropy based HRV assessment", *International Journal of Systems Science*, 43 (5), pp. 884-893, 2012.
10. "Effect of threshold value  $r$  on multiscale entropy based HRV", *Cardiovascular Engineering and Technology*, 3(2), pp. 211-216, 2012.
11. "Modified multiscale entropy in HRV for automatic selection of threshold value  $r$ ", *International Journal of Medical Engineering and Informatics*, 4(1), pp. 55-65, 2012.
12. "Ectopic beats and editing methods for Poincaré plot based HRV", *International Journal of Biomedical Engineering and Technology*, 7( 4), pp. 353-364, 2011

### **Books Edited/ Authored:**

1. "Computational Tools and Techniques for Biomedical Signal Processing" IGI Global, ISBN: 978-1-5225-0660-7. (SCOPUS Indexed)
2. "Medical Data Security for Bioengineers" IGI Global, ISBN: 978-1-5225-7952-6
3. "Entropy and Heart Rate Variability" Lambert Academic Publishing Germany, ISBN: 978-3-659-41918-8

### **Book Chapters:**

1. "Integer Wavelet Transform-Based ECG Steganography for Hiding Patients' Confidential Information in e-Healthcare Systems", *Soft Computing: Theories and Applications, Advances in Intelligent Systems and Computing*, pp. 513, Springer

2. "A Hybrid Image Steganography Using Chaotic Maps in DCT Domain", *Soft Computing: Theories and Applications, Advances in Intelligent Systems and Computing*, pp. 649, Springer
3. "Chaotic function based ECG encryption system", *Handbook of Research on Healthcare Administration and Management*, pp. 205-221, IGI Global
4. "Nonlinear complexity sorting approach for 2D ECG data compression", *Computational Tools and Techniques for Biomedical Signal Processing*, pp. 1-21, IGI Global.
5. "Analysis of electrocardiogram data compression techniques", *Computational Tools and Techniques for Biomedical Signal Processing*, pp. 272-313, IGI Global.
6. "Robust steganography in non-QRS regions of 2D ECG for securing patients' confidential information in E-healthcare paradigm", *Medical Data Security for Bioengineers*, pp. 27-51, IGI Global
7. "Medical data security tools and techniques in E-health applications", *Medical Data Security for Bioengineers*, pp. 124-131, IGI Global.
8. "Bernoulli's chaotic map-Based 2D ECG image steganography: A Medical Data Security Approach", *Medical Data Security for Bioengineers*, pp. 208-24, IGI Global.

**Conferences/ Invited talk: 30**