CV

SOLOMON A. TESFAMICAEL

ASSOCIATE PROFESSOR | NORWEGIAN UNIVERSITY OF SCINCE AND TECHENOLOGY (NTNU)

QUALIFICATION

PhD in Signal Processing
MSc in Algebra
B.Ed. in Mathematics

DIGITAL SKILS

- Microsoft -WORD, EXCEL,
- MATLAB
- Python
- Latex
- GeoGebra, CAS

EXPERIENCE

ASOCIATE PROFESSOR • DEPT. OF TEACHER EDUCATION AT NTNU • JANUARY 2016 – NOW

Teaching courses in Mathematics education to student teachers for grades 1-7, 5-10. Researching in mathematics education. Supervise bachelor, masters and PhD student's thesis.

Project member at NORHED-BDU This project is a 5-year (2016-2021) institutional partnership project among Bahir Dar University (BDU), Norwegian University of Science and Technology (NTNU), and the University of Juba (UoJ).

LECTURER • FLT-HIST • AUGUST 2013 - DECEMBER 2015
Teaching courses in Mathematics education to student teachers for grades 1-7, 5-10. Researching in mathematics education. Supervise bachelor student's thesis.

LECTURER • FLP-HINT • AUGUST 2012 - JULY 2013
Teaching courses in Mathematics education to student teachers for pre-schools, grades 1-7, and 5-10 teachers at Nord - Trondlag University College (HiNT).

COURSE ASSISTANT AT IET, NTNU • JAN 2011 - JUNE 2012
At the department of Electronics and Telecommunication (IET) Faculty of Information, mathematics and Electrical Engineering (IME), NTNU Assisted Courses: Information and Coding theory, Digital Signal Processing, Digital Communication, Statistical Signal Theory.

LECTURER • AT BDU • SEPT 2000 - JULY 2002
Lectured many freshman and pre-engineering courses. SANS department Coordinator: For two years I was working as the coordinator of SANS department at the Engineering faculty (POLY), Bahirdar University (BDU). There I have worked as Freshman and Pre-engineering students Coordinator for both Regular and Extension Students.

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CONTACT

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  Solomon.a.tesfamicael@ntnu.no
  solomonabedom@gmail.com
- **Phone:**
  +47 46448786
  +47 7341209

MATHEMATICS TEACHER • MOHAMMED HANFERE JUNIOR AND SECONDARY SCHOOL – ASSAYITA, AFAR REGION ETHIOPIA FLP-HINT • SEPTEMBER 1992 - JUNE 1996

Teaching mathematics for grades 7-12.
Unit leader: the last two years I have worked as unit leader and I was part of the different school leadership committees

EDUCATION

PHD • SEPT 2009 - JUNE 2016 • NTNU
At the department of Electronics and Telecommunication (IET) Faculty of Information, mathematics and Electrical Engineering (IME) Norwegian University of Science and Technology (NTNU) Under Professor Lars Lundheim and Ralf R. Muller.

Thesis title: Compressed Sensing in Signal processing: Performance Analysis and Applications. The Abstract of the thesis is attached at the end. Due to my former background in Mathematics, I was required to take courses in graduate and under graduate in Signal processing (Courses like: Digital Signal processing, Digital Communication, Multiuser Communication, Information and Coding theory, and the like). In addition, other mathematical courses in Numerical methods and Statistics.

FPPU • AUGUST 2011 - JUNE 2012 • NTNU
Fleksibel praktisk-pedagogisk utdanning (FPPU). This was only one-year study. To get the practical pedagogical knowledge to be teacher at Norwegian School system. The program is in Norwegian.

MATHEMATIC ANALYSYS COURSES • AUGUST 2006 – JUNE 2009 • NTNU
Different Analysis courses in Mathematics at the department of, IME, NTNU Complex analysis, Fourier analysis, Functional analysis, Partial differential equations, Sobolov Space ... (due to earlier plan to pursue PhD in Analysis)

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ATTENDED CONFERENCES WITH PRESENTATION

AFRICME 5 -2018
(Dar Es Salaam)

NoRMA -2017
(Stockholm)

CERME 10 -2017
Doblin

NoRDIC-2016
(Trondheim)

IEEE AFRICON 2015
(Addis Ababa)

IEEE - UKSim 2015
(Cambridge University)

SIP 2015
(Zurich)

MedViz Conference 2014
(Bergen)

ICSIA 2014
(Nottingham)

IACSIT 2014
(Melbourne)

RDSP 2013
(Istanbul)

MSC • AUGUST 2002 - AUGUST 2004 • NTNU
MSc in Coding theory – Algebra (August 2002 – August 2004): At the department of Mathematics, Faculty of Information, mathematics and Electrical Engineering (IME) Norwegian University of Science and Technology (NTNU) Under Professor Idun Reiten and Associate professor Dag Madsen.

BED • JUNE 2004 • NTNU
Bachelor of education (BED) in Mathematics (Sept 1997 – June 2000): At the department of Mathematics, Faculty of Education, Bahir Dar University (BDU).

DIPLOMA IN MATHEMATICS • DECEMBER 1991 – JUNE 1993 • BDTC
Trained as mathematics teacher for junior and lower secondary schools at Bahir Dar Teachers College (BDTC), Addis Ababa University (AAU)

HIGSCHOOL DIPLOMA • SEPTEMBER 1987 – SEPT 1991 • FASILEDES
Studied high school at Fasiledes Comprehensive High School, Gonder.

PROFESSIONAL DEVELOPMENT

READING SEMINAR WITHIN MATHEMATICS EDUCATION • AUGUST 2015 – DEMBER 2018 • FLT(HIST) AND NTNU

Reading Seminar group at Mathematic Section of former FLT (or present faculty of teacher Education at SU, NTNU) lead by Professor Tim Rowland (Emeritus Reader at Cambridge University, Professor II at NTNU) et al. in order to build capacity of doing research in mathematics education.

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ATTENDED SUMMER SCHOOLS

Compressed Sensing - 2011
At the Institut Henri Poincaré
(Paris)

IEEE Information Theory Society
2012 - (Antalya)

RESEARCH INTEREST

• **Mathematics Education**: - Current Research - on Comparative studies in the teaching and learning of mathematics in Ethiopian and Norwegian Schools (textbook comparison, teacher training/preparation).

Interest: Mathematical Teacher knowledge for teaching, textbook design, preschool mathematics, engineering education

• **Signal processing,** Compressive Sensing, Multiuser Communication, Wireless Communications-Random Matrix Theory, Replica Methods. Information Theory

• Functional Magnetic Resonance Imaging (fMRI), Magnetic Resonance Imaging (MRI).

PUBLICATION

Articles in journals with referee:

Tesfamicael, Solomon Abedom, Compressed Sensing Performance Analysis Via Replica Method Using Bayesian Framework, International Journal of Simulation, Systems, Science and Technology(IJSSST), 2015: Volume 16.(3) page 16.1-16.11

Tesfamicael, Solomon Abedom; Barzideh, Faraz. Clustered Compressive Sensing: Application on Medical Imaging. International Journal of Information and Electronics Engineering 2015 ; Volum 5.(1) s. 46-50

Tesfamicael, Solomon Abedom; Barzideh, Faraz. Clustered Compressed Sensing in fMRI Data Analysis Using a Bayesian Framework. International Journal of Information and Electronics Engineering 2014; Volum 4.(2) s. 74-80.

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PLACES VISITED

Cambridge University
Nottingham
Doblin
London
Zurich
Paris
Amsterdam
Copenhagen
Stockholm
Oslo
Istanbul
Antalya
Dubai
Melbourne
Livingstone
Dar Es Salaam
Addis Ababa

Book (parts of a book):

Tesfamicael, Solomon Abedom; Faraz, Barzideh. Bayesian Inference and Compressed Sensing.: Bayesian Inference. INTECH 2017 ISBN 978-953-51-3578-4. s. 257-278

PhD Thesis: Compressed Sensing in Signal processing: Performance Analysis and Applications. NTNU, Trondheim: NTNU grafisk senter 2016 (ISBN 978-82-326-1703-6) 160 s.

Master Thesis: Quantum Reed- Solomon Codes, Coding theory (2004).

How to teach mathematics: A text book in Methodology of teaching mathematics, (issued by the Department of mathematics at BDU) 2002.

Master Thesis: Bjørn

Conference proceedings:

Tesfamicael, Solomon Abedom. Comparative Study: The case of mathematics Teacher Preparation (MTP) programs in Norway and Ethiopia. AFRICME 5, 2018, International Mathematical Union (IMU); 2018-08-29 - 2018-08-31

Tesfamicael, Solomon Abedom. Seminar on Reform in Mathematics Education in Ethiopia. Ministry of Science and Technology (MoST) in Etiopia, UoG, and Region 3 Scince and Technology Comisioner.; 2018-09-03 - 2018-09-13

Tesfamicael, Solomon Abedom; Botten, Geir Harald; Lundeby, Øyvind Andersen. The teaching and learning of relations and functions: A Comparative study of Norwegian and Ethiopian textbooks. CERME 10, to be published in 2017.

Tesfamicael, Solomon Abedom; Barzideh, Faraz. CLUSTERED COMPRESSIVE SENSINGBASED IMAGE DENOISING USING BAYESIAN FRAMEWORK. Fourth International Conference On Signal & Image Processing (SIP 2015); 2015-01-02 - 2015-01-03

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Tesfamicael, Solomon Abedom; Barzideh, Faraz; Lundheim, Lars Magne. Improved Reconstruction in Compressive Sensing of Clustered Signals. IEEE AFRICON 2015; 2015-09-14 - 2015-09-17

Tesfamicael, Solomon Abedom; Bruhetesfa, Godana. Compressed Sensing Performance Analysis via Replica Method using Bayesian framework. IEEE UKSim 2015; 2015-03-25 - 2015-03-27

Tesfamicael, Solomon Abedom; Faraz, Barzideh. Clustered Compressed Sensing Via Bayesian Framework. UKSim-AMSS 17th International Conference on Modeling and Simulation; 2015-03-25 - 2015-03-27

Tesfamicael, Solomon Abedom; Lundheim, Lars. Compressed Sensing Based Rotative Quantization in Temporally Correlated MIMO Channels. International Workshops in Electrical Electronics Engineering; 2013-09-05 - 2013-09-07.

Godana, Bruhtesfa Ebrahim; Ekman, Torbjörn; Tesfamicael, Solomon Abedom. Block Diagonal Inversion Precoding for MIMO Broadcast Channels. Vehicular Technology Conference, VTC 2012-Fall; 2012-09-03 - 2012-09-06.

Godana, Bruhtesfa Ebrahim; Ekman, Torbjörn; Tesfamicael, Solomon Abedom. Block Diagonal Inversion Precoding for MIMO Broadcast Channels. I: Vehicular Technology Conference (VTC Fall), 2012 IEEE. IEEE Press 2012 ISBN 978-1-4673-1880

SUMMER SCHOOLS:

➢ Spring – Summer School Random Matrices – Stochastic Geometry Compressed Sensing, Paris, France, June 20 – 21, 2011.

➢ IEEE Information Theory Society, the 2012 IEEE European School of Information Theory, 16th-20th April 2011, Antalya, Turkey.

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COURSES THOUGHT:

Courses I taught at ILU, FLT (NTNU), HiST, HiNT, NTNU and BDU:

Matematikk for Førskolelærer (FLU220),

Matematikk 1 (1-7) (GLB110),

Matematikk 1 (5-10) (GLU 230)

Matematikk 1 (1-7) emne A, (Spring 2014),

Matematikk 1 (1-7) emne B, (Autumn 2014, Autumn 2015, 2018)

Matematikk 1 (5-10) (Spring 2013, 2014, 2015, 2016) ,

Matematikk 2(5-10), (2014, 2015, 2016, 2017, 201),

Master Course. Teaching and Learning of Mathematics – in Zambia at DALICE

Master Course: Teaching Learning of Mathematics I: at BDU – NORHED project

Courses I taught at IET/NTNU:

Digital Signal Processing (TTT4120),

Digital Communications (TTT4130),

Information Theory (TTT4125),

Statistical Signal Processing (TTT4240).

Courses I taught at BDU:

Preliminary Mathematics (math 101), Freshman Mathematics (math 160),

Quantitative mathematics (Qu. Mt 101), Quantitative mathematics (Qu. Mt 102),

Quantitative mathematics (Qu. Mt 103), Basic Mathematics-I (math 107),

Basic Mathematics-I (math 107), Area methods (math 251),

Applied mathematics (math 231)

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VOLUNTEER EXPERIENCE OR LEADERSHIP

Sept 1995 – June 1997 Ethiopian Red Cross Society Afar Region Youth Secretary.

After training by the Ethiopian Red Cross Society, took the responsibility of leading the Red cross activity in the Region.

Sept 1995 – June 1997 Football referee

Trained as football referee by Ethiopian Football Federation (EFF), in Afar region participated as assistant referee.

Sept 1998 – June 2000 Fellowship Leader

Campus Students Christians fellowship leader at BDU

August 2003 - June 2009 International Church Leader

In this time period, I had the opportunity to serve as cell group leader, international church leader, and also as pastor.

During 2004-2006 I have attended Bible School and theology School. That helped me to help myself and others spiritually and socially.

Sept 2009 – Nov 2011 Board Member

In this time period, I had the opportunity to serve as the mission board member of Betel Pentecostal Church Trondheim Norway, a Norwegian Church.

Jan 2014 – Dec 2015 Elder in Ebenezer Church in Trondheim

In this time period, I had the opportunity to serve as elder and teacher of the Bible among the Ethiopian and Eritrean Community.

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ABSTRACT (OF PHD THESIS)

This thesis deals with an emerging area of signal processing, called Compressive Sensing (CS), that allows the reconstruction of sparse or compressible signals from fewer measurements than are used in traditional schemes. Like traditional signal representation schemes, CS follows a similar framework: encoding, transmission/storing, and decoding. The encoding part is done using random projection (RP) or random sensing, and the decoding is done via nonlinear reconstruction algorithms from a reduced amount of measurements. The performance of the reconstruction schemes used and the application of such paradigm are the two main focuses of the thesis. It has three parts: the introduction, performance analysis of recovery algorithms in CS and some applications of CS.

The introductory part provides the background for the following four chapters. It begins by defining the basic concepts used in CS theory and presents the Bayesian framework. Further, an analytical tool from statistical mechanics for performance analysis of physical systems is introduced applied on a non-noisy CS problem. The Bayesian framework is given ample emphasis in the thesis for two reasons. First, it serves as a bridge between the recovery algorithms used in CS and a tool from the statistical mechanics, called the replica method. Second, it is used as main framework to incorporate different prior signal information, like sparsity and clusteredness. Furthermore, a short description of CS applications is given before the introduction concludes by presenting the scope and the contribution of the thesis.

The second part of the thesis deals with the study of the performance of recovery methods in CS systems using the Replica Method. At the beginning, the study of the performance of the recovery algorithms in CS was focused on the ratio of the amount of measurement used, the sparsity level, and how accurate the recovered information is. However, there was a luck of universal performance analysis. The Replica method provides this by considering large size systems. This thesis contributes to such analysis via the Bayesian framework. In this work noisy CS systems

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are considered and the recovering algorithms are reinterpreted as a maximum a posteriori (MAP) estimator. It, therefore, provides replica analysis including one step replica breaking ansatz for CS systems as an extension of similar analysis done for other systems like multiple input/multiple output (MIMO).

The CS application is the third part of the thesis. The theory of CS has been applied in many signal processing fields such as image processing, communication, networks and so on. There are hundreds, if not thousands of articles on this subject at present. In this thesis, there are novel results that contribute to the application of CS theory. The theory is applied to limited feedback in temporally correlated MIMO channels, where the sparsity property was used to reduce feedback overhead significantly while delivering the same performance. Further, including another assumption, i.e., more structure among the sparse entries, to the sparsity of signals, and modeling it as a modified Laplacian prior in Bayesian setting, a novel way of compressive sensing is presented in this thesis. It can have potential impact on medical imaging processing, especially to magnetic resonance imaging (MRI).