

Mojtaba Khodadadi

Research Interests

- Complex Systems
- Online Social Media & Networks
- Computational Social Science
- Stochastic Processes
- Econophysics
- Machine Learning

Education

- 2013 – 2015 **M.Sc. Condensed Matter Physics**, Isfahan University of Technology, Isfahan, Iran,
(Expected) GPA: 19.06/20 (4.00/4.00).
Supervisor: Dr. Farhad Shahbazi from Isfahan University of Technology & Prof. Mohammad Reza Rahimi Tabar from Oldenburg University and Sharif University of Technology.
- 2009 – 2013 **B.Sc. Physics**, Isfahan University of Technology, Isfahan, Iran,
GPA: 17.54/20 (3.78/4.00).
Major GPA: 17.82/20 (3.85/4.00).
- 2005 – 2009 **Diploma Mathematics & Physics**, Saadi High School & Adle Pre-University School, Isfahan, Iran,
Diploma GPA: 19.69/20 (4.00/4.00), Pre-University GPA: 19.51/20 (4.00/4.00).

Honors and Awards

Computer related:

- 2013 **Merit-Based Admission Offer**, to full-time Master Program in **Software Engineering** without Entrance exam, School of Computer Engineering, Iran University of Science and Technology, Tehran, Iran.
- 2010 **Honored as Outstanding Researcher Activity**, SBM Project, President of IUT¹, Isfahan, Iran.
- 2010 **Institute of Steel Employee Support & Retirement Fund Award**, SBM Project, Chairman & CEO, Tehran, Iran.
- 2009 **Ranked 2nd in 11th Iran's National Youth Kharazmi Award with the Statuette**, for "Smart Bandwidth Manager (SBM)" Project, Minister of Science, Research and Technology & Minister of Education, Iran.

Physics related:

- 2010, 2015 **Isfahan University of Technology Dean Award with the Statuette**, President of IUT, Isfahan, Iran.
- 2014 & 2015 **Ranked 1st, out of 58 Students**, in all Programs of M.Sc. Physics according to GPA, IUT, Isfahan, Iran.
- 2014 & 2015 **Ranked 1st, out of 34 M.Sc. Students**, in Condensed Matter Physics Program according to GPA, IUT, Isfahan, Iran.
- 2013 **Ranked 15th in 18th Iran's National Collegiate Scientific Olympiad**, among all B.Sc Physics Students of Nation, Iran.
- 2013 **Merit-Based Admission Offer**, to full-time Master Program in **Physics** without Entrance exam, IUT, Iran.
- 2013 **Ranked 4th, out of 61 in Undergraduate Physics program**, according to GPA, IUT, Isfahan, Iran.
- 2010 – Present **Selected as an Exceptional Talent in Physics Department**, IUT, Isfahan, Iran.

Fellowships & Grants

- 2009 – 2013 **Iran's National Elites Foundation 4-year Undergraduate Fellowship**, Government of Iran.
- 2010 & 2015 **University Outstanding Student Scholarship**, Isfahan University of Technology, Isfahan, Iran.
- 2010 **Iran's National Elites Foundation Research Grant**, for "Smart Bandwidth Manager (SBM)" Project, Vice President for Science and Technology, Government of Iran.
- 2011 **Isfahan Science & Technology Town (ISTT) Research Grant**, for "Electronic Content Management System (eCMS)" Project, Association of Creativity Efflorescence, Isfahan, Iran.
- 2014 **Isfahan University of Technology Research Grant**, for Master Thesis, Isfahan, Iran.
- 2014 & 2015 **Iran's National Elites Foundation 2-year Graduate Fellowship**, Government of Iran.

¹Isfahan University of Technology

Research Experience

Physics related

2014 – Present **Graduate Researcher (Master Thesis)**, under supervision of *Dr. F. Shahbazi*, Physics Dept., Isfahan University of Technology, Isfahan, Iran.

Fields of research: EEG Data Analysis, Machine Learning, Stochastic Processes, Complex Systems.

- Identifying epilepsy seizures focus by correlation matrix and stochastic processes methods.
- Seizure prediction using clustering of correlations between different brain parts over time.

Computer related

2007 – 2011 **Researcher**, *IT Center, Isfahan University of Technology*, Isfahan, Iran.

- Designing and Implementing "*Smart Bandwidth Manager (SBM)*" core.
- Developing, Testing and Debugging SBM v2.2.1 .

2010 **Researcher**, *Research Projects Office, Isfahan Science & Technology Town (ISTT)*, Isfahan, Iran.

- Developing, Testing and Debugging SBM v2.1.1 .

2011 – 2013 **Researcher**, *Isfahan Science & Technology Town (ISTT)*, Isfahan, Iran.

I was member of *Association of Creativity Efflorescence* at ISTT.

- Implementing an Integrated "*Electronic Content Management System (eCMS)*".
- Upgrade eLibrary to eCMS.

National Projects

2008 – 2010 **Smart Bandwidth Manager (SBM)**, *IT Center, Isfahan University of Technology*, Isfahan, Iran [link](#).

SBM is a dynamic network bandwidth management software that smartly controls and manages bandwidth of a network of sub-centers based on predefined priorities and limits of sub-centers and tries to keep total usage bandwidth on specific value. SBM works with Cisco Internetwork Operating System (Cisco IOS) of Routers and Switches. It was tested on internet bandwidth of Isfahan University of Technology and finally **SBM saves 48,000\$ per year**.

Motivation: When I was highschool student with my friend Morteza Parsa were doing research about Network Bandwidth Management at IT Center of Isfahan University of Technology. The internet usage bandwidth of the university was fixed at its maximum value (60 Mbit/sec) in office hours but in other hours decreased to 1/3 of its maximum value. We designed an efficient dynamic algorithm to assign free (unused) internet bandwidth to sub-centers which need. Afterward we implemented this algorithm to a software named "*Smart Bandwidth Manager (SBM)*".

Awards & Grants:

- **Ranked 2nd in 11th Iran's National Youth Kharazmi Award**, Minister of Science, Research and Technology & Minister of Education, 2009.
- **Iran's National Elites Foundation Research Grant**, Vice President for Science and Technology, Government of Iran, 2010.
- **Institute of Steel Employee Support & Retirement Fund Award**, Presidents' Organization, 2010.
- I was honored as **Outstanding Researcher Activity**, President of Isfahan University of Technology, 2010.
- Isfahan Province Education Organization Award, Presidents' Organization, 2010.
- Research Council of Isfahan Province Education Organization Award, Presidents' Organization, 2010.

Other Projects

2007 – 2010 **Electronic Library (eLibrary)**, *IT Center, Isfahan University of Technology*, Isfahan, Iran.

eLibrary enables users to search the profiles (metadata such as title, authors, ISBN, publisher, year, ...) of several thousands ebooks and eventually view the specific ebook that they are looking for. Technically eLibrary consists of both desktop and web applications. In desktop part "eBook Scanner" is responsible for scanning specific hard drive to find ebooks, reading their metadatas and storing them in database. In web part "eBook Search" and "eBook Treeview" enables users to search in metadata and subject (treeview display) respectively. Some other applications was designed for managing this system in both desktop and web part. eLibrary was designed for faculty members and students of university to focus on research and get ebooks in one click. **eLibrary was sold to two universities (Tafresh University and Islamic Azad University of Majlesi) each payed 8000\$.**

2011 – 2013 **Electronic Content Management System (eCMS)**, *Isfahan Science & Technology Town (ISTT)*, Isfahan, Iran.

eCMS is a research project which its important task is extraction metadata such as title, authors, ISBN, publisher, year, ... from ebook files (pdf, djvu, djv, epub, mobi, ...). eCMS can extract metadata from ebook files and check them with LoC website for validity then stores these information in database in order to use by eLibrary. It also extracts covers from ebooks and use Tesseract OCR technology for scanned ebooks.

Grant & Certification:

- **Isfahan Science & Technology Town (ISTT) Research Grant**, Isfahan, Iran, 2011.
- **Isfahan Science & Technology Town (ISTT) Accomplishment Certification**, Isfahan, Iran, 2013.

Publications

Mojtaba Khodadadi, Farhad Shahbazi, Mohammad Reza Rahimi Tabar, "**Identifying Epilepsy Focus by Correlation Matrix Method**", *In preparation*.

Mojtaba Khodadadi, Farhad Shahbazi, Mohammad Reza Rahimi Tabar, "**Identifying States of a Epilepsy Seizure**", *In preparation*.

Mojtaba Khodadadi, Farhad Shahbazi, Mohammad Reza Rahimi Tabar, "**PyMarkov: A Python Module for Markovian Stochastic Processes**", *In preparation*.

Mojtaba Khodadadi, Farhad Shahbazi, Mohammad Reza Rahimi Tabar, "**PyCorrState: A Python Package for Correlation States Extraction**", *In preparation*.

Invited Lectures

Summer 2010 **Java course: from Novice to Professional**, *Electronic and Open Learning Center, Isfahan University of Technology, Isfahan, Iran* [link](#).

When I was 18 years old, I was invited by "*Electronic and Open Learning Center*" and "*IT Center*" of Isfahan University of Technology to teach Java to Senior and Graduate students of Computer Science & Engineering.

Topics:

- Intro to Programming & Introducing Netbeans IDE
- Basics of Java Programming
- Object Oriented Programming with Java
- Input and Output (I/O), Exception Handling
- Collections Framework
- AWT, Swing
- Generics
- Applets
- Database Connectivity (MySQL), JDBC
- Multithreading Programming & Synchronization

Winter 2014 **Python Short Course for Physics Students: An introduction to Scientific Computing**, *Electronic and Open Learning Center, Isfahan University of Technology, Isfahan, Iran* [github](#).

I was invited by IUT *Physics department* to teach Scientific Computing with Python to graduate students of Physics.

Winter 2015 **Scientific Computing with Python: An Introduction to Data Analysis & High Performance Computing**, *Department of Physics, Isfahan University of Technology, Isfahan, Iran* [github](#).

I was invited by "*Department of Physics*" of Isfahan University of Technology to teach Scientific Computing with Python to graduate students of Physics.

Topics:

- Introduction to Programming
- Introducing IDE: Ninja IDE, Spyder, PyCharm
- Interactive computing with IPython
- Basics of Python Programming
- Python Object Oriented Programming
- Input and Output (I/O)
- Packages and applications
- Manipulating numerical data with NumPy
- Plotting with Matplotlib in details
- Data Analysis with Pandas
- Network Analysis with NetworkX
- Introduction to HPC

Computer Skills

Java 8 years experience,

- **Expert** in Multithreaded Programming, Object Oriented Programming, Socket Programming, Network Programming, Web Scraping.
- **Proficient** with JSP, JSF, Hibernate, Swing, Spring framework, JUnit framework, Log4j, GWT, NIO, Java Sockets, JCF, RegEx, iText, JavaDJVU, PDFBox, J4L OCR, Servlets, Struts, JDBC.

Python 2 years experience,

- **Proficient** in Scientific Computing.
- **Proficient** with NumPy, Pandas, Matplotlib, Scikit-learn, SciPy, VPython, NetworkX, BLZ, Blosc, Bcolz.

Database MySQL, SQLite, HSQLDB, SciDB, OpenTSDB.

Software Gephi, Mathematica, Matlab, Maple.

IDE & Editor Netbeans, IPython, Spyder, IEP IDE, PyScripter, Ninja IDE, PyCharm, Wing IDE, Eclipse.

Other Familiar with PHP, Javascript, AJAX, C++, Fortran, LaTeX, HTML, XML, CSS, SQL, Wordpress, Drupal.

Professional Membership

2013 – Present **Complex Systems Group**, Physics Dept., Isfahan University of Technology, Isfahan, Iran.

2009 – Present **Iran's National Elites Foundation (BMN)**, Government of Iran.

2011 – 2013 **Isfahan Science & Technology Town (ISTT)**, *Association of Creativity Efflorescence*, Isfahan, Iran.

Course Projects & Presentations

Graduate Courses at Isfahan University of Technology

- Spring 2014 **"Facebook Networks Analysis"**, *Advanced Statistical Mechanics II*.
Software: Gephi, NetVizz (facebook app) [link](#)
- Spring 2014 **"Implementing a Class for Monte Carlo Simulation by Metropolis Method in Python"**, *Advanced Statistical Mechanics I*.
 - Simulating 3D Random Walk of Problem 2.2 from *"Statistical Physics of Particles by Mehran Kardar, Cambridge University Press"*.
 - Programming language: Python.
- Fall 2013 **"A Review of Magnetic Monopoles"**, *Electrodynamics*.
- Fall 2013 **"Molecular Dynamics Simulation of Dilute Gas & Melting Transition and Visualization"**, *Computational Physics*.
 - Programming language: Java.

Undergraduate Courses at Isfahan University of Technology

- Spring 2013 **"EPR Paradox & Bell Inequality"**, *Modern Optics*.
- Summer 2013 **B.Sc. thesis "A Review on Game Theory"**, under supervision of [Dr. K. A. Samani](#).
- Fall 2012 **"Monte Carlo Simulation of the 2D Ising Model and Visualization"**, *Computer Applications in Physics*.
 - Programming language: Python.
- Fall 2012 **"Quantum Monte Carlo Simulation of Helium Atom"**, *Computer Applications in Physics*.
 - Programming language: Java.
- Spring 2012 **"BCS Theory"**, *Superconductivity*.
- Spring 2012 **"Dynamics of Molecular Motors"**, *Biophysics*.
- Fall 2011 **"Terrell Rotation"**, *Special Relativity*.
- Spring 2011 **"Monte Carlo Simulation of the 2D Ising Model"**, *Statistical Mechanics*.
 - Programming language: Java.
- Spring 2011 **"Bosons & Fermions"**, *Quantum Mechanics I*.
- Spring 2010 **"Optical Fibers"**, *Basic Physics III*.

Work Experience

Vocational

- 2007 – 2011 **Java Developer**, *IT Center, Isfahan University of Technology*, Isfahan, Iran.
 - Designing, Implementing, Developing and Supporting an Electronic Library (eLibrary).
 - Testing Smart Bandwidth Management (SBM) on the IUT internet network.

Miscellaneous

- 2007 – Present **Java Developer Freelancer**, Isfahan, Iran.

Teaching Experience

Teacher Assistant

- Fall 2015 **Advanced Statistical Mechanics I**, Instructor: [Dr. Seyed Javad Hashemifar](#), Physics Dept., IUT.
- Fall 2015 **Advanced Statistical Mechanics II**, Instructor: [Dr. Farhad Shahbazi](#), Physics Dept., IUT.
- Fall 2014 **Modern Physics**, Instructor: [Dr. Farhad Fazileh](#), Physics Dept., IUT.

Non-Academic Courses

- Summer 2011 **Entrepreneurship**, SITCO International, NIIT Isfahan Center, Iran's National Elites Foundation (BMN).
- Summer 2012 **Introduction to Market Research and Marketing**, Isfahan Science & Technology Town (ISTT), Isfahan.
- Fall 2011 **Ideas and Opportunities**, Isfahan Science & Technology Town (ISTT), Isfahan, Iran.
- April 2010 **Security & Hack**, Ashiyaneh Security Corporation, Tehran, Iran.

Participation in Conferences

- Winter 2013 **18th Special School of Physics**, Physics Dept., Institute for Advanced Studies in Basic Sciences (IASBS), Zanjan, Iran.
- Fall 2013 **2nd IPM Conference on Soft Matter, Biological and Statistical Physics**, School of Physics, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran.

Fall 2013 **Workshop on Physics of Polymers and Biopolymers**, School of Physics, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran.

Summer 2014 **4th Iranian Workshop on Computational Neuroscience**, Physics Dept., Institute for Advanced Studies in Basic Sciences (IASBS), Zanzan, Iran.

Conference Organization

September 2014 **International Iran Conferences on Quantum Information 2014 (IICQI)**, *Member of Local Coordinating Committee*, Sharif University of Technology and Isfahan University of Technology, Isfahan, Iran.

Web site: <http://iicqi.sharif.edu/events/iicqi-14>

January 2015 **12th Iran National Conference on Condensed Matter Physics**, *Member of Organization Committee*, Isfahan University of Technology, Isfahan, Iran.