

Sina Sajjadi

Education

- 2021–present **Ph.D in Network and Data Science**, *Complexity Science Hub Vienna and Central European University*, Vienna.
- 2016–2019 **M.Sc in statistical physics and complex systems**, *Sharif University of Technology* **First QS ranked University in Iran**, Tehran.
- 2011–2016 **B.Sc in Physics**, *Ferdowsi University of Mashhad*, Mashhad.
- 2007–2011 **High School Diploma in Physics and Mathematics Discipline**, (*NODET*) *National Organization for Development of Exceptional Talents*, Mashhad.

Languages

- **Persian:** Native
- **English:** Advanced
- **German:** Beginner
- **Arabic:** Beginner


Programming Languages and Related

- Languages C/C++ • Python (Numpy-Matplotlib-Scipy-Pandas-Sklearn-NLTK) • R • NetLogo
• Bash • Mathematica
- Related Git • Parallel Computing (MPI, OpenMP, Python's multiprocessing, mpi4py) • HPC (PBS)

Research Interests

- Network Science - Temporal Networks
- Epidemic Processes
- Social Inequality
- Statistical Inference
- Sociophysics
- Information Theory
- Game Theory
- Machine Learning and Clustering

Software development

- 2017–present  **EPYC** Versatile software written in C++ and Python for simulating various compartmental epidemic models on static and temporal networks.
Available under GPL-3.0 at <https://github.com/Sepante/Epyc>

Honors and Awards

- Apr 2021 **2nd place award** of the **Neglected Tropical Diseases (NTD) Hackathon**, held by **Task Force for Global Health** working on a solution for challenges surrounding rumors/misinformation relating to mass drug administrations.
- Sep 2020 Winner of **HackZürich 2020 Enhance Digital Services With Data** challenge for developing **DSNM web-app Fraud Detector and Recommender system for Fitness Activities**, working on the Helsana+ database.
- Sep 2020 **2nd place award** for the scientific video contest of **Dynamics of biological systems: from viruses to populations conference**, held by **Jagiellonian University** For **This animation** depicting *Social distancing in pedestrian dynamics and its effect on disease spreading*.
- Jun 2020 **2nd project award** in the **Exploring Network Epidemiology** in the Time of Coronavirus, online workshops held by **University of Maryland** and **Vermont's Complex Systems Center** among **29 groups**. Project title: *Racial disparities in COVID-19 cases: Beyond inherent vulnerability*.
- 2015-2016 Ranked **1st** in the Iranian National **Debate Contest** at the Province level, also Ranked **1st** in the Regional level (8 Provinces). Debating on social and cultural topics.
- Apr 2016 Ranked **2nd** in the **Iran Physicists' Tournament (IRPT)**, Tehran, Iran.
- Mar 2013 Ranked **3rd** in **Young Mathematicians** Competition, Ferdowsi University of Mashhad, Mashhad, Iran

Media Coverage

- 2021 My project "**Rumor Detection and Prevention**" for Neglected Tropical Diseases - Hackathon is covered by the **National Public Radio**. My group utilized sentimental analysis to detect high rumor regions and performed network analysis on both the high risk activities and also to find influential individuals within the communities. We also designed a board game, to educate the kids on the topic of neglected tropical diseases.

Research Experience

Here are some schematic model descriptions I have created for my past and present projects. [Please Click Here To View.](#)

- 2020–present **Node-Link Dynamics on Empirical Networks**, Studying the interaction between node and link attributes in reaching a **Social Balance**, using network modeling and mean-field approximations.
- 2019–present **Confrontation between centralized vs participatory decision making groups**, an agent based game theory model, based on interactions between a group snowdrift game (individual level) and a hawk-dove game (group level). This work is being done in collaboration with Prof. Sitabhra Sinha's group in IMSc, India.

- 2017–present **Epidemic Spreading Dynamics**, I have been involved in multiple projects, investigating several aspects of mathematical epidemic spreading dynamics, using various mathematical and computational methods, consisting of:
- **Cooperative disease spreading on temporal networks**, This work has been done as my M.Sc. thesis Achieving "Excellent" rank. By using different **shuffling methods** and categorizing the results using **k-means clustering** we studied each correlation's effect on hindering/enhancing the spreading phenomena. We observed that causal **temporal correlations** reduce the size of an outbreak, on the other hand, periodical correlations which can either decrease or increase the probability of an outbreak, have no significant effect on the size of a possible outbreak.
 - Studying the **racial disparities in COVID-19** infection, applying **NLP** and using a **game-theoretical model** on top of a **spreading process** occurring on a **stochastic block model network** to predict the racial disparity of infection observed in Chicago.

Research Visits

- Feb 2018 Visiting researcher **Empirical networks and neurodynamics group, Technische Universität Berlin.**

Teaching and Work Experience

- June 2020 **Speaker** for **Schelling Algorithm** Implementation and Visualization, two day workshop held virtually in the department of Physics, Sharif university of technology, Tehran-Iran. Codes [here](#).
- 2019–present **Teaching Assistant** for **Modeling of Spreading Phenomena** MSc course at Sharif university of technology, Tehran, Iran.
- 2019–present **Data Analyst** in **Statsminute** working on foreign travels and housing market data in order to retrieve Iranian population's Income status. Tehran-Iran.
- 2019 **Teaching Assistant** for **Computer Simulations in Physics** MSc course at Sharif university of technology, Tehran, Iran.
- 2019 **Teaching Assistant** for **Special Topics in Complex Systems**, covering topics in **network science** and **social media analysis**, MSc course at Sharif university of technology, Tehran, Iran.
- Aug 2018 **Junior speaker** for Tehran school on Theory and Applications of **Complex Networks** giving a talk on **Simulating Disease Spreading Models using Python** held in the department of Physics, Shahid Beheshti University, Tehran-Iran
- Spring 2018 **Teaching Assistant** for the 6th **Collaborative Scientific Software Development and Management of Open Source Scientific Packages** held by ICTP (International Centre for Theoretical Physics) in Tehran, Iran.
- 2017 **Teaching Assistant** for Basic Physics I and Basic Physics II at Sharif university of technology, Tehran, Iran.

Selected Schools, Courses, Workshops and Conferences

- **Conference on Complex Systems**, held by Complex Systems Society, October 2021. Contribution: A poster presentation.
- **IceLab Camp** workshop held by **Umeå University** on **Interdisciplinary Science and Collaboration**, September 2021 at Umeå, Sweden.
- **Behavioral Digital Trace Data in Response to the COVID-19 Pandemic** summer school held by The **Social ComQuant** July 2021.
- **Reinforcement Learning Summer School** workshop held by The **Alan Turing Institute** June 2021.
- **Winter Lecture Series** workshop held by **CSH** (Complexity Science Hub Vienna) on **Cultural Data Science, Computational Social Science, High Order Networks, Randomness and Innovation Dynamics** and **Statistical learning theory**, March 2021.
- **Advances in Applied Probability** workshop held by **ICTS** (International Centre for Theoretical Sciences) on **High dimensional computation** and **Statistical learning theory**, January 2021.
- **Conference on Complex Systems**, held by Complex Systems Society, December 2020. Contribution: A talk and a poster presentation.
- **Dynamics of biological systems: from viruses to populations** conference, held by Theory of Complex Systems Department, September 2020. Contribution: Paper presentation. **Jagiellonian University**
- **HackZürich 2020**, September 2020, Contribution: Developing **DSNM web-app** *Fraud Detector and Recommender system for Fitness Activities*, working on the Helsana+ database, **winning the Enhance Digital Services With Data challenge**.
- **Oxford Summer School in Economic Networks** on, **social networks, games and learning, financial networks, economic complexity, urban systems, and innovation** June 2020, Contribution: Poster presentation.
- **Exploring Network Epidemiology** in the Time of Coronavirus, online workshops held by **University of Maryland** and **Vermont's Complex Systems Center**, April 2020, Contribution: Group project.
- **CODATA-RDA School of Research Data Science for alumni**, on training the alumni to share their learning and to train others. Virtually held by ICTP, CODATA and RDA, Sep 2020.
- **CODATA-RDA Research Data Science Summer School** on Research Data management, Open Science, Machine Learning, Computational Infrastructures. at **ICTP** (International Centre for Theoretical Physics), 2019, Trieste, Italy.
- **CODATA-RDA Research Data Science Advanced Workshops on Extreme Sources of Data on data-analysis, software development and tools for analysis and reproducible science and sharing.** at **ICTP**, 2019, Trieste, Italy.
- Summer research program on **Dynamics of Complex Systems** held by **ICTS** (International Centre for Theoretical Sciences) on **Game Theory, Genetic Algorithms, Network Analysis, Time Series Analysis**. I alongside some other participants prepared lecture notes [here](#), 2019, Bengaluru, India.

- **Spring College on the Physics of Complex Systems at ICTP**, Trieste, Italy. (Full Mark, All courses passed, reinforcement learning, polymer physics, statistics of extremes, non-equilibrium quantum mechanic, hierarchical learning).
- 5th Workshop on **Collaborative Scientific Software** Development and Management of Open Source Scientific Packages held by **ICTP**. (*I was a teaching assistant, the next year.*)
- **Complex quantum systems out of equilibrium in many-body physics and beyond** conference held by **ICTP**, Yerevan, Armenia.
- 8th **IPM-HPC** workshop on **multi-core systems and parallel platforms**, Tehran, Iran.

Publications

- **Impact of temporal correlations on high risk outbreaks of independent and cooperative SIR dynamics** Sina Sajjadi, Mohammad Reza Ejtehad, Fakhteh Ghanbarnejad, *Plos One* 16.7 (2021): e0253563. [Link Here](#).
- **Protesting during the Covid: When economic deprivation overweighs contagion risk** Basak Taraktas, Sina Sajjadi, abstract accepted by the Special Issue of *Social Movement Studies* on: Social movements and Covid-19: dynamics, challenges and strategies.
- **Social distancing in pedestrian dynamics and its effect on disease spreading** Sina Sajjadi, Alireza Hashemi, Fakhteh Ghanbarnejad, *Physical Review E* 104.1 (2021): 014313. [Link Here](#) - [arXiv:2010.12839](#)
- **Epidemic Infection Disparity Explained By Segregation and Socio-economic Inequality, a Multilayer Agent Based Model** Sina Sajjadi, Ulya Bayram, Basak Taraktas, Mehrzad Shadmangohar, Mavi Ruiz, Pourya Toranj, *under review*.

Conference Proceedings

Talks

- **Misinformation: Detection and Hindering** Sina Sajjadi, Alireza Hashemi, Yasaman Asgari, Saeed Hedayatian, presented at **meeting of the Coalition for Operational Research on Neglected Tropical Diseases (COR-NTD)** November 2021.
- **Investigating social distancing via Agent Based Modeling** Sina Sajjadi, Alireza Hashemi, presented at **Workshop on Sociophysics: Social Phenomena from a Physics Perspective** held by ICTP-SAIFR, October 2021
- **Infection disparity explained by socioeconomic status and segregation: An agent based model** Sina Sajjadi, Pourya Toranj, Basak Taraktas, Mehrzad Shadmangohar, Ulya Bayram, Mavi Ruiz, presented at **NETWORKS 2021**.
- **k-means clustering method for coinfective spreading risk calculation** Sina Sajjadi, Reza Ejtehad, Fakhteh Ghanbarnejad, presented at the **Conference on Complex Systems**, 2020.
- **Social distancing in pedestrian dynamics and its effect on disease spreading** Sina Sajjadi, Alireza Hashemi, Fakhteh Ghanbarnejad, presented at the **DPG Conference**, 2021.
- **Surviving the Pandemic: The Effect of socioeconomic disparities on epidemic infection rates** Sina Sajjadi, Ulya Bayram, Basak Taraktas, Mehrzad Shadmangohar, Mavi Ruiz, Pourya Toranj, presented at **Mitchell Centre SNA, University of Manchester, webinar series**, November 2020.
- **Agent based modeling of direct and indirect transmission** Sina Sajjadi, Alireza Hashemi, Fakhteh Ghanbarnejad, presented at **Dynamics of biological systems Conference** held by Jagiellonian University, September 2020.
- **An analysis of the Turkish Workers' Protests During Covid-19** Basak Taraktas, Sina Sajjadi, presented at the **International Conference of Europeanists**.

- **Protesting during the Covid: When economic deprivation overweighs contagion risk** Basak Taraktas, [Sina Sajjadi](#), presented at the **Midwest Political Science Association Conference**.
- **Initial spreaders and evolution of epidemic dynamics on a hospital network** Sina Sajjadi, Fakhteh Ghanbarnejad, Mohammad Reza Ejtehad, *4th Iranian Computational Physics Conference*.

Poster Presentations

- **Epidemic Infection Disparity Explained By Segregation and Socio-economic Inequality, a Multilayer Agent Based Model** [Sina Sajjadi](#), Ulya Bayram, Basak Taraktas, Mehrzad Shadmangohar, Mavi Ruiz, Pourya Toranj, presented at **Conference on Complex Systems**, 2021.
- **Effectiveness of social distancing through the lens of agent based modelling** [Sina Sajjadi](#), Alireza Hashemi, Fakhteh Ghanbarnejad, presented at **Conference on Complex Systems**, 2020.
- **COVID-19 in Iran** Yazdan Babazadeh, Amin Safaeesirat, Yasaman Asgary, Adib Khazaei, Fatemeh Zarei, [Sina Sajjadi](#), Alireza Hashemi and Fakhteh Ghanbarnejad, presented at **NETSCI 2020**.
- **Impact of temporal correlations on high risk outbreaks of independent and cooperative SIR dynamics** [Sina Sajjadi](#), Fakhteh Ghanbarnejad, Mohammad Reza Ejtehad presented at ***The Oxford Summer School in Economic Networks***.
- **Interactive dynamics vs. bursty networks** [Sina Sajjadi](#), Fakhteh Ghanbarnejad, Mohammad Reza Ejtehad, and Fariba Karimi presented at ***2017 joint meeting of the DPG and EPS***.
- **Effects of Temporal Correlations on Co-Infection** [Sina Sajjadi](#), Fakhteh Ghanbarnejad, Mohammad Reza Ejtehad presented at **CODATA-RDA** Research Data Science Summer School, Trieste, Italy.

Popular Science

I write about Philosophy of Science on [Filsoof](#) meaning "The Philosopher" in Persian.

General Interests

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| ● Mathematics | ● Mythological Studies |
| ● Analytic Philosophy | ● Philosophy of Science |
| ● Philosophy of Mind | ● Philosophy of Ethics |
| ● Literature | ● Sociology |
| ● Political Sciences | ● Learning Languages |

References

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