

# Amitrajit Sarkar

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## PERSONAL DETAILS

Date of Birth | 10 May 1994  
Address | A-16, Purba Diganta,  
Santoshpur, Kolkata - 700 075,  
India  
Contact | +91 99035 96572

## EDUCATION

### JADAVPUR UNIVERSITY

BE IN COMPUTER SCIENCE AND  
ENGINEERING  
Expected May 2017 | Kolkata, India  
CGPA: 9.0 / 10.0 | Class Rank: 3

### GARDEN HIGH SCHOOL

Graduated May 2013 | Kolkata,  
India  
ICSE, 2011: 97.6%: School Topper  
ISC, 2013: 96.5%: School Topper

## LINKS

Gmail:[aaijmrtd@gmail.com](mailto:aaijmrtd@gmail.com)  
Github:<https://github.com/aaijmrtd>  
Blog:<https://aaijmrtd.github.io>

## SKILLS

### PROGRAMMING

Over 5000 lines:  
C • C++ • Java • BASH • Python  
Familiar:  
Android • VisualC# • Assembly • Lua  
HTML • CSS • Javascript • Scala  
Octave • VisualBasic •  $\text{\LaTeX}$  • MySQL

## AREAS OF INTEREST

Machine Learning  
Deep Learning  
Natural Language Processing  
Natural Language Understanding  
Artificial Intelligence  
Robotics

## RESEARCH

### SPEECH RECOGNITION AND SYNTHESIS | UNDERGRADUATE RESEARCHER

January 2016 - Present | Jadavpur University, Kolkata  
Developing a **Speech Recognition and Synthesis Tool** at the JU NLP Laboratory with **Professor Sivaji Bandyopadhyay**.

### CROSSLINGUAL DEPENDENCY PARSING | SUMMER INTERN RESEARCHER

May 2015 - July 2015 | Indian Institute of Technology, Kharagpur  
Developed a **CrossLingual Shift Reduce Dependency Parser** based on **Translational Transformations of Word Vector Models** with **Professor Sudeshna Sarkar**.

### AUTONOMOUS MULTIROBOTIC PLATFORM | UNDERGRADUATE RESEARCHER

May 2014 - December 2015 | Jadavpur University, Kolkata  
Developing an **Autonomous MultiRobotic Platform** capable of real-time coordination in solving problems of **localization, dynamic path planning, Simultaneous Localization and Mapping**, etc. with **Professor Chandan Mazumdar**.

## EXPERIENCE

### NET | NEURAL NETWORK LIBRARY | PYTHON

June 2015 - December 2015 | Indian Institute of Technology, Kharagpur

Developed an extensive **Neural Network Library from scratch**.

- **Layers:** Fully Connected, Convolutional, Min/Max/Average Pooling
- **Cost Functions:** Mean Squared, Cross Entropy, Negative Log Likelihood, Kullback Leibler Divergence, Cosine Distance
- **Transfer Functions:** Sigmoid, Hyperbolic Tangent, Hard Hyperbolic Tangent, Parametric Rectified Linear Unit, Hard Shrink, Soft Shrink, SoftMax, SoftPlus, Shift and Scale, SoftSign, Threshold, Stochastic Threshold
- **Radial Basis Functions:** Gaussian, Multi Quadratic, Generalized Multi Quadratic, Inverse Multi Quadratic, Generalized Inverse Multi Quadratic, Spline, Cubic, Linear
- **Long Short Term Memory:** Simple, Basic, Output Feedback, Peephole
- **Standard Architectures:** Perceptrons, Self Organising Maps, Radial Basis Function Networks, Long Short Term Memory, Hopfield Networks, Restricted Boltzmann Machines, Autoencoders
- **Unsupervised Pretraining:** Competitive Learning, K Means Clustering, Hebbian Learning, Contrastive Divergence
- **Training Optimization:** Velocity, Adaptive Gradient, Adaptive Gain, Root Mean Square Propagation, Regularization, Dropout, Batch Normalization
- **Optimization Benchmarking:** Univariate Curves (Linear, Quadratic, Power, Exponential), Multivariate Compositions (Sum, L1Norm, L2Norm, LPNorm), Noise Probability Distributions (Beta, Bernoulli, Gamma, Geometric, Gaussian, Poisson, Uniform)
- **Hyperparameter Optimization:** Grid Search, Nelder Mead's Algorithm
- Distributed Programming Support, GPU Optimization

## COURSEWORK

### UNDERGRADUATE

Computer Graphics  
Database Management Systems  
Data Structures and Algorithms  
Object Oriented Programming  
Introduction to Programming  
Numerical Methods  
Digital Logic  
Computer Organization  
Microprocessors  
Computer Architecture  
Systems Programming  
Software Engineering  
Abstract Algebra  
Linear Algebra  
Complex Algebra  
Advanced Calculus  
Probability Theory  
Graph Theory  
Combinatorics

## OTHER PROJECTS

### XBEE NETWORK

For MultiRobotic Intercommunication

### PETREL PLUGIN

C# Plugin for Schlumberger's Petrel  
Ocean Academic Competition

### TRAFFIC COUNTER

Background Subtraction in OpenCV

### QUADCOPTER

Disaster Management System

### COMPETITIVE CODING

ProjectEuler, CodeChef, HackerRank  
TopCoder, Kaggle

## EXPERIENCE

### JARVIS | INTELLIGENT DIALOGUE AGENT | PYTHON

September 2014 - December 2015 | Personal Project

Developed an Artificially Intelligent Natural Language Understanding Dialogue Agent.

- Speech To Text
- Dependency Parsing
- Frame Semantic Role Labeling
- WordNet similarity mapping
- Knowledge Graph
- Database Management
- Dependency Graph Alignment
- Integer Linear Programming
- Conversation Space Modeling
- Natural Language Generation
- Text To Speech
- **Uses:** CMU Sphinx, Stanford Parser, PuLP, NLTK, NetworkX, Matplotlib, Jpype, MySQLdb, SimpleNLG, ESpeak

### DISTRIBUTED NEURAL NETWORK | STOCK MARKET ANALYSIS TOOL

| PYTHON

March 2015 | Jadavpur University, Kolkata

Developed a Distributed Neural Network on Apache Hadoop

- Neural Networks
- Genetic Algorithms
- Parallel Processing
- Hadoop's Map Reduce

### CHESS ENGINE | CHESS ENGINE | C++

October 2013 - February 2014 | Personal Project

Developed a Chess Engine from scratch.

- Bitboards, 32bit Move Encoding
- Static Exchange Evaluation on Horizon
- NegaMax Adversarial Search for Sum Zero Games
- Alpha Beta Pruning
- Principal Variation Search
- Transposition Tables

### LINT | ARBITRARY PRECISION ARITHMETIC | C

October 2014 | Personal Project

Developed Arbitrary Precision Arithmetic Library from scratch.

- Efficient Memory Management
- Karatsuba's Algorithm
- Tim-Cook's Algorithm
- Fast Fourier Transform Multiplication Algorithm

## MASSIVE OPEN ONLINE COURSES

Natural Language Processing	Michael Collins	<b>Columbia University</b>
Natural Language Processing	Dan Jurafsky, Christopher Manning	<b>Stanford University</b>
Natural Language Understanding	Bill MacCartney, Christopher Potts	<b>Stanford University</b>
Artificial Intelligence	Dan Klein	<b>University of California, Berkeley</b>
Artificial Intelligence for Robotics	Sebastian Thrun	<b>Georgia Institute of Technology</b>
Machine Learning	Andrew Ng	<b>Stanford University</b>
Machine Learning	Sebastian Thrun, Katie Malone	<b>Stanford University</b>
Machine Learning	Nando de Freitas	<b>University of Oxford</b>
Neural Networks for Machine Learning	Geoffrey Hinton	<b>University of Toronto</b>
Deep Learning for Natural Language Processing	Richard Socher	<b>Stanford University</b>
Deep Learning	Vincent Vanhoucke	<b>Google</b>

## AWARDS

2013	Tarak Nath Sen Memorial Award for English	Satikanta Guha Foundation
2011	Creative Writing Competition, 2nd Prize	USIEF, International Education Week, American Center, Kolkata
2011	Mamraj Agarwal Rashtriya Puraskar to Brilliant Students	Hon'ble Governor Shri M. K. Narayanan
2011	Sanjay Sen Memorial Prize for Creative Arts	Satikanta Guha Foundation
2010	Creative Writing Competition, 5th Prize	The Albert Barrow Memorial All India Inter-School Creative Writing Competition (Junior), CISCE

## ACHIEVEMENTS

2016	Event Coordinator, Hexed	CSFest, Computer Science Fest of Jadavpur University
2016	Event Coordinator, YodaSpeak	CSFest, Computer Science Fest of Jadavpur University
2016	Team Member, 1st Prize in Breaking Bug	Srijan, Techno-Management Fest of Jadavpur University
2016	Team Member, 2nd Prize in H42	Srijan, Techno-Management Fest of Jadavpur University
2016	Team Member, 2nd Prize in Algomaniac	Jadavpur University, Kolkata
2015	Team Member, LifeSeeker (Drone), 1st Prize	Hon'ble Education Minister Partha Chatterjee, State Student and Youth Science Fair
2015	Team Member, 1st Prize in BuzzWord	Srijan, Techno-Management Fest of Jadavpur University
2015	Event Coordinator, Fast and Furious	Srijan, Techno-Management Fest of Jadavpur University
2015	Team Mentor, 4S-Bot, 3rd Prize in Robotics	Jontro Tontro, Jadavpur University
2015	Team Member, Sherlock, 3rd Prize in BugSmash	Institute of Engineering and Management, Kolkata, ACM certified
2014	Original Story, Screenplay, Musical Score	'The Hat', a short film
2014	Event Coordinator, Fast and Furious	Srijan, Techno-Management Fest of Jadavpur University
2013	Team Member, Flipper, 1st Prize in Robotics	Jontro Tontro, Jadavpur University
2010	'Sands of Time', Short Story published in 'Journeys'	The British Council, Kolkata
2010	Passed Grade 5 (Piano) with Merit	The Associated Boards of the Royal Schools of Music (Kolkata Center)