# Gunjan Sengupta

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## ACADEMIC DETAILS

| Certificate/Degree | Institution | Year of Completion | CGPA/%-Score |
|---|---|---|---|
| B.Tech(Hons.)Metallurgical and Materials Engg. | IIT Kharagpur | 2018 | 8.34/10 (Till 4th semester) |
| Class XII, AISSCE | JVM Shyamali, Ranchi | 2013 | 89.2% |
| Class X, AISSE | RK Public School, Garhwa | 2011 | 10/10 |

## FIELDS OF INTEREST

- Artificial Intelligence, Computer Vision, Digital Image processing, Robotics

## AWARDS AND ACHIEVEMENTS

- Won **Bronze medal** at **MIROSOT** event in FIRA Korea, 2015.
- Part of Team qualifying for finals in RoboCup **3D-Simulation League**, held at Germany 2016.

## MAJOR PROJECTS AND RESEARCH EXPERIENCES

- **Kharagpur Robot Soccer Students' Group (KRSSG)** (Research Project)
  *(Guide:Prof. J. Mukhopadhyay , Feb'15 - till date)*
  - Objective :Building team of autonomous robots capable of playing Soccerand participate at international events such as **FIRA** and **RoboCub**. It extensively incorporates all fundamentals of Robotics.
  - KRSSG has participated at FIRA in 2013,2014 and 2015 and RoboCup 2016 and won the bronze medel at FIRA 2015 in MIROSOT event.
  - Major contribution has been towards **Artificial Intelligence and Path Planning** division.
  - Created a **ROS** based code base using **STP**(Skills Tactics Plays) architecture for **intelligent strategy selection and team actions** based on state of the game.
  - A Play selection, updation and evaluation system.
  - **Dynamic Window** and **Visibility Graph** (algorithms) based path planner for fast processing and short path generation.
  - Also worked on Strategy development, **Vision module**(SSL-Vision) **Communication** between Simulator and ROS nodes using **Google Protocol Buffers**.
  - Currently working on implementation of **Voronoi diagram based Positioning system** and attacking methods using **Reinforcement Learning**.
- **Path Planning using RNN** (Research Project)
  *(Guide: Prof. S. Bhattacharya , July'16-Till date)*
  - Objective:**Dynamic path planning** of robots or manipulators in an unknown or **non-stationary environment**.
  - Working on use of a **Distance-Orientation Model**, a **RNN(Recurrent Neural Networks)** model as a tool for path prediction of a robot in spaces where the surroundings consist of a lot of fast moving obstacles.
- **Twitter Re-tweet Analysis** (Research Project)
  *(Guide: Prof.B. Mitra , Aug'16-Till date)*
  - Objective:Use **Machine Learning Techniques** to predict the number of re-tweets.
  - A Hawke's Process based model is being used to predict the probability of re-tweet at each node of the Tweet-tree.

## SELF INITIATED PROJECTS

- **Plot To Table**
  (General Championship-2016)
  - An open source software project for General Championship held at IIT Kharagpur, representing my hall of residence.My team won the finished **2nd** in the Competition.
  - Developed a software that could separate out plots from a given pdf input, and convert each plot to a tabular form using Image Processing techniques.
  - Worked on **Optical Character Recognition**, Image **Preprocessing** and **Image Segmentation**.
- **Computer Vision** (General Championship-2016)
  - **Pixelate** *(IIT Bombay Techfest, 2015)*: Built a robot working on an overhead camera feed using Computer Vision.The objective was to traverse a maze after solving it and performing specific tasks like placing a prop to a particular position, kicking a ball etc.Worked on use of **A* algorithm for maze solving**, **Robot tracking** using **OpenCV**, **Object Recognition**, Path Planning and Communication using **Bluetooth**.
  - **Aughit** *(Kshitij, IIT Kharagpur 2015)* : Built a bot which worked as a paddle for game Brick Breaker after processing the video feed of the game. Worked on **Object Recognition** using **Template Matching**, Positioning algorithm for maximum scoring and **Arduino**-Uno.
- **Raspberry Tank**
  (General Championship-2016n)
  - Involved in development of an semi-autonomous tank using Raspberry Pi for Hardware Modelling competition in General Championship IIT Kharagpur.It was a very small tank that was capable of entering hostile situations and mapping the surroundings and shooting non-lethal shots using the stun gun mechanism.Its motion was controlled by a web based control portal which received video feed from an on board camera.
  - Worked on Web Development for control of robot using the **WebIOPi** library and **localisation** and **Human Detection** using OpenCV library.

## TECHNICAL SKILLS

- **Languages** (C, C++, Python)
  **Database** (MySQL)
  **Script** (Python, Shell)
  **Tools** ( Matlab, Octave, OpenCV(library), LaTeX, Visual Studio, Qt, ROS(Robot Operating System), Git, Linux, SolidWorks ).

## RELEVANT COURSES

| | |
|---|---|
| Programming and Data Structures | Design And Analysis of Algorithms |
| Information Retrieval | Probability and Stochastic |
| Basic Electronics | Partial Differential Equations |
| Maths I (Differential Calculus, Sequence Series and Complex Variables) | Maths II (Matrix algebra and Interpolation) |

## EXPERIENCE AND POSITION OF RESPONSIBILITY

- Mentor of IEEE and Texus Instruments certified winter workshop on Digital Image Processing.
- Team Subhead of Artificial Intelligence Team at Kharagpur Robot Soccer Student's Group
- Core Team Member of Code-O-Soccer organising team. A national level Artificial intelligence based event held at Kshitij-2016, IIT Kharagpur.