

# Nihal Kumar Singh

FOURTH YEAR UNDERGRADUATE

IIT Bombay, India

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## Education

### IIT Bombay

B. TECH. IN CIVIL ENGINEERING

MINOR IN COMPUTER SCIENCE AND ENGINEERING

July 2015 - Graduating 2019

CPI - 8.70/10

CPI in CS courses- 9.33/10

## Research and Work Experience

### Language Modelling and Synthesis of Code-Switched text

IIT Bombay

GUIDE: PROF. PREETHI JYOTHI, IIT BOMBAY [\[CSALT\]](#) [\[REPORT\]](#)

July 2018 - Ongoing

(IN COLLABORATION WITH MICROSOFT RESEARCH INDIA)

- Studied the underlying syntax for code-switched text by looking at linguistic theories and investigating parse trees. Devised strategies for generation of code-switched text from a monolingual corpora using only a translation system and parser.
- Built a pipeline to generate close to natural Hindi-English code-mixed text using an embedded sentence replacement strategy. Tested the perplexity improvements of the language model trained on synthetic code-switched data evaluated on carefully collated "true" code-switched data.

### Android Developer

Tokyo, Japan

MERCARI, JAPAN [\[BLOG\]](#)

May 2018 - July 2018

- Worked on successfully implementing the listing templates feature to the [main app of Mercari](#), the [largest CtoC marketplace in Japan](#). Implemented an architecture pattern - the Model-View-Presenter (MVP) architecture, to enforce separation of responsibility.
- Worked with the Design, Backend, QA and the entire Android team in a multicultural environment to drive the feature to completion. Learned to write Kotlin code, wrote unit tests using frameworks like Mockito and created automation tasks using CI.

### Google Summer of Code

Open Source

MOVINGBLOCKS- TERASOLOGY [\[PROJECT PAGE\]](#) [\[OFFICIAL BLOG\]](#)

May 2017 - July 2017

- Developed the [Lost](#) gameplay mode involving puzzles, traps and exploration based content packed in a new world with backing lore.
- Dealt with the game's physics, multiplayer and Entity Component System. Created new modules for [AdvancedBehaviors](#) (for event driven behavior switching), [AdventureAssets](#) (for physics based trap elements), making accompanying API changes to the engine.
- Created and added [WildAnimals](#) to the game. Imported models and animations from Blender and configured them to run in-game.

### Google Summer of Code and Google Code-In Mentor

Open Source

MOVINGBLOCKS- TERASOLOGY [\[GCI 2016\]](#) [\[GSoC 2018\]](#)

2016, 2017 and 2018

- Mentored the multi-world and the L&S Capture The Flag project in [GSoC 2018](#). Nominated to represent the organization and speak at the GSoC Mentor Summit held at Google HQ, Sunnyvale, CA.
- Involved as a mentor since the organization's [first Google Code-In participation](#). GCI is a pre-university level Google Summer of Code. Extensively coordinated and assisted in reviewing and authoring tasks. Documented guides to help students in getting started.

## Projects

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### NeurIPS 2018 Pommerman Challenge [\[Project Page\]](#)

CSE, IIT Bombay

REINFORCEMENT LEARNING COURSE PROJECT UNDER PROF. SHIVARAM KALYANAKRISHNAN

Fall 2018

- Investigated several strategies for multi-agent learning problems and studied the advantages of using imitation learning approaches using the Pommerman platform. Designed and submitted agents based on Deep Q-Learning from Demonstration and Proximal Policy Optimization.

### Voice Conversion [\[Project Page\]](#)

CSE, IIT Bombay

MACHINE LEARNING COURSE PROJECT UNDER PROF. PREETHI JYOTHI

Spring 2018

- Built a pipelined approach to convert one person's voice into another person's voice. Proposed a deep learning approach to convert source waveform to phonemes and further phonemes to target waveform. Trained on TIMIT and CMU ARCTIC corpus respectively.
- Performed extensive experimentation with bi-directional Recurrent Neural Networks using LSTM and GRU cells. Adopted a multitask training approach by evaluating loss over an intermediate state with a pyramidal network architecture.

### Secure Authenticated Fast Exams Application [\[Website\]](#)

CSE, IIT Bombay

R&D PROJECT UNDER PROF. BHASKARAN RAMAN

Autumn 2016

- Worked for the development of the SAFE Android application that facilitates online paperless tests in educational institutes.
- Multiple devices concurrently connect to a Wireless Access Point to fetch test data with action-logging happening in real time at the invigilator's console. Worked on fetching and displaying of performance history and correct/incorrect answer visuals on the app.

### MooDLD- Moodle Downloader [\[Code\]](#)

UG Academic Council IIT Bombay

- Built a Moodle downloader in Python using Tkinter GUI for downloading shared course files on Moodle and segregating them.
- Developed an Android application for the same using Asynchronous tasks and multiple user customization features. (for Moodle version < 2.4, where Moodle Mobile wasn't compatible). Published by the Institute's Academic Council for institute wide usage. Crossed 1000 downloads within 2 days of launch. Pulled off since Moodle version bump to allow support for official Moodle Mobile app.

### J.A.R.V.I.S.- Personal Assistant [\[Code\]](#)

Hobby Project

- Used the Python AIML library to create a personal assistant that responds to voice and text commands. Leveraged text to speech and speech to text systems, employing basic pattern recognition.

### Steganography Tool [\[Code\]](#)

Digital Image Processing Course Project

- Implemented a steganography tool using MATLAB with custom terminal GUI. Implemented variations of encryption algorithms using Least Significant Bit to encrypt/decrypt text within an image with a custom passphrase.

## Achievements

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Oct 2017 **Finalist, Digital Ocean Campus Champ** Contest- build an application prototype

Online

Oct 2017 **1st Place, Ubisoft GameJam**- 48 hour GameJam at Ubisoft Pune studios

Ubisoft Pune

Mar 2017 **Yahoo! Prize**, The "most creative and fun hack" in **Yahoo! Japan's** hackathon

IIT Bombay

Dec 2016 **Runner Up, Microsoft Code.Fun.Do** institute wide hackathon

IIT Bombay

Aug 2016 **5th Place, Hack InOut**- out of 1000+ teams in India's largest hackathon

NIT Surat

Mar 2016 **Runner Up, Kandy Hackathon**- institute wide open hackathon

IIT Bombay

Sep 2015 **2nd Place, Lenovo Game Jam**- institute wide Game Development hackathon

IIT Bombay

## Positions of Responsibility

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### Manager

*IIT Bombay*

WEB AND CODING CLUB, INSTITUTE TECHNICAL COUNCIL [WEBSITE]

*Apr. 2016 - Mar. 2018*

- Led an institute wide team of 22, as part of one of the biggest college technical clubs in India, to conduct hobbyistic programming activities in the institute. Organized multiple talks, workshops and competitions. Awarded the Institute Organizational Color 2017-18.
- Organized and conducted the first ever, [Data Science Day](#), consisting of Panel Discussion, talks from Professors and the Mumbai chapter of Stanford's Women in Data Science conference to supplement the learning of students in the associated fields.
- Conceptualized and built the [community wiki](#) and the [internship portal](#). Started the [WnCC YouTube channel](#) for knowledge sharing.
- Established ties with Google Developers Group- Mumbai, Ubisoft, Yahoo! Japan, Microsoft, Mercari and multiple other sponsors.

### Web and Tech Coordinator

*IIT Bombay*

WEB AND CREATIVES, MOOD INDIGO [WEBSITE]

*Sep. 2016 - Dec 2016*

- Created the official app for Mood Indigo, Asia's largest college cultural festival with a footfall greater than 1.31 Lakhs. (5k downloads)
- Implemented core backend functionality in the app, fetching events and creating timely notifications for subscribed events.

## Relevant Courses

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### Computer Science

Computer Programming and Utilization, Data Structures and Algorithms, Design and Analysis of Algorithms<sup>†</sup>, Computer Networks, Operating Systems, Introduction to Machine Learning, Foundations of Intelligent and Learning Agents<sup>†</sup>, Computer Graphics<sup>†</sup>

### Others

Calculus, Linear Algebra, Differential Equations, Economics, Quantum Mechanics, Electromagnetism

## Skills

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**Comfortable** C/C++, Python, Java, Android, HTML/CSS

**Familiar** JavaScript, Django, OpenCV, Bash, Ruby, PHP, Jekyll, MySQL, SQLite, Arduino

**Software/Tools** Tensorflow, MATLAB, Octave, Git, Adobe After Effects, NCH Video Pad,  $\text{\LaTeX}$

## Miscellaneous

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### Journalism

Selected in the Times of India- NIE student camp for junior-journo in 2011 to be trained under Nikhat Kazmi. Authored and edited independent articles published in Times of India - NIE.

### Sports

Swimming- Completed the 12 hour Swimathon '16.  
Football- Inter-school Football player.

### Interests

Music, Gaming, Videography and Travelling

<sup>†</sup> Ongoing courses taken in the Fall semester of 2018.