CHRIS FRANCIS

Computer Science and Engineering
Indian Institute of Technology Gandhinagar

E-mail: chrisfrancischris@gmail.com

LinkedIn: chrisfrancis09 GitHub: frank-chris Website: frank-chris.github.io

EDUCATION

Qualification	Institute	CPI/%	Period
B.Tech.	IIT Gandhinagar	9.81 out of 10	2018-2022
AISSCE (CBSE)	St. Paul's Public School	98.4%	2017-2018
AISSE (CBSE)	St. Paul's Public School	10 out of 10	2015-2016

INTERNSHIPS

Summer Intern, California Institute of Technology (Remote) **[May-July 2021]**

- Worked on the identification of species present in low biomass metagenomic samples using machine learning.
- Developed a pipeline to visualize metagenomic data and train machine learning models on it.
- Achieved a classification accuracy of around 81% in determining whether a species is noise or actually present in a sample.
- Gained experience in PyTorch, TensorFlow, and Plotly.

Research Intern, Indian Institute of Science, Bangalore (Remote) **[May-June 2020]**

- Selected as a Summer Research Fellow under the Summer Research Fellowship Programme (SRFP) 2020 by the Indian Academy of Sciences and worked under the supervision of Dr. Deepak Subramani.
- Worked on data visualization and parameters for a data-driven Partial Differential Equation based model of COVID-19 infections.
- Developed a webpage to show the results and observations of the model using JavaScript, HTML, and CSS. The webpage included time-series plots using FusionCharts.js and choropleth maps using Leaflet.js (Link to webpage).
- Learned to use JavaScript for data visualization and web development.
- Gained experience in data wrangling using Python.

Application Developer, InsIIT: An all-in-one app for IIT Gandhinagar students **[May-June 2020]**

- Developed the InsIIT App under Students' Summer Online Projects (SSOP) 2020 at IIT Gandhinagar (Link to the Android version).
- Worked on the campus map feature which enables users to search for locations on the campus, read about locations, and get directions to their desired location.
- Implemented a simple database using Google Sheets to store information about locations and handled the overall UI of the application.
- Learned to use Flutter and its packages to develop mobile applications.

Co-inventor, FoodBuddy: An assistive dining device for the disabled, Invent@IITGN **[May-June 2019]**

- Invented a voice-controlled robotic device that assists people with arm disabilities to eat independently.
- Achieved more than 1000% cost reduction from existing solutions. Enhanced portability and user experience.
- Filed provisional patent applications for the invention in India (IN201941027110) and USA (US62912080).
- Learned 3D CAD modelling, 3D printing, laser cutting, and product design.
- Gained experience in prototyping, Internet of Things, microcontrollers, and patent law.

PROJECTS

Cross Modal Learning for Fashion Image-Text Retrieval **[January-May 2021]**

- Implemented several cross-modal learning schemes such as Siamese Network, Correlational Network, and Deep Cross-Modal Projection Learning for the task of image-text retrieval in the fashion clothing domain (GitHub repository).
- Performed experiments on the DeepFashion and Indian Fashion datasets.
- Gained experience in PyTorch, TensorFlow, Keras, and Flask.

Acad Search: A search engine to find professors in computer science **[January-May 2021]**

- Developed a search engine that can cater to the needs of students looking for professors to approach for projects, internships, or jobs (GitHub repository).
- Implemented boolean retrieval, phrase-based retrieval, and TF-IDF (Term Frequency-Inverse Document Frequency) based retrieval.
- Gained experience in web scraping, data cleaning, and retrieval algorithms.

Compiler for a simple C-flavoured programming language **[January-May 2021]**

- Created a compiler for a simple C-flavoured programming language using Flex, Bison, and C (GitHub repository).
- Implemented basic features like variables, expressions, control flow, arrays, functions, input/output, and function scope in the language.
- Gained experience in compiler design using Flex and Bison.

Simulating the Natural Selection of Speed in a Population of Animals **[January-May 2021]**

- Simulated the natural selection of speed in a population of animals living in an environment with finite food resources using NetLogo (GitHub repository).
- Studied the relationship between several environmental parameters and the natural selection of speed in simple animals.
- Gained experience in modelling complex systems using NetLogo.

In-Memory Searchable File System **[August-November 2020]**

- Created a file system using libfuse, the userspace side of Filesystem in USErspace (FUSE), that resides completely in memory (GitHub repository).
- Implemented a searchability feature in the file system that allows searching for files using prefix matching and substring matching.
- Achieved 3-4 times better throughput than the on-disk file system (ext4) for write and rewrite operations.
- Learned to create in-memory file systems and benchmark them.

On the Complexity of the Game of SUPERSET **[August-November 2020]**

- Studied the card game Superset which is a variant of the popular card game Set and proved a result regarding the complexity of a problem related to Superset (Link to report).
- Made significant progress on proving another result related to Superset.
- Gained experience in literature review and proving results using existing theorems.

Mini-Classroom: Classroom Management Software in C++ **[September-November 2020]**

- Implemented a classroom management software, with features similar to Google Classroom, from scratch using C++ (GitHub repository).
- Client and server programs used Transmission Control Protocol (TCP) connections.
- Live text chat was implemented using TCP connections.
- Gained experience in networking protocols and socket programming.

Implementation of H-Pattern Branch Predictor for ChampSim simulator **[June 2020]**

- Studied and implemented the H-Pattern Branch Prediction Algorithm (described here) for ChampSim using C++.
- Observed that H-Pattern improved the performance of GShare and Hashed Perceptron branch predictors.
- Gained experience in branch prediction algorithms.

Motion estimation using the Block Matching Algorithm on an FPGA **[October-November 2019]**

- Implemented motion estimation using the Block Matching Algorithm on a Nexys 4 Field-Programmable Gate Array (FPGA) using Verilog (GitHub repository).
- The results were about 8000 times faster than the same algorithm implemented on Python.
- Gained experience in FPGA, Verilog, and motion estimation.

TEACHING EXPERIENCE

Teaching Assistant, Data Structures and Algorithms-I, IIT Gandhinagar **[August-December 2020]**

- Teaching Assistant for the course ES 242: Data Structures and Algorithms-I, taught by Prof. Neeldhara Misra at IIT Gandhinagar in the Fall Semester of 2020.
- Taught guest lectures on basic C programming, linked lists, tree traversal, and coding problems.
- Created coding questions and tested solutions for course assignments and quizzes.
- Gained experience in teaching and assessment techniques.

ACHIEVEMENTS, AWARDS, SCHOLARSHIPS

Dr. JL Nayyar Scholarship for the Academic Year 2020-21, IIT Gandhinagar **[May 2021]**

- Donor scholarship of INR 100K awarded by IIT Gandhinagar to support internships. Preference is given to the student who has demonstrated exemplary oral and written communication, and presentation skills during the first six semesters.

Dean's List Semester 5 **[January 2021]**
- Awarded for academic excellence in semester-1 of the academic year 2020-21 at IIT Gandhinagar.

First position, Online Graphic Design, Inter-IIT Cultural Meet 4.0 (national level) **[December 2019]**
- Awarded for the best redesign of a news app user interface to improve the reading experience of users.
- Gained experience in user interface design.

Third position, Rebranding Marathon, Inter-IIT Cultural Meet 4.0 (national level) **[December 2019]**
- Part of the team that won the third position in the Rebranding Marathon for rebranding Jet Airways, including a new logo and associated deliverables.
- Gained experience in brand design.

Scholarship for Academic Excellence for the Academic Year 2018-19 **[August 2019]**
- Awarded INR 20K for the best academic performance (rank 1) in the computer science discipline in the academic year 2018 - 19 at IIT Gandhinagar.

Dean's List Semester 2 **[August 2019]**
- Awarded for academic excellence in semester-2 of the academic year 2018-19 at IIT Gandhinagar.

Dean's List Semester 1 **[January 2019]**
- Awarded for academic excellence in semester-1 of the academic year 2018-19 at IIT Gandhinagar.

Third position, Costume Design, Inter-IIT Cultural Meet 2018 (national level) **[December 2018]**
- Part of the team that won the third position in Costume Design at the Inter-IIT Cultural Meet 2018.
- Gained experience in costume design and teamwork.

District Topper, AISSCE 2018 (CBSE Class XII) **[May 2018]**
- Scored 98.4%, the highest percentage marks in my district in AISSCE 2018, including 100/100 in Mathematics, Physics, and Chemistry.

SKILLS

Languages: Python, JavaScript, C, C++, HTML, CSS, Dart, LaTeX, Verilog

Tools and Frameworks: PyTorch, TensorFlow, Keras, Plotly, Scikit-learn, OpenCV-Python, PyQt5, Flutter, AWS SageMaker, Flask, Leaflet.js, Autodesk Inventor, Autodesk Fusion 360, Adobe Illustrator, Adobe Photoshop

POSITIONS OF RESPONSIBILITY

Head of Technical Operations, Torque (Student Magazine) IIT Gandhinagar **[October 2020-August 2021]**
- Led the Technical Operations team of Torque, the student magazine of IIT Gandhinagar.
- Worked as the lead developer and UI designer for Torque's first website, created using HTML, CSS, Javascript, and Bootstrap (Link to website).

Design Coordinator, Amalthea (Technical Summit), IIT Gandhinagar **[April 2019-April 2020]**
- Led the 12 member design team of Amalthea, the annual technical summit of IIT Gandhinagar.
- Organized workshops on graphic design and web development, both of which had more than 100 participants.
- Learned brand design, graphic design, Adobe Illustrator, and Adobe Photoshop.
- Gained experience in marketing, teamwork, leadership, and ideation.

Design Coordinator, Eureka(cultural event), IIT Gandhinagar **[August 2018]**
- Led the 40 member design team of Eureka, a cultural event by first-year B.Tech. students.
- Gained experience in decoration, poster design, and invitation design.

EXTRA-CURRICULAR ACTIVITIES

Member, Palette (art club), IIT Gandhinagar **[August 2018-Present]**
- Organized an origami workshop for students.
- Represented the club at Inter-IIT Cultural Meet 2019 (national level competition), won the first position in an event and was part of the team that won the third position in another event.
- Represented the club at Inter-IIT Cultural Meet 2018 (national level competition) and was part of the team that won the third position in an event.

Member, Quizzing Society, LitSoc (literary club), IIT Gandhinagar **[August 2018-Present]**
- Represented the club at Inter-IIT Cultural Meet 2018 (national level competition).

Member, NYASA (social service initiative), IIT Gandhinagar **[August 2018-January 2019]**
- Organized Sanjeevani (a medical camp for the people of Palaj).
- Organized classes for children at the NYASA school on campus.