
TUSHAR GAUTAM

CONTACT

+1-720-421-2291

[Email](#)

[Personal Website](#)

[Linkedin](#)

[GitHub](#)

[Codechef](#)

[StackOverflow](#)

POSITIONS

- Core Member, 2014-2017, Delta Force, github.com/delta
- Open Source Code Maintainer, 2016-2017 Coala Organisation, github.com/coala
- Event Manager, 2015-2016, Pragyan, Tech Fest, NIT Trichy <https://www.pragyan.org/>

HOBBIES

- Trekking
- Long motorcycle rides
- Watching documentaries
- Reading books

EXPERIENCE

Technologist, Alphonso Inc, Bangalore, India

June 2017 - June 2021

Opportunity to work on a wide range of projects. Some of my contributions have been the following:

- Alphonso's proprietary *Audio Content Recognition* algorithm requires custom Live-TV database indices available on every server in order to perform a content recognition. Two major optimisations were done to address vertical and horizontal scaling. For vertical scaling, overhauling of data structure for Live-TV database index cache to optimise the algorithmic search time complexity from linear to logarithmic was done. This cache is crucial for *Audio Content Recognition* algorithm as it demands performing database loading for lookup on a TV feed in real time.
- For horizontal scaling, redesigning database index deployment pipeline to scale to thousands of servers within a sub-second time was crucial. The challenge was to deploy small index databases at an interval of 2 seconds across thousands of servers within a sub-second time. The pipeline is very critical for Alphonso to perform *Audio Content Recognition* on a Live-TV feed hence requires index deployment to be reliable and to happen in real-time.
- Worked on designing distributed log collection pipeline using *Graylog* and *ElasticSearch*, application metrics collection and monitoring via *Telegraf* and *InfluxDB*, streamlined application deployment via *Docker* and *Kubernetes*, High-availability and Load-balancing of critical services via *HaProxy* and Floating IPs. Also built expertise on *Mesos*, *HDFS* and *Ceph* to manage the large scale distributed storage and compute cluster.

Google Summer of Code student, Python Software Foundation

April 2016 - Aug 2016

Contributed to coala project under Python Software Foundation as Google Summer of Code student. As part of the project, I developed *coala-html* which is an angular application used to display results from *coala* as an interactive web page. Before *coala-html*, coala results were limited to console. Noteworthy lessons learned during GSOC were test driven development, test automation and importance of code documentation.

Speaker, EuroPython, Bilbao, Spain

July 2016

Conducted a training session titled "*Guide to make an open source contribution*", using *Git*, *Continuous Integration and Deployment* tools at EuroPython — an annual International Python Conference in Europe. To build the understanding of an open source contribution workflow, participants made real time contributions to *coala* project. [Github.com/coala](https://github.com/coala). Key take away was the introduction to *Git* — a distributed version control software.

Software Developer Intern, CitrusPay, Pune, India

June 2015 - July 2015

Refactored the existing Javascript library which integrates a payment checkout page with Citrus payment gateway. Being a payment gateway company, Citrus supports payment wallet. I worked on implementing a new REST interface and crucial bug fixes. As a sophomore university student, opportunity to intern with CitrusPay was a learning experience. It gave me a glimpse of the entire software life-cycle.

Student Software Developer, Delta Club, NIT Trichy

July 2014 - May 2017

Delta Club is an elite programming club of the National Institute of Technology, Tiruchirappalli. As a core member, I was responsible for the maintenance of the institute website, development, administration and updating most of the contents on the institute intranet. It offered a steep learning experience by throwing up new challenges everyday and opportunity to work on a wide range of projects around the corner for anyone with the drive and knowledge to try it out. I participated in various online coding competitions and conducted tech-talks in the university campus.

EDUCATION

MS, Computer Science, Aug, 2021- Present

University of Colorado, Boulder, CO, US

B.Tech, Production Engineering, 2013 - 2017

National Institute of Technology, Trichy, India

CGPA: 7.38 / 10

RELEVANT COURSEWORK

UNDERGRADUATE

- Basics of Programming (CS101) : C++ programming and OOPS
 - Mathematics - I & II (MA101, MA102) : Calculus and Linear Algebra
 - Probability and Statistics (MA208)
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- Pattern Recognition (EC459)
 - Industrial Robotics (PR004)

INDEPENDENT

- Data Structures and Algorithms, CLRS Book.
- Using Databases with Python, University of Michigan, Coursera
- Introduction to Operating Systems, Georgia Tech, Udacity
- Cloud Computing Concepts, University of UIUC, Coursera
- Machine Learning, Stanford University, Coursera
- Web Performance Optimisation, Google, Udacity
- Neural Networks and Deep Learning, Deeplearning.ai, Coursera
- Structuring Machine Learning Projects, Deeplearning.ai, Coursera
- Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization, Deeplearning.ai, Coursera

B.TECH PROJECT

Project titled “Intelligent Estimation of Heating and Cooling Load Requirements of Buildings”—to study the effect of various input variables (relative compactness, surface area, wall area, roof area, overall height, orientation, glazing area, glazing area distribution) on two output variables, namely heating load (HL) and cooling load (CL) of buildings. Reports suggest that building energy consumption has steadily increased over the past decades worldwide, and heating, ventilation and air conditioning (HVAC), which have a catalytic role in regulating the indoor climate, account for most of the energy use in the buildings. Therefore, one way to alleviate the ever increasing demand for additional energy supply is to have more energy-efficient building designs with improved energy conservation properties. When it comes to efficient building design, the computation of the heating load (HL) and the cooling load (CL) is required to determine the specifications of the heating and cooling equipment needed to maintain comfortable indoor air conditions. Various Machine Learning approaches were implemented, compared and visualised on the datasets obtained from Machine Learning Repository, Centre for Machine Learning and Intelligent Systems, UCI. Finally, a model with the best accuracy was proposed.

OPEN SOURCE PROJECTS

- COALA

Maintainer and Contributor | Python

<https://github.com/coala/coala>

coala is a static code analyser that provides a unified command-line interface for linting and fixing code, regardless of a target programming language. Being a contributor and maintainer to the project I worked on multiple bug fixes and new features along with conducting code reviews to Github pull requests.

- **COALA-HTML**

Author | Python, AngularJS

<https://github.com/coala/coala-html>

Developed from scratch an interactive website generator for coala. Before this project, coala support was limited to console only. Coala-html enabled interacting with coala via an interactive website.

- **IGITT**

Contributor | Python

<https://gitlab.com/gitmate/open-source/IGitt>

<https://gitlab.com/gitmate/open-source/gitmate-2>

Unified REST interface to access various git hosting services like GitHub, GitLab etc. IGITT was a crucial component to GitMate — an open-source automated code review and issue triaging tool for GitHub & GitLab projects. I contributed multiple patches for crucial bug fixes and implemented a new feature to predict a bug rank for any new patch using the bug prediction algorithm by Google called BugSpot.

- **CODE-CONTROL**

Contributor | MongoDB, ExpressJS , AngularJS, NodeJS

<https://github.com/ash7594/code-control>

Code Character is an online game in which a player writes a JavaScript code to control a bot with attack and defend strategies and defeat the opponent player's character to win the game. The game has a good application of Graph Data Structure. The game was hosted online during Pragyan 2016 - technical festival at my alma mater - NIT Trichy.

- **CODE2PDF**

Author | Python

<https://github.com/tushar-rishav/code2pdf>

Console app to convert a given source code file into PDF file with options for more than 20 syntax highlighting themes, custom PDF sizes and line formatting. Currently, the Github repo has more than 300 stars, 27 forks and over 200k downloads thus far.

- **BALERT**

Author | Python

<https://github.com/tushar-rishav/balert>

A console app for sending voice notification when computer's battery is low, with options to set custom warning messages & critical charge level. It's published at PyPi and has over 100k downloads thus far.

- **ALGORITHMS**

Author | Python | C++

<https://github.com/tushar-rishav/Algorithms>

Compilation of various Data Structures and Algorithms written in Python / C++. The source of reference were Introduction to Algorithms book by CLRS and Algorithms and Data Structure online course.

- **TOPCODER-DL**

Author | Python

<https://github.com/tushar-rishav/topcoder-dl>

Inspired from Youtube-dl, the topcoder-dl downloads all the data science tutorials from Topcoder and saves them as PDF. Multithreading was used to optimise on network I/O.

- **OVERTHEWIRE CHALLENGES**

Author | Linux

<https://github.com/tushar-rishav/Overthewire>

My solutions to the wargames offered by the OverTheWire community to learn and practice Linux security concepts in the form of fun-filled games.

SKILLS

PROGRAMMING

- Python, NodeJS, C++

TECHNOLOGY

- Docker
 - Mesos, Spark
 - Kafka, Graylog
 - MongoDB, InfluxDB
 - Ceph, HDFS
 - Ansible
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