

# ACHYUDH RAM

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RESEARCH OBJECTIVE	Building intelligent software development automation systems by bringing together diverse fields like software analytics, machine learning, information retrieval and social networks.
EDUCATION	<p><b>University of Waterloo</b>, Ontario, Canada</p> <p><b>M.Math. (Thesis), Computer Science</b>, <i>Expected:</i> August 2020</p> <ul style="list-style-type: none"><li>Affiliated to the Data Systems Group and the Software Architecture Group</li></ul> <p><b>Birla Institute of Technology &amp; Science</b>, Pilani, India</p> <p><b>B.E. (Hons.), Computer Science</b>, Graduated with <i>Distinction</i></p> <ul style="list-style-type: none"><li>GPA: 9.71/10.0 and Major GPA: 9.73/10.0</li></ul> <p><b>M.Sc. (Hons.), Economics</b>, Graduated with <i>Distinction</i></p> <ul style="list-style-type: none"><li>Major GPA: 10.0/10.0</li></ul>
UNDERGRADUATE THESIS	<p><b>PHASE 1:</b> <i>Assessing the reviewability of code changes and automating the evaluation of GitHub Pull Requests</i> Aug '17 – Dec '17</p> <ul style="list-style-type: none"><li>Adviser: Prof. Alberto Bacchelli, University of Zurich</li></ul> <p><b>PHASE 2:</b> <i>Empirical modeling of sentiments in code review discussions on collaborative coding platforms like GitHub</i> Jan '18 – May '18</p> <ul style="list-style-type: none"><li>Adviser: Prof. Mei Nagappan, University of Waterloo</li></ul>
TEACHING	<p><b>Teaching Assistant</b> - Neural Networks &amp; Fuzzy Logic Jan '17 – May '17 BITS F312 with Tirtharaj Dash, Department of Computer Science, Birla Institute of Technology &amp; Science, Pilani</p> <p><b>Teaching Assistant</b> - Data Structures &amp; Algorithms Jan '17 – May '17 CS F211 with Dr. A. Baskar, Department of Computer Science, Birla Institute of Technology &amp; Science, Pilani</p>
EXPERIENCE	<p><b>Software Engineering Intern, Microsoft Research</b> May '18 – Aug '18</p> <ul style="list-style-type: none"><li>Worked on query optimization for COSMOS, Microsoft's production Big Data engine</li><li>Performed static analysis on SCOPE queries and evaluated the analysis on production jobs</li></ul> <p><b>Research Intern, University of Waterloo</b> Jan '18 – May '18</p> <ul style="list-style-type: none"><li>Worked with Prof. Mei Nagappan on the empirical modeling of sentiments in GitHub Pull Request discussions as a part of the THEMIS.COG project</li></ul> <p><b>Research Intern, TU Delft</b> Aug '17 – Dec '17</p> <ul style="list-style-type: none"><li>Worked with Prof. Alberto Bacchelli on assessing the reviewability of code changes and automating the evaluation of GitHub Pull Requests</li></ul> <p><b>Software Engineering Intern, Intuit</b> May '17 – Jul '17</p> <ul style="list-style-type: none"><li>Developed a data processing layer with parallel query evaluation for layout-based database retrieval and a report generation layer to provide performance insights for businesses</li><li>Won HackAttack 2017 by building <i>Foresight</i>, an Android app that uses object detection and realtime databases to help the differently-abled navigate better</li></ul> <p><b>Research Intern, Indian Bank</b> May '15 – Jul '15</p> <ul style="list-style-type: none"><li>Developed environment sensitive time-series forecasting models for setting business targets</li></ul>
PUBLICATIONS	<p><b>What Makes a Code Change Easier to Review? An Empirical Investigation on Code Change Reviewability</b> <i>26th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (2018)</i></p> <p><b>Investigating Type Declaration Mismatches in Python</b> <i>IEEE Workshop on Machine Learning Techniques for Software Quality Evaluation (collocated with SANER 2018)</i></p>

## RESEARCH PROJECTS

### **Detecting inconsistencies between Python code and comments** *Sep '17 – Nov '17*

Advisers: Dr. A. Bacchelli, L. Pascarella

GitHub: [achyudhk/PyFunc-Signature-Parser](#)

An analysis of type inconsistencies between source code and method docstrings in Python across popular Python libraries and building an automated tool to identify these inconsistencies.

### **Analysis framework for decoding online developer communities** *Dec '15 – May '17*

Adviser: Prasad Talasila

GitHub: [achyudhk/Mailing-List-Network-Analyzer](#)

An analysis of author interaction through community detection in mailing lists, IRC channels and Slack teams using a text mining based approach to identify topic experts and label communities, in order to examine the activity and decode the structure of the developer communities.

### **Fitness-aware brokering of hosted containerized environments** *Jan '17 – May '17*

Adviser: Dr. Santonu Sarkar

GitHub: [achyudhk/Fitness-Aware-Container-Brokering](#)

An integration agent that benchmarks and containerizes a SaaS catalog offering and a smart fulfillment engine that deploys it into the best-fit container out of a set of containers hosted on various underlying clouds. *In association with IBM Research Labs.*

### **Novel feature selection using Fuzzy C-Means clustering** *Feb '17 – Apr '17*

Adviser: Dr. Rajendra Roul

GitHub: [achyudhk/FCM-Feature-Selection](#)

Feature selection using cosine similarity scores on the semantic centroids calculated from the normalized term-term correlation factors based on Fuzzy C-Means clustering. Selected features resulted in comparable F-scores for classification compared to MI and  $\chi^2$

### **Semantic segmentation using a deconvolution network**

*Mar '17 – Apr '17*

Neural Networks Course Project

Reference: [arXiv:1505.04366](#)

A deconvolution network that can identify Red Blood Cells in an input image by predicting a binary segmentation mask.

### **Video translation of American Sign Language gestures**

*Nov '16 – Dec '16*

Machine Learning Course Project

GitHub: [achyudhk/Sign-Language-Recognition](#)

An ensemble classifier that applies hard negative mining and non-maximal suppression for localization, using histogram of gradients and local binary patterns as features. Achieved an accuracy of ~99% on localization and 96.8% on top-5 classification (IoU metric).

### **Identifying the trends in Indian Legislative issues using NLP**

*Aug '16 – Dec '16*

Adviser: Dr. Anoop Kumar

GitHub: [achyudhk/Parliamentary-Debate-NLP](#)

Identification of latent structures within parliamentary debates using natural language processing to discover seasonal trends in the debates of the upper and lower houses.

### **Miscellaneous Projects**

- Feed-forward Neural Network library using computational gate approach supporting multiple optimizers, common activation and loss functions
- Implementation of state of the art Deep Learning papers on Google SVHN and MNIST datasets
- Implementation of machine learning algorithms like Support Vector Machines, Principal Component Analysis, K-means Clustering, Fuzzy C-means Clustering in Python
- Design and implementation of MIPS single-cycle, multi-cycle and pipelined architectures
- Network Topology Simulation and Analysis using Wireshark, NS2, NAM, xGraph and AWK
- Multi-user chat service using socket programming with multicast and broadcast messages
- FTP client and server using socket programming
- BibTeX Parser and Code Beautifier for C using LEX and YACC
- Weather monitoring station design and simulation using  $\mu$ -processor programming and interfacing

## TALKS AND PRESENTATIONS

### **Google Developer Group, Goa**

- Leveraging the power of Virtualization, Docker and the Cloud

*Apr '17*

### **Department of Economics, BITS Pilani**

- Monte-Carlo methods to assess the feasibility of biofuel production using simulation of economic models (Adviser: Dr. Rajorshi Sen Gupta) *Nov '15*
- Cross country analysis of statistical models for assessing the effect of economic factors on insurance penetration (Adviser: Dr. Aswini Kumar Mishra) *May '16*
- Rationality, uncertainty and cognition in financial markets – An experimental approach using double auction asset market simulation (Adviser: Dr. Anoop Kumar) *May '17*

## SKILL SET

### **Languages**

C, C++, Python, Java, JavaScript, BASH, SQL, HTML, CSS

## Frameworks

Amazon Web Services, Google Cloud Platform, Firebase, Docker, Scikit-Learn, Numpy, Matplotlib, NLTK, Gensim, Keras, NetworkX, Flask, Scikit-Image, Chart.js

## AWARDS AND SCHOLARSHIPS

**Institute Merit Scholarship** — BITS Pilani *Aug '14 – May '18*  
*Awarded six times* for being ranked within the top 1% of the university's students by GPA

**Bhushan Bhatia Graduate Application Scholarship** — BITSAA *Feb '18*  
Awarded based on academic performance to cover graduate application expenses

**Research Travel Grant** — IPCD, BITS Pilani *Aug '17*  
Awarded in recognition of my senior thesis at TU Delft

**HackAttack 2017 Runners-up** — Intuit Inc. *Jun '17*  
Built *Foresight*, an Android app that uses object detection, realtime databases, and Google Places API to help the differently-abled navigate better

**IUCAE Grant** — Inter-University Centre for Alternative Economics *Apr '17*  
Awarded towards experimental work on *Rationality, Uncertainty and Cognition in Financial Markets* with Dr. Anoop Kumar

**Duke of Edinburgh International Award** — Bronze Category *Jul '13*