Amit Goyal

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Personal Information

- ***Name*** : Amit Goyal
- ***Father's Name*** : Sh. Hari Shanker Goyal
- ***Mother's Name*** : Smt. Usha Goyal
- ***Date of Birth*** : 01.02.1991
- ***Nationality*** : Indian

Educational Qualifications

Class	School/College	Board/University	Year	%age/CPI
M.S. by Research, CSE	IIT Bombay	IIT Bombay	2021	8.79
M.E., CSE	Thapar University	Thapar University	2015	9.69
B.E., CSE	University Institute of Engineering & Technology	Panjab University	2013	88.89%
XII	St. Sophia Senior Secondary School	CBSE	2008	72%
X	K.L. Arya D.A.V. Public School	CBSE	2006	92.4%

Publications

- Amit Goyal, Akshat Garg, Digvijaysingh Gour, R. K. Shyamasundar, and G. Sivakumar. (2021). Information Flow Secure CAmkES. *6th International Conference on Internet of Things, Big Data and Security (IoTBDS)*, pages 237-244.
- Amit Goyal, R. K. Shyamasundar, G. Sivakumar, Raoul Jetley, and Srini Ramaswamy. (2021). Empirical Analysis of Greedy, GE and GRE Heuristics. *14th Innovations in Software Engineering Conference (ISEC)*, pages 1-11.
- Amit Goyal, R. K. Shyamasundar, Raoul Jetley, Devina Mohan, and Srini Ramaswamy. (2019). Test Suite Minimization of Evolving Software Systems: A Case Study. *14th International Conference on Software Technologies (ICSOFT)*, pages 226-237.
- Amit Goyal, Shalini Batra, Neeraj Kumar, Gagangeet Singh Aujla, and Mohammad S. Obaidat. (2018). Adaptive Skip Graph Framework for Peer-to-peer Networks: Search Time Complexity Analysis. *IEEE Global Communications Conference (GLOBECOM)*, pages 1-6.
- Amit Goyal and Shalini Batra. (2015). Adaptive Probabilistic Skip Graph. *IEEE International Advance Computing Conference (IACC)*, pages 953-957.

Teaching Assistant

- CS 213 Data Structure and Algorithms (Theory) Autumn 2017 (*TA of the Semester Award*), Autumn 2016
- CS 293 Data Structure and Algorithms (Lab) Autumn 2017 (*TA of the Semester Award*)
- CS 745 Principles of Data and System Security (Theory) Spring 2017 (*TA of the Month Award*)
- CS 226 Digital Logic Design (Theory) Spring 2016 (*TA of the Month Award*)
- UCS 404 Principles of Programming Languages (Lab) Spring 2015
- UCS 763 Parallel and Distributed Computing (Theory) Autumn 2014
- UTA 003 Computer Programming (Lab) Autumn 2013

Projects Undertaken

M.S. Thesis	Towards Realizing Secure and Reliable Software Systems *(July 2015 – October 2021)*
Guide	Professor G. Sivakumar and Professor R. K. Shyamasundar (IIT Bombay)
Skills Used	C, Python, Data Structures, Operating System, Security, and Software Testing

In this digital era, software systems have become ubiquitous in our everyday life. One of the ways to categorize software systems is: Application software, system software, engineering and scientific software, and embedded software. This thesis presents our contributions in improving the security (in terms of confidentiality and integrity) and reliability (in terms of testability) of embedded software. The techniques used here can carry over other software systems as well. To address security, we establish information flow security in embedded software systems by making CAmkES (Component Architecture for microkernel-based Embedded Systems) based systems, information flow secure. We prevent the indirect accesses existing in CAmkES based systems at run time by augmenting RWFM (Readers Writers Flow Model), first at the user level in uIFS-CAmkES, and then at the kernel level in kSIFS-CAmkES and kIFS-CAmkES to improve the performance. Prototypes of some real life examples like electronic voting, GPS navigation system, electronic bidding, etc., have been implemented to demonstrate that IFS-CAmkES based systems prevent indirect accesses at run time. We also identify these accesses at compile time in static IFS-CAmkES and generate information flow policy diagrams, so that the system designers can take the design decisions accordingly to secure the information flow. To address reliability, we perform test suite minimization in the embedded control systems domain for requirement coverage of an industrial tool, the SCAN tool. We perform an empirical analysis of trends in minimized test suite size and run time of Greedy, GE, and GRE heuristics with varying percentages of essential test cases, and provide guidelines to the testing team to choose appropriate heuristics. We further demonstrate the application of the heuristics and validate the empirical study guidelines on the SCAN tool.

M.E. Thesis	Adaptive Probabilistic Skip Graph *(January 2014 – June 2015)*
Guide	Dr. Shalini Batra (Associate Professor, Thapar University)
Skills Used	C, Algorithms, and Data Structures
Skip graphs, a variant of skip list, are one of the best candidates for peer to peer networks. The complexity for searching a node in skip graph is *O(log n)*. The skip graph does not adapt itself according to the most frequent search queries which lead to congestion in the network. We propose a new data structure "Adaptive Probabilistic Skip Graph" which adapts itself according to the search queries using a probability vector (added in the basic structure of the skip graph node). Two replacement policies, least recently used and least frequently used have also been proposed and implemented to avoid a situation in which more than *log n* nodes have the same membership vector.	

B.E. Internship	Monitoring and Optimizing PIMCO Night Cycles and Internal Reporting Tool for Gemini Solutions *(January 2013 - June 2013)*
Guide	Mr. Sandeep Arsid (Financial Engineer, Gemini Solutions) and Professor Sarbjeet Singh (UIET, PU)
Skills Used	Bash Shell, C Shell Scripting, Software Engineering, HTML, PHP, and MySQL
Worked in 4 teams with the following responsibilities: *(i) Beta Team* - Beta monitoring and quality assurance, sending beta dashboards, creating beta cycle summary, writing scripts for creating beta reports, developing monitoring tools for oracle, introducing DACC in beta, and making worklists. *(ii) Delta Team* - Delta cycle documentation and monitoring, writing scripts for making delta reports, and optimization of delta scripts. *(iii) Prod Team* - Prod monitoring and standardization of prod scripts. (iv) *Support Team* - Improved the company's already existing internal reporting tool and later helped in developing the new reporting tool by handling its database design and implementation.	

B.E. Project	Design and Implementation of Static Crawler *(July 2012 - December 2012)*
Guide	Dr. Mukesh Kumar (Associate Professor, UIET, PU)
Skills Used	Software Engineering, Java (Core)
We designed a static crawler using naïve bays algorithm and taking "Computer" as the field. The crawler first learns through the available documents in relevant and irrelevant categories with respect to the field. It then categorizes a test document as relevant or irrelevant. We further extended it to add some dynamic nature by updating its calculations after an optimum number of documents are checked for their relevance, and allowing the user to select the search field at run time.	

Technical Talks

- Talk on *Assessment of seL4 Security* in FOSAD 2017, Bertinoro, Italy
- Talk on *Security Fundamentals* in CyberSec 2017, IIT Bombay
- *Basic Python Workshop* in CrytoNyt 2014 and CryptoNyt 2015, Thapar University
- *Basic Java Workshop* in Chakravyuh 2013, Thapar University

Academic Achievements

- University Gold Medalist 2013-15 Batch, Thapar University
- University Gold Medalist 2009-13 Batch, Panjab University
- Qualified UGC NET in December 2014, June 2015 and December 2015, and GATE in 2013 and 2021
- Ph.D. Fellowship from ABB Corporate Research (January 2017 to December 2020)
- Ph.D. Fellowship from MietY, GoI (January 2016 - December 2020), and from MHRD, GoI (July - December 2015)
- Six months internship at Gemini solutions during B.E., 8th semester with a monthly stipend of Rs. 15000
- Got Ph. D. admission at IIIT Delhi, IIT Roorkee, and IIT Bombay in July 2015
- Placed in TCS, IBM, and LPU during campus placements at Thapar University in 2014
- Placed in Nagra Vision and Gemini Solutions during campus placements at Panjab University in 2012

Administrative Responsibilities

- Core Team Member, Research and Innovation Symposium in Computing (RISC) 2017
- Institute Doctoral Representative (PGAC) and Senate Member, IIT Bombay for two consecutive sessions 2016-18
- Institute Organizational Color Award, IIT Bombay for two consecutive sessions 2016-18
- Mess Councilor, Hostel 15, IIT Bombay for the session 2015-16
- Best Office Bearer Freshman Award, Hostel 15, IIT Bombay for the session 2015-16
- Dr. J.K. Pal Memorial Award for the Best IEEE Student Member in 2015
- Proctor (2014-15) and Cultural Head (2013-14), Hostel J, Thapar University
- Student Coordinator (2014-15) and Technical Lead (2013-14), Linux User Group, Thapar University
- President, IEEE Student Chapter, Thapar University for the year 2014
- Member, Student Consultative Committee, Thapar University for two consecutive sessions 2013-15
- Convener (2012-13) and Member (2010-12), Public Relations & Tours Committee, UIET

References

- Dr. Shalini Batra, Associate Professor and Head CSED, Thapar University — Email - sbatra@thapar.edu
- Dr. Mythili Vutukuru, Associate Professor, CSED, IIT Bombay — Email - mythili@cse.iitb.ac.in