

AVINASH KUMAR SINGH

Robotics & Artificial Intelligence Laboratory, Indian Institute of Information
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Educational Qualification:

- **Doctor Of Philosophy (Ph.D.)**

Currently pursuing at Department of Robotics, I.I.I.T Allahabad U.P. India.

Supervisor: Prof. G. C. Nandi (Dean Academic IIITA)

Status: Ph.D. Thesis Submitted on 12 Feb 2016

Course Credited: Soft Computing, Robotics and Industrial Automation, Research Methodology.

Grade Obtained: A (9/10)

- **Master Of Technology**

University : K.I.I.T University Bhubaneswar Odisha India.

Specialization : Computer Science & Information Security.

Year : 2011.

CGPA : 8.91.

- **Master Of Science**

University : Kumaun University Nanital, Uttaranchal India.

Specialization : Information Technology.

Year : 2009.

Percentage : 76%.

- **Bachelor Of Science**

University : Kumaun University Nanital, Uttaranchal India.

Subjects : Mathematics, Chemistry, Information Technology.

Year : 2007.

Percentage : 65%.

Distance Learning

- **Master Of Computer Application**

University : I.G.N.O.U India.

Year : 2010.

Percentage : 65%.

- **Bachelor Of Computer Application**

University : I.G.N.O.U India.

Year : 2007.

Percentage : 58.5%.

PH.D RESEARCH DETAILS

Title: On Effective Human Robot Interaction based on Recognition and Association.

Abstract:

Extensive research is going in the area of robotics, especially towards developing Humanoid Robots, which can interact with us socially. Such robots will be extremely useful for many household applications in near future. To make it happen several challenging problems related to Recognition needs to be solved. The Robot should learn interacting with the environment and also interacting with the people. Faces play a magnificent role in human robot interaction, as they do in our daily life. The inherent ability of the human mind facilitates us to recognize a person by exploiting various challenges such as bad illumination, occlusions, pose variation etc. which are involved in face recognition. But it is a very complex task in nature to identify a human face by humanoid robots. The recent literatures on face biometric recognition are extremely rich in its application on structured environment for solving human identification problem. But the application of face biometric on mobile robotics is limited for its inability to produce accurate identification in uneven circumstances. The existing face recognition problem has been tackled with our proposed component based fragmented face recognition framework. The proposed framework uses only a subset of the full face such as eyes, nose and mouth to recognize a person. It's less searching cost, encouraging accuracy and ability to handle various challenges of face recognition offers its applicability on humanoid robots. The second problem in face recognition is the face spoofing, in which a face recognition system is not able to distinguish between a person and an imposter (photo/video of the genuine user). The problem will become more detrimental when robots are used as an authenticator. A depth analysis method has been investigated in our research work to test the liveness of imposters to discriminate them from the legitimate users. The implication of the previous learned techniques has been used with respect to criminal identification with NAO robot. An eyewitness can interact with NAO through a user interface. NAO asks several questions about the suspect, such as age, height, her/his facial shape and size etc., and then making a guess about her/his face. A rough set based reasoning approach has been proposed to map the eyewitness imprecise knowledge to the existing criminal database. If the facial description is not matched inside the database, it is assumed that there is no previous information about criminal face exists. In all such cases NAO help Police sketch artist to create portraits of the criminal.

M.TECH RESEARCH DETAILS

Title: Detection and Prevention of SQL Injection Attack in Web Application

Abstract:

When Internet was developed, the founding fathers of Internet hardly had any inclination that Internet could transform itself into an all pervading revolution which could be misused. Due to the anonymous nature of the Internet, it is possible to perform various attacks against web applications. SQL Injection is the most threatening attack against web applications, and it covers up to 20% of all cyber-attacks, which is maximum among all and a big cause to worry. SQL injection is an attack method used by hackers to retrieve, manipulate, fabricate or delete information in organizations relational databases through web applications. Despite being remarkably simple to protect against SQLI, there is an astonishing number of production systems connected to the Internet that are vulnerable to this type of attack. In this

thesis, we have proposed two different mechanisms to prevent and detect SQL Injection in a web application. For prevention, we have designed SQL Meta Character Filter which we have placed in between the user and the application server to intercept all the request coming from the user. The Meta filter parses the input URL to detect attack patterns. If any pattern matches with the stored signature, then it redirects the request to the error page. For the detection purpose, we have designed a Network based Vulnerability Scanner, which scans the whole web application and generates an automatic report describes which pages are vulnerable and which are not. So a developer can fix these problems before launching it on the web. Both of these approaches have been implemented successfully and are fully able to fix SQLI vulnerabilities.

RESEARCH INTEREST

Machine Learning, Pattern Recognition, Human-Robot Interaction, Computer Vision, Natural Language Processing, Cryptography & Network Security.

ACADEMIC ACHIEVEMENTS AND MEMBERSHIPS

- Certified Professional Hacker by Techdefence.
- Got First rank in MSc (IT) at University level.
- Got 2nd position in M.Tech (Information Security) at University level.
- IEEE Professional Student Member.
- Official Mentor of IEEE in IIIT-Allahabad student chapter from June 2013.
- Chair of IEEE in IIIT- Allahabad student chapter from June 2014.
- Program Committee member of “Second International Conference of Networks and Communications (NC 2014)”, Sydney, Australia.
- Technical Program Committee member of “International Conference on Signal Propagation and Computer Technology”, organized by Government Engineering College Ajmer and Technically Sponsored by IEEE Delhi Section.
- Organizing committee member of “SERB sponsored 1st summer school on robotics”, organized by IIIT Allahabad.

WORKSHOP AND CERTIFICATION COURSE ATTENDED

- Attended Microsoft Summer School on “**Distributed Algorithms, Systems, and Programming**” organized by **Microsoft Research India**, held at Indian Institute of Science (IISc) Bangalore from 28th may to 8 June 2012.
- Attended the **National workshop cum training program on Computing Techniques and Applications (NWCTP-CTA)** organized by **Center for Mathematics of Banaras Hindu University** Campus – Varanasi during July 01 – 07, 2012.
- Successfully completed **Three Months “Certificate Course on Machine Intelligence and Soft Computing”** with **B+ grade** offered by Center for Soft Computing Research (CSCR) of **Indian Statistical Institute – Kolkata** during September 21 – December 21, 2012.
- Attended 1st **Indian Workshop on Machine Learning** organized by **Indian Institute of Technology, Kanpur**, July 1 – 3, 2013.

- Attended **Faculty Development Programme on Image Processing, Computer Vision and Pattern Recognition**, conducted from 18th June – 22nd June, 2013 at **National Institute of Technology Delhi**.
- Attended **DAAD Supported International Workshop on Advances in PDE Modeling and Computation (APDEMC 2013)** organized by **Department of Mathematics Indian Institute of Technology Madras – Chennai** during October 21-25 2013.

INVITED TALKS

- Presented 3 day talk on “Authentication Techniques and Web Application Security” in a one week long (June 23-28, 2014) workshop on “Information Security and Computer Forensic (WISCF-2014)”, organized by Department of Computer Science & Engineering, Motilal Nehru National Institute of Technology Allahabad, Allahabad, India.
- Presented talk on “Computer & Network Security” in a one day workshop (September 7, 2014), at UPTEC Computer Consultancy Ltd Allahabad organized by Computer Society of India, Allahabad Chapter.
- Presented talk on “Spoofing Attacks & System Security” in a one day workshop (January 31, 2015), at Arcade Business College, Patna, Bihar, India organized by Ph.D. chamber of Commerce, India.
- Presented one day talk on “Robotic Vision: Detection and Tracking” in a one month long (June 8-July 5, 2015) summer school on “Emerging Trends in Computer (ETCS-2015)”, organized by Department of Computer Science & Engineering, Motilal Nehru National Institute of Technology Allahabad, Allahabad, India.

CONFERENCE PUBLICATIONS

1. **Avinash Kumar Singh** and G C Nandi, “Sketch drawing by Nao Humanoid Robot”, accepted for the publication in 35th IEEE International Conference TENCON 2015, pp. 1-6, Macau, November 1-4, 2015.
2. **Avinash Kumar Singh**, Neha Baranwal, G C Nandi, “Human Perception based Criminal Identification through Human Robot Interaction”, published in Eighth International Conference on Contemporary Computing (IC3), 2015 International Conference on, pp.196-201, 20-22 August 2015.
3. **Avinash Kumar Singh**, Arun Kumar, G C Nandi and Pavan Chakraborty, “Expression Invariant Fragmented Face Recognition”, published in IEEE, International Conference on Signal Propagation and Computer Technology (ICSPCT-2014), organized by Government Engineering College, Ajmer, Rajasthan-India. Digital Library, pp. 184-189 July 2014.

4. **Avinash Kumar Singh**, Piyush Joshi, G C Nandi, “Face Recognition with Liveness Detection using Eye and Mouth Movement”, published in IEEE, International Conference on Signal Propagation and Computer Technology (ICSPCT-2014), organized by Government Engineering College, Ajmer, Rajsthan-India. Digital Library, pp. 592-597 July 2014
5. **Avinash Kumar Singh**, Piyush Joshi, G C Nandi, “Development of a Fuzzy Expert System based Liveliness Detection Scheme for Biometric Authentication” published in Elsevier, 7thInternational Conference on Image and Signal Processing (ICISP-2013), organized by University Visvesvaraya College of Engg. Department of Computer Science and Engineering Bangalore University, Bangalore –India. Digital Library: Vol. 4, pp. 96-103 October 2013.
6. **Avinash Kumar Singh**, G.C Nandi, “Face recognition using facial symmetry” – published in 2nd International Conference on Computational Science, Engineering and Information Technology (CCSEIT-2012), Coimbatore, 2012 in the proceeding of ACM. Digital Library, pp. 550-554, October, 2012.
7. **Avinash Kumar Singh**, Sangita Roy, “A Network Based Vulnerability Scanner for Detecting SQLI Attacks in Web Applications”, published in the proceeding of IEEE 1st International Conference on Recent Advances on Information Technology (RAIT-2012). Digital Library: pp. 585-590, 15-17 March 2012, ISM Dhanbad, Jharkhand, India.
8. Shashank Srivastava, **Avinash Kumar Singh**, G.C. Nandi, “Inter Cipher Block Diffusion: A Novel Transformation for proposed parallel AES”, published in the proceeding of Elsevier (Procedia Technology), 2nd international conference on communication, computing and security. Digital Library: Vol. 6, pp. 872-879, Oct 6-12.
9. Sangita Roy, **Avinash Kumar Singh**, Jyotirmayee Parida, “Audio Steganography Using LSB Encoding Technique with Increased Capacity and Bit Error Rate Optimization”, published in 2nd International Conference on Computational Science, Engineering and Information Technology (CCSEIT-2012), Coimbatore, 2012 in the proceeding of ACM Digital Library:pp. 372-376, October, 2012.
10. Sangita Roy, **Avinash Kumar Singh**, Ashok Singh Sairam “A Novel Approach to Prevent SQL Injection Attack using Filter”, published in the proceeding of IEEE International Conference on Engineering and Information Management (ICEIM 2011).Digital Library: Vol. 4, pp-139-143, 16-18 April 2011, Chengdu, China.
11. Sangita Roy, **Avinash Kumar Singh** and Ashok Singh Sairam, “Analysing SQL Meta Characters and Preventing SQL Injection Attacks Using Meta Filter”, published in the

proceeding of International Conference on Information and Electronics Engineering, ICIEE 2011, IACSIT Press. Digital Library: vol. 6, pp. 167-170, 28-29 May 2011, Bangkok, Thailand.

JOURNAL PUBLICATIONS

1. **Avinash Kumar Singh**, G C Nandi, “Visual Perception based Criminal Identification- a query based approach”, published in “Taylor & Francis International Journal of Experimental & Theoretical Artificial Intelligence. (in press) **SCI-Impact Factor: 1.703**
2. **Avinash Kumar Singh, G C Nandi**, “NAO Humanoid Robot: Analysis of Calibration Techniques for Robot Sketch Drawing”, published in “Elsevier International Journal of Robotics and Autonomous Systems”, Vol. 79, pp. 108-121. **SCI-Impact Factor: 1.618**
3. **Avinash Kumar Singh**, Piyush Joshi, G C Nandi, “Face Liveliness Detection through Face Structure Analysis”, published in inderscience “International Journal of Applied Pattern Recognition”, Vol.1, No.4, pp.338 – 360. **E-SCI (Thomson Reuters)**
4. Sangita Roy, **Avinash Kumar Singh** and Ashok Singh Sairam, “Detecting and Defeating SQL Injection Attacks”, published in the proceeding of International Journal of Information and Electronics Engineering (IJIEE), Singapore, Vol. 1 , No. 1 , pp.38-46, July 2011.
5. Sangita Roy ,**Avinash Kumar Singh** and Ashok Singh Sairam, “A Novel Approach to Prevent SQL Injection Attack using URL Filter”, published in International Journal of Innovation, Management and Technology, Vol. 3, No. 5, pp 499-502 October 2012.

COMMUNICATED PUBLICATIONS

- **Avinash Kumar Singh**, G C Nandi, “Visual Perception based Criminal Identification- a rough set based reasoning approach”, submitted for the publication in “Elsevier International Journal of Artificial Intelligence”.

EMPLOYMENT HISTORY

- Worked as Assistant Professor from July- 2011 to Dec 2011 in Gwalior Engineering College Gwalior, M.P, India.
- Working as an Associate Process Manager with eclerx at Mumbai since 19th November 2015.

COURSES TOUGHT

Network Security, Cryptography, Database Management System, C, C++, J2EE.

SOFTWARE PROFICIENCY

Languages : C, C++, JAVA, and Visual Basic 6.0, PHP.
Database : Oracle 8I, 10G, MS-Access, MySQL.
Operating Systems : MS DOS, Windows, Ubuntu 13.0.
Tools Used : MATLAB, OpenCV2.4.9.

REFERENCES

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Dr. Pavan Chakraborty
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PERSONAL PROFILE

Mother's Name : Vibha Singh
Father's Name : L.P.Singh
Nationality : Indian
Gender : Male
Date of Birth : 28-December-1986
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Mobile No : +919005722861
Permanent Address : S/O L. P. Singh, House No: 610/1292, Kesav Nagar,
Sitapur Road, Lucknow-226021, Uttar Pradesh

DECLARATION:

I hereby declare that the above mentioned particulars are true to the best of my knowledge and belief.

Place: ALLAHABAD

Date:

(Avinash Kumar Singh)