



1. **Name and Photograph** Ms Farhat Azad
2. **Designation and complete address including email id** : Principal Scientist,
farhatazad786@gmail.com
3. **Areas of Interest** : Geotechnical Engineering, Technology Management &
Transportation Planning
4. **Educational Qualification** – starting from the highest degree

Degree	Year of Passing	University/Instt.	Subject	Div./Class/Grade
Phd	2014	School of Planning and Architecture – New Delhi	Planning of Freight/Truck traffic movement in Delhi-NCR	NA
M.Tech.	2005	Indian Institute of Technology - Delhi	Geotechnical & Geo- environment Engg.	7.41
B.Tech.	1994	Jamia Collage of Engineering and Technology	Civil Engg.	Honours- 84%
Diploma in Autocad	1995	One-Point Computer Solutions, South Extension, New Delhi	Designing and Drafting	Ist Division

5. Professional Experience - in reverse chronological order

Grade/Post	From	To	Institution
Principal Scientist (TPE)	19.11.2016	Till date	Central Road Research Institute, New Delhi
Senior Scientist & Head (TMBD)	13.08.2014	18.11.2016	Central Road Research Institute, New Delhi
Senior Scientist	19.11.2011	12.08.2014	Central Road Research Institute, New Delhi
Scientist 'C'	10- 03- 2006	19.11.2011	Central Road Research Institute, New Delhi
Scientist 'B'	10- 09- 1997	10-03-2006	Central Road Research Institute, New Delhi

Planning Engineer	01-01-1996	27-08-1997	New Millennium Pvt. Ltd. 1/51, Julaina Complex, New Delhi
Product Support Engineer	04-05-1995	24-12-1995	Chintels Softworld Pvt.Ltd.M- 32, Greater Kailash, New Delhi

6. Membership to Professional Bodies:

- * Life member of national Indian geotechnical Society
- * Life member of Indian Road Congress
- * Member-Secretary for ISTAG committee

7. Achievements :

i. Patents :

Sl No.	Title	Country	Filed on (Date)	Granted on (Date)	Names of other inventors
1	New design for box insertion through highly unstable cohesionless soil by 2stabilization of vertical cut slopes	Singapore	27 th july 2013	17 th May 2016	Singh Kanwar, Prasad Pulikanti Subramanya, Mathur Sudhir, Azad Farhat, Gangopadhyay Subhamay
1	New design for box insertion through highly unstable cohesionless soil by 2stabilization of vertical cut slopes	US	16-jan-2015	6 th July 2016	Same as above
2	New design for box insertion through highly unstable cohesionless soil by 2stabilization of vertical cut slopes	Great Britain	19 th jan 2015	7 th August 2015	Same as above
4	New design for box insertion through highly unstable cohesionless soil by 2stabilization of vertical cut slopes (Application No 1502552.1)	Sri lanka	16 th feb 2015		Same as above
5	Carbon based mixture for improved performance of flexible pavements as one of bitumen additives or fillers and methods of preparation thereof (Application No 201611008235)	India	2015		Jain Pramod Kumar, Siksha Kar Swaroopa, Farhat Azad, Dr Madhu Bala Soni, Dr. Ashok Sharma, Vimal Kumar Dubey

ii) **Patents Filed for CSIR-CRRI:**

As Head(TMBD) along with team members		
Year	IP Filed	Patent Team
2013-2014	Design and Development of Pothole Repair Machine (062NF2014)	Kar Siksha Swaroopa, Jain Pramod Kumar, Sharma Dinesh Chandra, Neha Singh
2014-2015	Process of using Thermocol (Expanded Polystrene) Waste in Hot Bituminous Mixes for Road Construction (0176NF2013)	Kumar Shanta, Tiwari Devesh, Singh A.P., Sitaramanjaneyulu K., Gangopadhyay Subhmay
2014-2015	Utilisation of PVC Pipe Waste in Modifying Bitumen for Paving Application (0250NF2013)	Ambika Behl, Girish Sharma, Gajendra Kumar, P.K. Jain, Subhmay Gangopadhyay
2014-2015	Development of Electro Mechanical Field Density Gauge (063NF2014)	Havangi Vasant Gurusiddappa, Sinha Anil Kumar, Rana Rajesh, Singh Yogender Kumar, Saha Sunil Chandra, Gangopadhyay Subhamay
2015	New process for preparation of harder grade bitumen (vg40 and vg50) for formation of asphalt surfacing for roads and airfields 08NF2015/IN)	Jain Pramod Kumar, Arora Khusboo, Abhishek Mittal, Gajender Humar
As Team member		
2012	A method for box insertion through highly unstable cohesion less soil by stabilization of vertical cut slopes (<i>Part of Patent team also</i>)	

iii) **Technology Transfers:** CSIR-CRRI scientists and researchers have always been developing great technologies. Following technologies were transferred to industries:

- * **SETUCARE:** the Mobile Inspection Unit (MBIU) is an electro – mechanical device mounted on a truck which provides access to hidden parts of bridges or similar infrastructures for their proper inspection. This technology has been developed jointly by a CSIR labs comprising of CSIR-CRRI, New Delhi and CSIR-CMERI-COEFM, Gill Road, Ludhiana sponsored by Department of Science & Technology, Delhi. The technology is being transferred to :
 - **Gujarat Apollo Industries Limited, Gujarat**
 - **Gemini Power Hydraulics Pvt. Ltd., Mumbai**

- * **PATCHFILL** – The Pothole Repairing Machine is exclusively designed to prepare cold mix batches for immediate patching without holding the traffic for long. The machine is utilizing Pneumatic Compressor system for its working. The technology is being transferred to:
 - **Torchtar Membranes & Bitumen Products Pvt. Ltd., New Delhi**
 - **Leofab Projects Pvt. Ltd., Orissa**
 - **SUPREME Bitu-chem India Pvt. Ltd., Nagpur**
 - **SM Engineers Pvt. Ltd., Guwahati**

iv) **Conferences & Workshops:**

- **Workshop for Preparation of Roadmap for R&D and Practices for Use of Fly Ash in Roads, Embankments, Bridges and allied Structures, March 21, 2014, CSIR-CRRI:** Workshop was organized to provide a forum for producers of fly ash and prospective consumers along with the policy-makers and other stakeholders to come to a common platform to deliberate about opportunities for maximum utilization of fly ash in roads, embankment and bridges. It had covered all pertinent issues in fly ash including environmental, regulation, disposal challenges and practical methods of fly ash management for each technology. Professionals engaged in specifying, approving, marketing, or using fly ash presented state-of-art information. It has created a network of professionals for making gainful use of fly ash.
- **Workshop on Road Construction Machinery: Creating Benchmarks (RCM), Oct. 25-26, 2013, Bangluru;** Held in collaboration with VOLVO, MORTH, IRC, NHAI & Karnataka PWD to promote global standards in Road Construction Technology considering the need for proper benchmarking in machine technology and to achieve overall operational cost efficiency in machine usage. *Conference was conducted and compared by u/s.*
- **Workshop on Technologies for North East Region and Implementation Framework (TIF – CSIR 800), Sept. 6-7, 2013, Gangtok;** held in collaboration with CSIR-NEIST, NRRDA, RMD Department, Sikkim, R&B Department, Sikkim and Bitchem to showcase CSIR-CRRI technologies. *The objective of the workshop was to deliberate on the technologies that are suitable for the north-east region and to discuss the framework as to how such technologies can be adopted by the departments so that new and better technologies can be easily implemented at the grassroot level.*
- **CORTNE 2013:** The Conference on Road and Transportation Technologies for the North East Region (CORTNE 2013) was organized by CSIR-CRRI and CSIR-NEIST in collaboration with PWDs of all eight North Eastern States. The Conference held during Feb. 22-24, 2013 at Guwahati, had been the first of its kind where all North-Eastern States participated. It was inaugurated by Shri Tarun Gogoi, Hon'ble Chief Minister of Assam and was attended by about 350 delegates. *There were 25 technical presentations for which topics were decided by u/s after literature survey for the problems pertaining to road and transportation in North-East region.* Conference was conducted and compared by u/s.

- v) **Initiative towards Linking Research Institutions/Laboratories with schools for promoting “Science Education and Research amongst School Children and Teachers”** – Prepared a proposal on “Improved understanding for Science & Technology education in Schools of India” giving methodology in flow chart for teachers concerning – Knowledge & Capabilities, Balanced Personality, Thinking for Student’s Welfare, Self Evaluation, Personal Interference in School Community for healthy environment along with Dr. Anuradha Shukla in DST on the topic and it was decided to send a proposal.

vi) **Software Development** : Following software are being developed:

- * Android based CSIR-CRRI application as a micro-site of CRRI showing the details of the Divisions – published on Google Play
 - * Android based Driving skill test application where one can test her driving skills undertaking a test of 25 questions – published on Google Play
 - * Android based game for- “Road Safety of a driver while driving”
 - * Salary system for CSIR-CRRI: A salary system is being developed by TMBD team, which has eased out the calculations and report generations. The benefits can be summarized as:
 - Old salary system used to run only on one PC while new salary system is on Intranet, controlled by administrator in TMBD, which run on each and every employee’s desktop.
 - It is user-friendly, anybody can run the software.
 - * Modules regarding salary slips and bills are being incorporated, thus reports can be easily generated as per requirements of employees of CSIR-CRRI.
- Got Commendation Certificate in IRC in the month of January 2013 for, “ A Laboratory Study of Construction & Demolition Waste for use in Road Works published in Highway Research Journal, Highway Research Board, IRC, Volume 5 No.1, January – June2012
- Nominated for CSIR- Technology Award in 2014
- Got Certificate of Accreditation of New/alternative materials by Indian Road Congress for the project, “To develop carbon based additive for enhanced performance of bituminous pavement”- 2015

Research & Development -Related

Research & Development related activities by u/s include quality control of roads, feasibility study for the utilization of stabilizers, subsoil investigation, ground improvement and Transportation Planning related issues.

Geotechnical Related (Till 2016)

- ✓ **Design of Soil Nailing for stabilization of vertical cut slopes for construction of road under the approach embankment of bridge by box pushing technique at west end approach of old Yamuna Bridge No. 249, Delhi Shahadra section-Team Member**

This project was one of the major challenging and interesting work done by CRRRI, because of the following reasons mentioned below. (**Got- US Patent for the technology**)

- After several visits to site location at Shahadra, it was noticed by CRRRI team that the 3 - Precast box segments are required to be pushed in highly unstable cohesion less soil strata i.e Fine Yamuna sand for this particular site.
- In addition to this, also a Rubble Masonry Retaining wall at front and back has to be dismantled which would expose unsupported earth face of 7.5m height, highly prone to collapse.
- The site was zero tolerance site and any disruption of railway traffic was not allowed because per day 150-200 trains were passing the track at the top of embankment.
- Therefore, the design scheme and methodology for stabilization of cohesion less soil strata has to be such that it stabilizes all sides, when cut to almost vertical profile during box pushing operations.

Keeping in view the complexities of site Soil nailing technique was adopted using scheme of driven and grouted nails

- ✓ **Technical /Quality Audit of Roadwork under PMGSY for Indian Audit and Accounts Department (SSP-4441)-Team Member**

- Planning and Scheduling for various soil samples collected from the sites of state of Orissa, Uttar Pradesh, Andhra Pradesh and Rajasthan which included Laboratory testing such as Gradation test, Fineness Modulus, Water absorption, Standard Proctor and Atterberg limits of the following roads were conducted :
 - Ballia, Deoria and Jalaun District in state of U.P (8 Roads)
 - Kendrapada & Kunrda District in state of Orissa (10 – Roads)
 - Nizamabad, Medak, Nellore & Kurnool District in state of Andhra Pradesh (21 – Roads)
 - Nagpur, Jaipur, Sikar & Churu District in state of Rajasthan (10-Roads)
- Formulation of tests results in Excel sheets to avoid long calculations
- Analysis of tests results as per MORTH specifications.
- Interacted with the client and consultant during execution of the project.

Out come:

- Observational techniques and required necessary changes were made to execute the construction of road as per MORTH specifications.

- ✓ **Technical /Quality Audit of Roadwork of Delhi-Jaipur Highway for JP Associates**

- Carried out the sub-soil investigation for the stretch of the Delhi- Jaipur Highway, Gurgaon.
- Total 6 tests pits were digged
- Assisted in preparation of interim and final draft report

✓ **Investigation to determine/ascertain the causes for the distress and suggest the remedial measures for the runway pavement of Jaipur airport**

The broad objective of the study was to investigate and ascertain probable causes of distress and suggest remedial measures / solutions (on short term and long term basis) for improvement of the runway pavement. The prime aim of the assignment was to determine the causes of frequent damages in flexible portion of the runway at Jaipur Airport and recommend suitable measures / solutions for the correction / improvement / strengthening of pavement in order to augment its structural capacity, commensurate to the needs of aircrafts operating currently and projected operations. The scope of work under the study includes the following major activities / tasks:

- Assessment of pavement surface condition through visual inspections
- Extraction of 4" and 6" diameter cylindrical cores for ascertaining the conditions of bituminous layers of the runway pavement
- Measurement of layer thicknesses in the pavement structure
- Test pits observations and collection of subgrade soils and other road building materials used for construction of the existing runway pavements
- Laboratory evaluation of in-situ materials and mixes retrieved from the existing pavement structure
- Probable causes of distress and recommendation for the needed remedial measures
- Technically, the conditions of lower layers of runway were also proved to be in very bad condition by using the onsite data with the help of software called DRIP.
- Aggregate drain was designed to solve the problem.

✓ **Typical problems for Drainage system on Delhi roads and their remedial measures**

The purpose of this project was to provide a practical way for road authorities and other relevant bodies in respect of better road drainage system. To understand the problem better and find out some ways out to have better drainage system, it was decided to understand the behaviour of GSB for all six grades i.e Close grades (Grade I, II and III) and Coarse grades (Grades I, II and III). Further, for every grade, different lanes were considered to know the effect of drained water for 2, 4, 6 and 8 lanes.

✓ **Utilization of Construction and Demolition (C&D) Waste in Road works**

Construction & Demolition waste consists of the materials generated during the construction, renovation and demolition of buildings and other structures. The project was taken up to evaluate feasibility of using C&D waste materials for road construction – as fill material, in stabilized form. Thus the main **objectives** for the study are as follows:

- Bulk utilization of C&D waste in different layers of road construction.
- Characterization of C&D waste to know physical, chemical and engineering properties.
- Laboratory feasibility study on use of C&D waste in stabilized mixes.
- Recommendations regarding possible utilization of C&D wastes in road embankment and different layers of road pavement.
- Results obtained are quite satisfied and acceptable and are being implemented on a stretch at Wazirabad

✓ **To develop carbon based additive for enhanced performance of bituminous pavement” -**

Role is as Project Leader– Completed

- Literature review at national and international level.
- Compilation of relevant information
- Review/Comparison of available technologies
- Finalisation of relevant layers in pavement, where carbon can be used.
- Planning & execution for laboratory testing using different percentages of carbon.
- Finalisation of Report

Transportation Planning & Environment Division : (2016 onwards)

1. **“Assessment of Freight Vehicular Movement in Delhi and its planning for the safety of road users”-OLP-0582 (Project Leader)**. The project was planned to evaluate and study the movement of freight vehicles in and around Delhi. It further focused on the gaps on present practices being implemented to control and regulate freight traffic with respect to safety of road users. Project also considered the various parameters for crash causation involved in freight traffic along with identification of appropriate remedial measure – **Completed**
2. **“Development of mobile application for supply chain and freight transportation management for farmers” OLP 0613 (Project Leader)** – Project was planned to develop a user friendly mobile app for farmers which will provide easy searching of market rates of crops, and more income from available resources - **Completed**
3. **“Devising Novel Methods in Driver Testing and Certification” – OLP 0593 (Team Member)** – Project concentrates on development of comprehensive testing framework for driver testing and licensing along with simulator based evaluation of drivers road tests on subjective and objective variables – **Completed**
4. **“Land-use based parking policy – A Case Study of Delhi” OLP 0606 (Team Member)** – Main objective of the project is to analyse the existing parking (On-street, Off-street) condition at different land uses in Delhi which will help to develop balance parking system considering demand and supply for different land use. Project will also provide solutions for optimized utilization of available parking facilities. **In Progress**

Research Publications

- Azad, F., Das, P. and Sewa Ram. "ASSESSMENT OF FREIGHT VEHICULAR MOVEMENT ON ARTERIAL ROADS OF DELHI FOR SAFETY OF ROAD USERS". IJTTE (submitted)
- PARMAR, J., DAS, P. & AZAD, F. Evaluation of Parking Characteristics: A Case Study of Delhi. *15th World Conference on Transport Research, 2019* Mumbai. ELSEVIER. (Manuscript Accepted under Peer-review track)
- PARMAR, J., DAS, P. & AZAD, F. A Methodology of Evaluating Parking System Performance: A Case Study of Delhi. *Case Studies on Transport Policies* (Elsevier). (ESCI Indexed) (Manuscript Submitted).
- Ms Farhat Azad, Prof P.Sarkar and Dr. Anuradha Shukla "Critical review of Freight traffic problems in Delhi-NCR and their possible solutions"- Published in Journal of Development Management & Communications, Vol:II No:4 Oct-Dec 2015, ISSN 2348
- Ms Farhat Azad, Prof M Akbar(IIM- Lucknow), Shri Saurikhia "Decision Making framework for Research & Development organisation for Road & Transportation sector"- Published in SS International Journal of Economics & Management, Vol-3, Sep-2013, ISSN 2231-4962
- Shri U.K.Guruvittal, Ms Farhat Azad. Shri J.Ganesh, Shri Binod Kumar & Shri Sudhir Mathur, "A Laboratory Study of Construction & Demolition Waste for use in Road Works published in Highway Research Journal, Highway Research Board, IRC, Volume 5 No.1, January – June2012

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