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AREA OF INTEREST

Blating Technology, Tunnelling, Slope Stability and Rock Mechanics, Mine Planning and Backfilling, Application of AI/ML in mining, Environment and Sustainability.

WORK EXPERIENCE

- **Senior Scientist**, *CSIR-Central Institute of Mining and Fuel Research, Barwa Road (CIMFR),* Dhanbad, September 2021 to August 2025
- **Assistant Professor**, *Department of Mining Engineering Indian Institute of Technology, BHU, Varanasi,* July-2021 to September 2021

EDUCATION

NATIONAL INSTITUTE OF TECHNOLOGY, RAIPUR, CG

Ph.D., Mining Engineering.

- Dissertation: "*Development of an innovative blasting technique for blast performance optimization"*.

B.Tech., Mining Engineering, CPI = 9.24/10. *(Gold medal)*

- Course project: "Improving the powder factor by placing low-cost non-explosive uniformly distributed air gaps in explosive column".

INDIAN INSTITUTE OF TECHNOLOGY, KHARAGPUR, WB

M.Tech., Mining Engineering, CGPA = 9.20/10.

- Course project: "Performance analysis of distributed spherical air gap blasting for surface mine blasts" which is sponsored by TATA Steel ltd.

AWARDS AND HONORS

- **Dr. Rajendra Prasad Memorial Award 2021** including a gold medal a certificate by Institution of Engineers (India) at Vigyan Bhavan, New Delhi.
- **Chhattisgarh Young Scientist Award 2019** including a plaque, certificate and a cash prize of 21,000/- Rupees, by Chhattisgarh Council of Science and Technology, Department of Science and Technology, Government of Chhattisgarh (C.G.).
- **Young Scientist Award 2019** including a plague and certificate by Northern Coalfields Limited, a Govt. of India Undertaking, Madhya Pradesh (M.P.).
- Recognition as **Best M.Tech. Thesis 2017** from Department of Mining Engineering, IIT Kharagpur.
- **Institute Gold Medal** for **2015** batch of Mining Engineering from NIT Raipur.
- **Letter of Endorsement** from Century Cement, Birla Group for developing "DAG Blasting" technology in year 2018.

- **Letter of Appreciation** from Special Blasts Limited for developing "DAG Blasting" technology in year 2017.

SPONSORED RESEARCH AND CONSULTANCY PROJECTS ONGOING/COMPLETED

S.No.	Title	Name of Sponsoring Agency
1.	Scientific study on slope stability at Kete site Chhattisgarh	Adani Enterprises Ltd
2.	Scientific study on slope stability at PCB site Chhattisgarh	Adani Enterprises Ltd
3.	Determination of physico-mechanical Properties of rocks of borehole no. Mtkhn-21 (p-34) of Hingna-Bazaargaon north coal block, Kamptee coalfield, Nagpur, Maharashtra	Central Mine Planning and Design Institute Limited
4.	Scientific study on slope stability at PEKB site Chhattisgarh	Adani Enterprises Ltd
5.	Advice for physico- mechanical properties test of litho core samples of Borehole no. Mns-07(p-64) drilled in north of Shaktigarh block, pkt valley coalfield, District- Betul, MP	Central Mine Planning and Design Institute Limited
6.	Scientific study for designing of deep hole drilling and blasting system at RG OCM-1, Extension Project (Phase-III), RG-III Area, SCCL	Singareni Collieries Co. Ltd
7.	Technical guidance for excavation (controlled blasting) and preparation of Drilling Pattern and Blast Designs at various work fronts of Dulhasti Stage-II H.E Project.	MAX INFRA (I) Pvt. Ltd.
8.	Technical guidance for excavation (controlled blasting) and preparation of Drilling Pattern and Blast Designs at various work fronts of Uri-I Stage-II H.E Project.	MAX INFRA (I) Pvt. Ltd.
9.	Scientific study of technical feasibility of using Site Mixed Emulsion Explosives (SME) in 02 Iron Ore Mines	Solar Industries India Limited
10.	Scientific study for controlled blasting in Quarry-I of Amalgamated Yeona I & II, OCM, Majri Area, WCL	Western Coalfields Limited
11.	Scientific study to determine limestone recovery of Arasmeta limestone mine	Nuvoco Vistas Corp. Ltd.
12.	Scientific study to determine limestone recovery of Kirari limestone mine	Nuvoco Vistas Corp. Ltd.
13.	Scientific study to explore the feasibility for fly ash utilization in PEKB coal mine	Adani Enterprises Ltd
14.	Scientific study to explore the feasibility for fly ash utilization in PCB coal mine	Adani Enterprises Ltd
15.	Advice for PMP (Physico-Mechanical Properties) test of Litho Core Samples Driled in Dhorakuhi Coal Block, PKT Valley CF Madhya Pradesh	Central Mine Planning and Design Institute Limited
16.	Scientific study on stability analysis for OB dump no. 1 & no. 3 of Kamptee patch from JN Hospital to PipriVillage along the nallah at AIKDOCM, Nagpur Area.	Western Coalfields Limited
17.	Safety and feasibility study of dumping flyash in excavated voids of three mines of Mn group of mines, Tata Steel Limited	Tata Steel Limited
18.	Feasibility study of Nigahi mine for dumping overburden mixed with pond ash in the running mine dumps	Northern Coalfields Limited
19.	Feasibility study of excavation below Seam-V at present working area in the non-forest land of Barjora (North) Opencast Coal Mine	Montecarlo Limited
20.	Review of geological model and verification of the annual production plan of Manoharpur coal mine project for FY 2022-23	Odisha Coal and Power Limited
21.	Estimation of Reserve for Highwall Mining near Tikak and Tirap Collieries of North Eastern Coalfields, Coal India Limited	North Eastern Coalfields, CIL

22.	Vetting and certification of the sections of M/S Dott Services Limited	Dott Services Limited
23.	Determination of Physico-Mechanical Properties of Rocks of Borehole No. AKKC-28(P-36) of Kerwa Coal Block, Korba Coal Field, Chhattisgarh.	APC Drilling and Construction Pvt. Ltd.
24.	Monitoring of Blast Induced Ground Vibration in Under Ground and Surface at Balaghat Mine	MOIL, Nagpur
25.	Trial blast study at Shree Cement Limited, Baloda-Bazar	Solar Industries India Ltd., Nagpur

PUBLICATIONS IN JOURNALS

- Rathore, A. S., Pradhan, M., Deo, S. V., & **Balakrishnan, V.** (2025). Coal mine overburden sand as resource material for making cement concrete. International Journal of Mining and Mineral Engineering, 16(1), 73-91.
- **Balakrishnan V.** (2024), Evaluating the efficacy of air-decking technique for surface mine blasts, *International Journal of Mining and Mineral Engineering*, 15(3), 351-361.
- **Balakrishnan V.,** Rai P., (2021), An Overview of Flyrock and its Prediction in Surface Mine Blasting using Soft Computing Techniques, *Recep Tayyip Erdogan University Journal of Science and Engineering*, 2(2) 105-119.
- Dhekne P. Y., **Balakrishnan V.,** and Jade R. K., (2020). Effect of Type of Explosive and Blast Hole Diameter on Boulder Count in Limestone Quarry Blasting, *Geotechnical and Geological Engineering*, 38, 4091–4097.
- **Balakrishnan V**., Pradhan M. and Dhekne P.Y., (2020). Investigating rock fragmentation in distributed spherical air-gap blasting technique, *Powder Technology, 362, 101-110.*
- **Balakrishnan, V.**, Pradhan, M., and Dhekne, P. Y. (2019). Field investigation in the detonation behaviour of emulsion explosive column induced with air gaps. *Mining Science*, 26, 55-68.
- **Balakrishnan, V.**, Pradhan, M., & Dhekne, P. Y. (2019). Effect of distributed spherical air-gaps on performance of emulsion explosive. *Journal of The Institution of Engineers (India): Series D*, 100(2), 155–162.
- **Balakrishnan V.**, Pradhan M., (2018), Explosive consumption reduction by introducing hollow plastic tubes in explosive column, *Journal of Engineering and Applied Sciences*, 13, 4325-4330.
- **Balakrishnan V.**, Pradhan M., (2018), Performance analysis of using discarded water bottles in explosive column for surface mine blasts, *Chemical Engineering Transactions*, 67, 211-216.
- **Balakrishnan V.,** Pradhan M. & Pathak K., (2018), Explosive consumption reduction using DAG blasting, *Indian Mining and Engineering Journal*, 57(1), 34-37.
- Pradhan M., **Balakrishnan V.** & Pradhan G. K., (2015), Use of discarded water bottles in blasting: An innovative enviro-friendly technique. *International Journal of Chemical, Environmental & Biological Sciences*, 3(1), 51-53.
- **Balakrishnan V.,** Pradhan M. & Dhekne, P.Y. (2021), Experimental study to rationally reduce blast-induced ground vibration and air overpressure, *Transactions of The Mining, Geological and Metallurgical Institute of India*, 117, March 2020-April 2021, 62-70.

BOOK CHAPTERS

- **Balakrishnan, V.,** Prashant, & Kumbhakar, D. (2026). Challenges and opportunities in pond ash disposal in opencast mine dumps. In A. Sinha et al. (Eds.), Innovative and responsible mining for inclusive growth (pp. 505–517). Springer Nature Switzerland AG. https://doi.org/10.1007/978-3-032-09929-7_36
- Prashant, **Balakrishnan, V.,** Behera, S. K., Singh, R. V., Prakash, A., Singh, R. K., Roy, A. K., & Rana, P. K. (2026). Feasibility of dumping pond ash along with overburden in a running mine: A case study. In A. Sinha et al. (Eds.), Innovative and responsible mining for inclusive growth (pp. 519–534). Springer Nature Switzerland AG. https://doi.org/10.1007/978-3-032-09929-7_37

CONFERENCE PROCEEDINGS

- Shrama J., **Balakrishnan V.**, A Comprehensive Carbon Footprint Assessment of Mining Operations in India and Roadmap to Net-Zero (January, 2026), International Symposium on Advances in Mining, Environment and Tunnelling (ISAMET-26) , 12-14 February 2026, VNIT Nagpur.
- **Balakrishnan V.**, Kumar A, Kumbhakar D (January, 2025), Mitigating inundation risks in mining: effective drainage strategies and disaster prevention measures, National Seminar on "Technological Advancement for Sustainable Mining and Exploration" (TASME-2025), Dhanbad, 12-23.
- Prashanth, G., & **Balakrishnan, V**. (2023). Diesel consumption in opencast coal mines and possible use of alternate fuel. In Proceedings of the 5th International Conference on Opencast Mining Technology and Sustainability, NCL, Singrauli, 182.
- **Balakrishnan V.,** Mandal S.K., (December, 2021), *Mine valuation techniques and its relevance in Indian scenario*, paper presented in 4th International conference on opencast mining technology and sustainability, NCL, Singrauli, 65-67.
- Rathore A. S., Pradhan M., Deo S. V., & **Balakrishnan V.,** (January, 2021), *Potential Utilization of Coal Mine Overburden Material*, paper presented in 3rd International conference on opencast mining technology and sustainability, NCL, Singrauli, 157-163.
- **Balakrishnan V.,** Bhandari T., & Dhekne P.Y., (February, 2020), *Review of fragmentation prediction models,* paper presented in National seminar on recent practices and advancement in mineral industry, Visvesvaraya National Institute of Technology, Nagpur, 166-174.
- **Balakrishnan V.,** Pradhan M. & Dhekne P.Y., (December, 2019), *DAG blasting: A novel method of blasting using plastic waste*, paper presented in 2nd International conference on opencast mining technology and sustainability, NCL, Singrauli, 238-242.
- **Balakrishnan V.,** Pradhan M. & Pathak K., (April, 2018), *An innovative method of blasting for optimizing blast performance in iron ore mines*, paper presented in National seminar on responsible mining in new paradigm and growth and investment opportunity for mining and steel in mineral rich states, NMDC and FICCI, Raipur, 91-97.
- **Balakrishnan V.,** Pradhan M. & Pathak K., (August, 2017), *DAG Blasting: An innovative cost-effective blasting technique,* paper presented in National seminar on Indian coal mining industry: Overcoming challenges for better tomorrow, MGMI, MCL HQ, Sambalpur.
- **Balakrishnan V.,** Pradhan M. & Pathak K., (August, 2017), *Performance analysis of distributed spherical air-gaps in explosive column for surface mine blasts,* paper presented in National seminar on recent trends in mining technology and geosciences, National Institute of Technology, Raipur, 72-80.

OTHER OUTREACH ACTIVITES

- Initiated and established **Student-Alumni Relation Cell (SARC)**, Dept. Mining Engg. NIT Raipur.
- Introduced a new open elective on **Climate Change and Carbon Management** for VII semester from AY 2026-27
- Introduced a new open elective on **Underground Space Technology** for VIII semester from AY 2026-27
- Member of Star Rating Committee of Coal Mines, initiated by Ministry of Coal, GOI for Year 2025-26.

OTHER ACADEMIC COURSES AND CERTIFICATES

- IIT Bombay outreach program collage to corporate on "Workplace communication, Soft skills and Effective use of IT for professional activities" in year 2018.
- IIRS outreach program on "Basics of Remote sensing, Geographic Information System and Global Navigation Satellite System" in year 2017.
- IIRS outreach program on "Remote sensing and Geographic Information System application in Water Resources" in year 2018.
- "Advance Diploma in Computer Application" in year 2005-06.
- "Advance Diploma in Multimedia" in year 2007.
- "Gas testing Certificate of Competency", since in year 2013.
- "First aid certificate of senior professional" from St. John Ambulance (India), Indian Red Cross Society since year 2014.
- Completed 'Entrepreneur development program' under Ministry of Micro, Small & Medium Enterprises.

MEMBERSHIP OF PROFESSIONAL BODIES

- Institute of Engineers (India)- Membership no: AM183656-3
- Lifetime membership of Mining Engineers Association of India (MEAI)
- Lifetime membership of The Mining, Geological & Metallurgical Institute of India (MGMI) LM–11249
- Lifetime membership of Indian Geotechnical Society (IGS), Membership no: LM-6262.
- Lifetime membership of Alumni Associations of NIT Raipur and IIT Kharagpur.

SHORT TERM COURSES/ SEMINARS ORGANIZED AS COORDINATOR/ SECRATORY

- Short term course on "**Responsible and Sustainable Mining: Currency for Modern Work force (RASM- 2026)**" from 19-23rd Jan 2026 at NIT Raipur.

REVIEWER

- Bulletin of Engineering Geology and the Environment
- International Journal of Rock Mechanics and Mining Sciences
- Arabian Journal of Geosciences
- Journal of South African Institute of Mining and Metallurgy
- Mining, Metallurgy & Exploration

SOFTWARE PROFICIENCY RELATED TO MINING

- **Blasting Technology:** Wipfrag, Fragalyst, Blastware, Handitrap VOD
- **Mine Planning:** Surpac, Minex, Datamine, Deswik
- **Slope Stability:** Flac 2D/3D
- **Other:** MATLAB, Q-GIS.

LAB ESTABLISHMENT

- Established '**Advance Mine Planning Laboratory**' in Department of Mining Engineering, NIT Raipur.
- Initiated '**Drone Remote Sensing and GIS Research**' in CIMFR Centre for Mine Safety and Analytics CSIR-CIMFR, Dhanbad.

NEW OPEN ELECTIVE COURSES STARTED (NEP 2020)

- Open elective course for VII Semester BTech Students " **Climate change and carbon management**" of 03 credits aligning with the goal of India to achieve net zero by 2070.
- Open elective course for VIII Semester BTech Students "**Underground space technology**" of 03 credits aligning with the goal of underground space utilisation, tunnelling, disposal of nuclear waste, and infrastructure development.

DEPARTMENTAL/INSTITUTIONAL ACTIVITIES

- Professor Incharge and Coordinator- Student Alumni Relation Cell (SARC)- Dept. of Mining Engg., NIT Raipur.
- Professor Incharge- Blasting Technology Laboratory
- Professor Incharge- Advance Mine Planning and Design Laboratory
- Department Coordinator of Industry Institute Collaboration Cell (IICC)
- Department PhD Coordinator

PhD GUIDANCE (Ongoing/Completed)

S.No.	Name of Research Scholar	Area
1.	Mr. Kartik Varwade	Slope Stability
2.	Mr. Ravikant Patle	Slope Stability
3.	Mr. Brajendra Shrivas	Reliability and Productivity of UG mining machines
4.	Mr. Sanskar Srivastava	Slope Stability
5.	Mr. Rajendra Tiwari	Mine Planning, Closure, Just Transition
6.	Mr. Akash Kumar Pandit	Mine Closure and Just Transition
7.	Mr. Rupesh Kumar	Mine Environment and Sustainability
8.	Mr. Aabhas Singh Thakur	Mine Valuation and Taxation