Curricular Summary

Dr. Aditya Kumar Patra, Associate Professor (Air quality and Health)
Laboratory for Air Quality Research (LAQR)
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(1) Education

PhD & DIC (Atmospheric Sciences), Centre for Environmental Policy, Imperial College London, UK (2006)
MBA (Operations Management), Indira Gandhi National Open University, New Delhi, India (2002)
MTech (Environmental Science & Engineering), Centre for Mining Environment, Indian School of Mines Dhanbad, India (1997)
BE (Mining Engineering), Department of Mining Engineering, Regional Engineering College Rourkela, India (1995)
Diploma (Mining Engineering), Orissa School of Mining Engineering, Keonjhar, India (1991)

(2) Professional Experience

Endeavour Executive Fellow, **School of** Minerals and Energy Resources Engineering, University of New South Wales, Sydney (2018)
Associate Professor, Department of Mining Engineering, IIT Kharagpur, India (2016…)
Commonwealth Academic Fellow, Department of Earth Science and Engineering, Imperial College London (2015-2016)
Associated faculty, School of Environmental Science and Engineering, IIT Kharagpur, India (2010…)
Assistant Professor, Department of Mining Engineering, IIT Kharagpur, India (2009-2016)
Commonwealth Scholar, Centre for Environmental Policy, Imperial College London (2002-2006)
Scientist, Central Institute for Mining and Fuel Research (CSIR), Dhanbad, India (1996-2009)

(3) Professional/Academic Awards

Endeavour Executive Fellowship, Department of Education and Training, Government of Australia (2018)
Commonwealth Academic Fellowship, Commonwealth Scholarship Commission, UK (2015)
Commonwealth Scholarship, Commonwealth Scholarship Commission, UK (2002)
Indian School of Mines Gold Medal, Indian School of Mines Dhanbad, India (1997)
Institution of Engineers Gold Medal, Regional Engineering College, Rourkela, India (1995)
Rourkela Steel Plant Gold Medal, Orissa School of Mining Engineering, Keonjhar, India (1991)
UGC Scholarship, University Grants Commission, Government of India (1995-1996)
Merit Scholarship, Regional Engineering College, Rourkela, India (1991-1995)
State Geology Scholarship, Department of Mining and Geology, Government of Orissa, India (1988-1991)
National Scholarship, Board of Secondary Education, Government of Orissa, India (1985-88)

(4) Research interests

- Fine and ultrafine air borne particulate matter in urban environment - Measurement and modelling
- Ambient air quality study - Statutory monitoring, source apportionment, hotspot identification and development of emission inventory
- Vertical profile of air pollutants in urban and indoor environment - Use of UAV mounted sensor systems
- Air quality classification and forecasting - Use of machine learning techniques
- Indoor air pollution - Quantification, characterisation and modelling
- Dispersion of respirable particles generated during surface mining operations - in-pit and beyond-pit dispersion
- Pollutant dispersion in deep opencast mines - Modelling of vertical movement of particles
- Workers' occupational exposure to fine and ultrafine particles in mines - Quantification and health risk assessment
- Air quality assessment in mining area - Statutory monitoring, source apportionment and control strategies
- Optimisation of water use for dust control in mines - Use of real time IoT enabled feedback system
- Whole-body vibration (WBV) exposure of heavy machine operators - Evaluation of health risk and control measures
- Commuter exposure to fine and ultrafine particles in traffic environment- Quantification, characterisation and modelling
- Exhaust emission and resuspension in traffic microenvironment - Measurement and modelling
- Diesel particulate matter emissions from urban traffic and mining operations –Measurement and modelling

(5) Research guidance

PhD: Completed – 5; Ongoing – 12
MTech: Completed -27; Ongoing – 3
BTech: Completed – 46; Ongoing - 4

(6) Teaching

Undergraduate level

Environmental sciences (EV10003; 2-0-0-2)
Environmental sciences (EV20001; 2-0-0-2)
Underground coal mining (MI31001; 3-0-0-3)
Environmental engineering (MI40001; 3-0-0-3)
Legislation for mine environment (MI40020, 3-0-0-3)

Postgraduate level

Environmental control in mines (MI62003; 3-1-0-4)
Clean coal technology (MI60052; 3-0-0-3)

Teaching Labs

Environmental control in mines lab (MI69003; 0-0-3-2)

Environmental engineering lab (MI49003; 0-0-3-2)
Mine surveying lab (MI29002; 0-0-3-2)

(7) Publications

Quantitative indicators

Publications in journals: 45
Papers in conference proceedings: 46
Published books: 2
Published book chapters: 3
Edited proceedings: 3
Citation matrix (Google Scholar): citations = 708; h-index = 15; i10-index = 18

Link to My Citations

Google Scholar: https://scholar.google.com/citations?user=Og8I9MEAAAAJ
ORCID ID: http://orcid.org/0000-0002-4408-3421
Researchgate: https://www.researchgate.net/profile/Aditya_Patra

Selected Publications

1. Sahu, S. P. and **Patra, A. K.** (2021). Assessment of dispersion of respirable particles emitted from opencast mining operations: development and validation of stepwise regression models. ***Environment, Development and Sustainability***, Accepted.
2. Upadhyay, R., Bhattacherjee, A., **Patra, A. K.** and Chau, N. (2021). Association between whole-body vibration exposure and musculoskeletal disorders among dumper operators: a case-control study in Indian iron ore mines. ***WORK: A Journal of Prevention, Assessment & Rehabilitation***, Accepted.
3. Upadhyay, R., Jaiswal, V., Bhattacherjee, A. and **Patra, A. K.** (2021). Role of whole-body vibration exposure and posture of dumper operators to musculoskeletal disorders: a case study in metalliferous mines. ***International Journal of Occupational Safety and Ergonomics***, xx:xxx-xxx
4. Kolluru, S.S.R., **Patra, A. K.**, Nazneen and Siva Nagndra, S.M. (2021). Association of air pollution and meteorological variables with COVID-19 incidence: Evidence from five megacities in India. ***Environmental Research***, 195:110854.
5. **Patra, A. K.**, Gorai, A, Rengde, V. R. and Sharma, Y. (2020). GIS-based exposure assessment and characterization of particulate matter in a mining region in India. ***Environment, Development and Sustainability***.
6. Sahu, S. P. and **Patra, A. K.** (2020). Development and assessment of multiple regression and neural network models for prediction of respirable PM in the vicinity of a surface coal mine in India. ***Arabian Journal of Geosciences.***
7. Ranjan, A. K., **Patra, A. K.** and Gorai, A. K. (2020). A Review on Estimation of Particulate Matter from Satellite-based Aerosol Optical Depth: Data, Methods, and Challenges. ***Asia-Pacific Journal of Atmospheric Sciences***.
8. Ranjan, A. K., **Patra, A. K.** and Gorai, A. K. (2020). Effect of lockdown due to SARS COVID-19 on aerosol optical depth (AOD) over urban and mining regions in India. ***Science of the Total Environment***, 745:141024.
9. Kolluru, S. S. R. and **Patra, A. K.** (2020). Personal exposures to PM during short distance highway travel in India. ***Transportation Research Part D***, **Transport and Environment**, 81:102315.
10. Gorai, A. K., Raval, S. and Patra, A. K. (2020). Path analysis approach to quantify the causal factors of ground-level ozone concentration near coal-mining regions. ***International Journal of Environmental Science and Technology***, 17:645-660.
11. Kolluru, S. S. R., **Patra, A. K.** and Dubey, R. S. (2019). In-vehicle $PM_{2.5}$ personal concentrations in winter during long distance road travel in India. ***Science of the Total Environment***, 684:207-220.
12. Chaudhary, D. K., Bhattacherjee, A., Patra, A. K., Upadhyay, R. and Chau, N. (2019). Associations between whole-body vibration exposure and occupational and personal factors in drill operators in Indian iron ore mines. ***Mining, Metallurgy & Exploration***, 36:495-511.
13. Kolluru, S. S. R., **Patra, A. K.** and Kumar, P. (2019). Determinants of commuter exposure to $PM_{2.5}$ and CO during long-haul journeys on national highways in India. ***Atmospheric Pollution Research***, 10:1031-1041.
14. Gautam, S., **Patra, A. K.** and Kumar, P. (2019). Status and chemical characteristics of ambient PM2.5 pollution in China: a review. ***Environment, Development and Sustainability***, 21, 1649–1674.
15. Gautam, S., Teraiya, J. and **Patra, A. K.** (2018). Spatial statistics, spatial correlation and spatial graph theory in air pollution. ***Environmental Technology and Innovation***, 11:384-389
16. Sahu, S. P., **Patra, A. K.** and Kolluru, S. S. R. (2018). Spatial and temporal variation of respirable particles around a surface coal mine in India. ***Atmospheric Pollution Research***, 9:662-679.
17. Kolluru, S. S. R., **Patra, A. K.** and Sahu, S. P. (2018). A comparison of personal exposure to air pollutants in different travel modes on national highways in India. ***Science of the Total Environment***, 619-620:155-164.
18. Gautam, S., **Patra, A. K.**, Sahu, S. P. and Hitch, M. (2018). Particulate matter pollution in opencast coal mining areas: a threat to human health and environment. ***International Journal of Mining, Reclamation and Environment***, 32:75-92.
19. **Patra, A. K.,** Gautam, S., Majumdar, S. and Kumar, P. (2016). Prediction of particulate matter concentration profile in an opencast copper mine in India using an artificial neural network model. ***Air Quality, Atmosphere and Health***, 9(6):697-711.
20. Gautam, S., Prasad, N., **Patra, A. K.,** Prusty, B. K., Singh, P., Pipal, A. S. and Saini, R. (2016). Characterization of $PM_{2.5}$ generated from opencast coal mining operations: A case study of Sonepur Bazari Opencast Project of India. ***Environmental Technology and Innovation***, 6:1-10.
21. **Patra, A. K.,** Gautam, S. and Kumar, P. (2016). Emissions and human health impact of particulate matter from surface mining operation-A review. ***Environmental Technology and Innovation***, 5:233-249.
22. Roy, D., Gautam, S., Singh, P., Singh, G., Das, B. K. and **Patra, A. K.** (2016). Carbonaceous species and physicochemical characteristics of PM_{10} in coal mine fire area - a case study. ***Air Quality, Atmosphere and Health***, 9:429-437.
23. Gautam, S., Kumar, P. and **Patra, A. K.** (2016). Occupational exposure to particulate matter in three Indian opencast mines. ***Air Quality, Atmosphere and Health***, 9(2):143-158.
24. Dev, S., **Patra, A. K.,** Mukherjee, A. and Bhattacharya, J. (2015). Suitability of different growth substrates as source of nitrogen for sulfate reducing bacteria. ***Biodegradation***, 26:415-430.
25. Chaurdhary, D., Bhattacherjee, A., **Patra, A. K.** and Chau, N. (2015). Whole-body Vibration Exposure of Drill Machine Operators in Iron Ore Mines and role of Machine Related, Individual and Rock Related Factors. ***Safety and Health at Work***, 6:268-278.
26. Chaurdhary, D., Bhattacherjee, A. and **Patra, A. K.** (2015). Analysis of Whole-body Vibration Exposure of Drill Machine Operators in Open Pit Iron Ore Mines. ***Procedia Earth and Planetary Science***, 11:524-530.

27. Gautam, S., Prusty, B. K. and **Patra, A. K.** (2015). Dispersion of respirable particles from the workplace in opencast iron ore mines. ***Environmental Technology and Innovation***, 4:137-149.
28. Gautam, S. and Patra**, A. K. (**2015). Dispersion of particulate matter generated at higher depths in opencast mines. ***Environmental Technology and Innovation***, 3:11-27
29. Gautam, S., Prusty, B. K. and **Patra, A. K.** (2012). Pollution due to particulate matter from mining activities. ***Journal of Recycling and Sustainable Development***, 2:53-58.
30. Gautam, S., **Patra, A. K.** and Prusty, B. K. (2012). Opencast mines: a subject to major concern for human health. ***International Research Journal of Geology and Mining***, 2:25-31.
31. **Patra, A. K.**, Chowdhry, M. and Prusty, B. K. (2011). Effect of synthesis parameters on the compressive strength of fly ash based geopolymer concrete. ***International Journal of Environmental Pollution Control and Management***, 3:79-88.
32. **Patra, A. K.** and Gautam, S. (2011). A pilot scheme for rooftop rainwater harvesting at Centre of Mining Environment, Dhanbad. ***International Journal of Environmental Sciences***, 1(7):1542-1548.
33. Gautam, S., and **Patra, A. K**. (2010). Rain water harvesting for artificial recharge to ground water - A sustainable innovative vision. ***International Journal of Environmental Engineering and Management***, 1:77-80.
34. **Patra, A.,** Colvile, R., Arnold, S., Bowen, E., Shallcross, D., Martin, D., Price, C., Tate, J., ApSimon, H., and Robins, A. (2008). On street observation of particulate matter movement and dispersion due to traffic on an urban road. ***Atmospheric Environment***, 42:3911-3926.

(8) Reviewer of Journals

Science of the Total Environment (Elsevier); Environmental Research (Elsevier); Air Quality, Atmosphere and Health (Springer); Atmospheric Pollution Research (Elsevier); Aerosol and Air Quality Research (Taiwan Association for Aerosol Research); Urban Climate (Elsevier); Environmental Monitoring Assessment (Springer); Environmental Science and Pollution Research (Springer); Environmental Engineering Research (Korean Society of Environmental Engineers); Environment, Development and Sustainability (Springer); Asia Pacific Journal of Atmospheric Science (Springer); Environmental Technology and Innovation (Elsevier); Arabian Journal of Geoscience (Springer); Urban Climate (Elsevier); Process Safety and Environmental Protection (Elsevier); Indoor and Built Environment (SAGE); International Journal of Coal Preparation and Utilization (Taylor & Francis)

(9) Books/Monographs/Book chapters

Book: Gautam, S. and **Patra, A**. (2016). Dispersion of respirable particles from Indian opencast mines. LAP Lambert Academic Publishing, Germany. ISBN: 978-3-659-90279-6.

Book: Patra, A. (2010). Particulate matter emission from paved road surface. LAP Lambert Academic Publishing, Germany. ISBN: 978-3-8383-8379-8.

Book chapter: Kolluru, S.S.R. and **Patra, A.** (2021). Estimation of passenger exposure to PM2.5 on a highway. In book: Urban Air Quality Monitoring, Modelling and Human Exposure Assessment (Editors: S M Shiva Nagendra, Uwe Schlink, Andrea Muller and Mukesh Khare), Springer Nature Singapore Pte Ltd. Chapter 25. Pages 355-366.

Book chapter: Gautam, S. and **Patra, A.** (2018). Particulate Matter Dispersion in Indian Non-coal Opencast Mines. In book: Environmental Contaminants – Measurement, Modelling and Control (Editors: T Gupta, A K Agrawal, R A Agrawal and N K Labhasetwar), Springer Nature pp.123-143. Online ISBN: 978-981-10-7232-8. doi:10.1007/978-981-10-7332-8_6

Book chapter: Pathak, K., and **Patra, A.** (2012). CO_2 sequestration and development of North East India. In Renewable energy and sustainable development (Editors: Rupam Kataki, R and Anil C. Borah), EBH Publishers (India), India; Pages 281-292. ISBN: 978-93-80261-78-2.

(10) Edited Proceedings

Editor: Safety in Mines: Proceedings of the 34th International Conference of Safety in Mines Research Institutes (34th ICSMRI 2011), 07-10 December 2011, New Delhi, India. Macmillan Publishers India Limited. ISBN: 978-93505-9042-3.

Member of the Editorial Committee: Mine Ventilation - Proceedings of the Ninth International Mine Ventilation Congress, 10 – 13 November, 2009, New Delhi, India.

Editor: Proceedings of the National Seminar on Policies, Statutes & Legislation in Mines (POSTALE 2008), 20-21 December 2008, Central Institute of Mining & Fuel Research, Dhanbad, India.

(11) Miscellaneous

Patra, A. K. (2007). Adverse health effects of particulate matter in urban atmosphere: A brief review. *Souvenir 2007*. Pages 63-69. Engineers Forum, Balasore, India.

Patra, A.K. (2000). Air-borne dust survey in opencast mines. *Technomin*, 1: 45-48. Department of Mining Engineering, Regional Engineering College, Rourkela, India

(12) Workshop/conference organised

National Workshop on Modern Mining Engineering Curriculum in India, 24-25 November 2016, IIT Kharagapur, India

European Workshop on "Greenhouse gas recovery from coal mines and unmineable coalbeds and conversion to energy (GHG2E)", 08-10 December 2014, Hotel Monotel, Kolkata.

34th International Conference of Safety in Mines Research Institutes (34th ICSMRI 2011), 07-10 December 2011, India Habitat Centre, New Delhi.

(13) Course organized for Industry/Academia

Short Term Course on "**Environmental control in mining and allied industries**" during October 12 - 14, 2011, Department of Mining Engineering, IIT Kharagpur

Short Term Course on "**Best Practices and Emerging Technologies for Mining Profession**" during August 17 - 20, 2021 (Online), Department of Mining Engineering, IIT Kharagpur (Sponsored by the Directorate of Mines, Odisha).

(14) Key-note speaker/conference session chair

Session chair: Whole-body vibration exposure; XXIXth Annual Occupational Ergonomics and Safety Conference, Seattle, Washington, USA, June 1-2, 2017. International Society for Occupational Ergonomics and Safety.

(15) Invited lectures/presentations

Title: National Clean Air Programme and challenges for sustainable air environment in mining areas

Venue: A National Webinar on Environment and sustainable mining, Coal India Limited, Kolkata (August 2021
Title: India's vision on National Clean Air Programme, pollution control & development of sustainable environment in mining areas
Venue: A National Webinar on Sustainable approach for Ecosystem Restoration by adopting climate-smart Mining with enriching lives of neighbouring communities Mahanadi Coalfields Limited, Sambalpur (July 2021)
Title: Given an opportunity, nature heals - Lessons learnt from COVID-19 Pandemic
Venue: International webinar on Ecosystem restoration, Institute of Quality and Environment Management Services, Bhubaneswar (June 2021)
Title: Air quality assessment – Instrumentation and IoT application
Venue: International webinar on Safe Mining and Advance Resources Technology (SMART 2020), Indian Institute of Technology Kharagpur (December 2020)
Title: Exposure monitoring of aerosol in urban environment
Venue: Winter school on human exposure to indoor and outdoor air pollution, Indian Institute of Technology Madras (December 2020)
Title: Air quality measurement and standards
Venue: School of Mining Engineering, University of New South Wales, Sydney, Australia (April 2018)
Title: Design and implementation of in-situ gas content and gas pressure measurements at Moonidih Mine seam XVI
Venue: EU project workshop, Kolkata, India (December 2014)
Title: Safety of the machine operators from whole-body vibration exposure in opencast mines
Venue: Odisha State Safety Conclave, Bhubaneswar, India (September 2014)
Title: Estimation of Coal Mine Methane (CMM) potential in India: A case study of Moonidih Mine
Venue: North China Institute of Science and Technology, China (July 2014)
Title: Assessment of methane resource in underground coal mine
Venue: Velenje Coal Mine, Velenje, Slovenia (June 2013)
Title: Carbon management in coal mines.
Venue: Workshop on Sustainable Development, Central Coalfields Limited, Ranchi, India (March 2013)
Title: Appropriate climate – responsive technologies for inclusive growth and sustainable development
Venue: 45th Engineers' Day, NALCO, Angul, India (September 2012)
Title: Green House Gas Recovery from Coal Mines and Unmineable Coal Beds and Conservation to Energy,
Venue: EU project workshop, Imperial College London, UK (July 2012)
Title: Atmospheric dispersion modelling: A discussion on meteorology and models
Venue: KIIT University, Bhubaneswar, India (July 2011)
Title: Carbon footprint and carbon management
Venue: KIIT University, Bhubaneswar, India (July 2011)
Title: Carbon dioxide sequestration-state of the art
Venue: National Institute of Technology Rourkela, India (June 2010)
Title: Air pollution and control in mines
Venue: Executive Development Programme, Bharat Coking Coal Limited, Dhanbad, India (June-July 2001)

(16) Professional activities - Reviewer/Examiner/Expert Committee member

2020-21	**Expert, Academic audit**, Anna University, Andhra Pradesh
2019-22	**Member, Board of studie**s, Department of Mining Engineering, Aditya Engineering College, Andhra Pradesh
2018-20	**Member of expert committee** on Ecology, Environment, Earth and Ocean Sciences and Water for review of fast track translational (FTT) and fast track commercialization (FTC) project proposals
2018…	**Reviewer of project proposals** on "air quality measurement and modelling' submitted to SERB, DST, India
2017	**Expert committee member** for selection of Management Trainees for Coal India Limited
2013	**Member, Curriculum Review Committee**, Department of Mining Engineering, National Institute of Rourkela.
2018…	**PhD thesis examiner** – 4 (2 from NIT Rourkela and 2 from IIT-ISM Dhanbad)
2011-13	**International independent reviewer of projects proposals** submitted for funding to National Centre of Science and Technology Evaluation, Astana, Republic of Kazakhstan (Reviewed 25 projects)
2009-2011	**Underground Coal Mining, Course developed** under National mission project on e-learning, MHRD, Govt. of India

(17) Projects and Consultancy

2020 – 2021	Verification of captive power generation process from waste gas (non-fossil fuel) of carbon black manufacturing plant of PCBL Durgapur (Phillips Carbon Black Ltd, Durgapur)
2020 – 2022	Assessment of Diesel Particulate Matter (DPM) level in ambient mine environment of opencast mines of MCL and its effect on health of the employees in mines (Mahanadi Coalfields Limited, Burla, Sambalpur)
2019 – 2022	Monitoring of Air Quality in non-monsoon Period at Identified locations of Kusmunda OCP to assess Impact of the proposed expansion up to 40MTPA and Endorsement of the undertaking of the project proponent regarding mitigation measures and infrastructure available (South Eastern Coalfields Limited, Kusmunda Area)
2017 – 2020	Study of pollution caused by coal based thermal power plant (CBTPP) in Janjgir-Champa region (Chhattisgarh Environment Conservation Board)
2016 – 2019	Assessment of whole-body vibration at Noamundi iron ore mine of Tata Steel (Tata Steel Limited, Noamundi)
2016 –2018	Assessment of whole-body vibration exposure of HEMM operators at Kaliapani chromite mines (Balasore Alloys Limited, Jajpur, Odisha)
2015 – 2018	Bridge project on assessment of coal bed methane and shale gas reservoir quantity **(European Commission-Imperial College London)**
2015 – 2018	Assessment of whole body vibration exposure of HEMM operators at the West Bokaro Mine (Tata Steel, West Bokaro)
2015 – 2016	Technical support for ash mound management and design (HINDALCO Industries Limited, Hirakud)
2014 – 2017	Ash mound management at Hirakud unit of HINDALCO industries limited (HINDALCO Industries Limited, Hirakud)
2013 – 2014	Safety audit of Bhushan Steel Limited (Bhushan Steel Limited, Dhenkanal, Odisha)
2013 – 2014	Subsidence study of Surda, Kendadih & Rakha mines of HCL (Hindustan Copper Limited, ICC, Ghatshila)
2012 – 2014	Assessment of action plan for design of breached ash mound at Hirakud unit of HINDALCO industries limited (HINDALCO Industries Limited, Hirakud)

2012 – 2013	Assessment and reporting status and technical needs for the safety of ash mound of HINDALCO Industries Limited (HINDALCO Industries Limited, Hirakud)
2012 -- 2015	of forest land for mining and other allied activities (Steel Authority of India Limited)
2011 – 2015	Greenhouse gas recovery from coal mines and unmineable coal beds and conservation to energy **(European Commission-Imperial College London)**
2010 – 2011	Compliance of FC & EC conditions of KIOM-MIOM including submission of reports and presentation and supervision during execution of different schemes of the reports (Steel Authority of India Limited, Government of India)
2009 – 2011	Development of suitable pedagogical methods for various classes, intellectual calibres and research in e-learning (Department of Higher Education, MHRD, Government of India)
2009 – 2012	Assessment of sealed off areas at Moonidih Mine, India **(Southern Illinois University Carbondale, USA)**
2010 – 2014	Dispersion of particulate matter from deep opencast mines (ISIRD, SRIC, Indian Institute of Technology Kharagpur)
2009 – 2011	Evaluation of sealed off areas at Moonidih Mine, India **(Southern Illinois University Carbondale, USA)**
2009 – 2010	Assessment of technologies for storage of CO2 for carbon sequestration (National Thermal Power Corporation, New Delhi)
2007 – 2009	Study on feasibility of southward extension and deepening of eastern and western quarries of Chasnalla (Steel Authority of India Limited)
2007 – 2007	Estimation of mineable reserve, monthly planning of excavation and estimation of stripping ratio for proposed surface mining in Ramnagore Colliery (Steel Authority of India Limited)
2006 – 2009	Design of ground stabilisation above old, abandoned, inaccessible subsurface coal mine workings along the proposed alignment of Kodarma-Giridih new broad gauge line near Giridih (East Central Railway, Ministry of Railways, Govt. of India)
2006 – 2009	Generation of socioeconomic baseline data for fire and subsidence affected people in BCCL mining areas (Bharat Coking Coal Limited, Dhanbad)
2006 – 2009	Preparation of mine plan for Digwadih, 6&7 Pits, Bhelatand 'A' and Sijua underground coal mines of Tata Steel (Tata Steel Limited, Jamadoba)
2004 – 2005	Movement and dispersion of particulate matter due to traffic on road surface (modelling) **(Greater London Authority, London)**
2002 – 2004	Movement and dispersion of particulate matter due to traffic on road surface (field study) **(Greater London Authority, London)**
2002 – 2009	Scientific study of caving characteristics and associated ground stability problems in 70 LE and 75 LW bord & pillar depillaring panels in Churcha West Mine, SECL (South Eastern Coalfield Limited, Bilaspur)
2001 – 2002	Stack emission and ambient air quality studies of Bokaro Thermal Power Station with suggestive remedial measures (Damodar Valley Corporation)
1999 – 2001	Environmental standards with respect to non-coal mining sector - part of a world bank aided project titled "environmental management capacity building technical assistance project") (Ministry of Environment and Forests, Govt. of India)
2000 – 2001	Evaluation of free silica content near opencast mines of Mahanadi Coalfields Limited (Mahanadi Coalfields Limited, Sambalpur)
1998 – 1998	Assessment of SPM, free silica, zinc dust and SO2 in ambient and workplace environment of zinc smelter, Debari, Udaipur (Hindustan Zinc Limited, Udaipur)
1998 – 2002	Stack emission and ambient air quality studies of Chandrapura Thermal Power Station (Damodar Valley Corporation)
1998 – 1999	Relative inter- sectoral pollution assessment of fly ash and mine dust in SPM content of ambient air in Ib Valley area of MCL (Mahanadi Coalfields Limited, Sambalpur)
1998 – 1998	Study of air quality, water quality, noise pollution as per environment and pollution acts and rules at Ramnagore Opencast Mine, ISP (Steel Authority of India Limited)
1996 – 1997	Prediction of air quality for Baranj Opencast Coal Mine, Nagpur (Nippon Denro Ispat Limited, Nagpur)

(18) International collaborations

1. Southern Illinois University Carbondale, USA
2. Imperial College London, United Kingdom
3. Trolex Limited, United Kingdom
4. Formac Electronics Ltd, United Kingdom
5. Premogovnik Velenje DD, Slovenia
6. Hornonitrianske Bane Prievidza AS, Slovakia
7. Beijing Sindicatum Clean Energy Technology & Services Company Ltd, China
8. China Coal Information Institute, China
9. China Pingmei Shenma Energy And Chemical Group Co Ltd, China
10. North China Institute of Science and Technology, China
11. Henan Polytechnic University, China

Research Project: Greenhouse gas recovery from coalmines and unmineable coal beds and conservation to energy (Imperial College London, United Kingdom; Trolex Limited, United Kingdom; Formac Electronics Ltd, United Kingdom; Premogovnik Velenje DD, Slovenia; Hornonitrianske Bane Prievidza AS, Slovakia; Beijing Sindicatum Clean Energy Technology & Services Company Ltd, China; China Coal Information Institute, China; China Pingmei Shenma Energy And Chemical Group Co Ltd, China; North China Institute of Science and Technology, China; Henan Polytechnic University, China; 2011-2015)
Research Project: Assessment of sealed off area CMM at Moonidih Mine, India (Southern Illinois University Carbondale, USA, 2009-2011)
Research Project: Movement and dispersion of particulate matter due to traffic on road surface (Greater London Authority, London, 2002-2005)

(19) Academic supervision

PhD Thesis (Completed-5; Ongoing-12)

2021…**Namrata Mishra** (Research topic yet to be decided) **(Supervisor)**
2021…**Samrat Santra** (Research topic yet to be decided) **(Supervisor)**
2021…**Umesh Kumar Singh** (Research topic yet to be decided) **(Supervisor)**
2020… **Abhijit Pal** Smart dust sensor network for efficient dust suppression in opencast mines **(Supervisor)**
2020…**Penchala Abhishek** Particulate matter emission estimation and control in opencast mines **(Supervisor)**

2020…**Naragam Bhanu Sree** Assessment of indoor air quality vis-à-vis outdoor air quality **(Supervisor)**
2020…**Vibhas Jaiswal** Particulate emission and dispersion in opencast mines **(Supervisor)**
2019…**Sachidanand Kumar** Numerical simulation of particle dispersion in open pit **(Supervisor)**
2019…**Sujatha A M** Assessment of diesel particulate emission in opencast mines **(Supervisor)**
2019…**Badri Madhu** Air quality assessment in opencast mines using sensors **(Supervisor)**
2018…**Nazneen** Estimation of black carbon emission in traffic environment **(Supervisor)**
2017…**Dubey Ravish Shailendra** Vertical and horizontal dispersion of air pollutants emitted from traffic **(Supervisor)**
2017…**Dhruti Sundar Pradhan** Particulate matter exposure of the machine operators in Indian opencast coal mine **(Supervisor)**
2020 **Kolluru Soma Sekhara Rao** Estimation of commuter exposure to pollutants on national highways in India **(Supervisor)**
2020 **Satya Prakash Shau** Dispersion of respirable particles escaping from an active surface mine (**Supervisor)**
2016 **Dhanjee Kumar Chaudhary** Relationship of some factors with whole-body vibration exposure experienced by production drill operators in iron ore mines: an epidemiological study **(Joint supervisor)**
2016 **Subhabrata Dev** Improvement of sulfate and metal removal from industrial wastewater using marine waste extract as an economic source of nitrogen supplement **(Joint supervisor)**
2015 **Sneha Gautam** Dispersion of respirable particulate matter from workplace in Indian non-coal opencast mines **(Supervisor)**

MTech Thesis (Completed-27; Ongoing-3)

2022… **Vishal Kumar** Assessment of diesel particulate matter in the ambient air in a mining area
2022… **Avi Singh Raghuwanshi** (Under progress …)
2022… **Utkarash Tyagi** (Under progress …)
2021 **Mohit Ramakant Malusare** Effect of COVID-19 induced lockdown on air quality- A data analytic approach
2021 **P Anil Kumar** Investigation of effect of lockdown on ambient air quality using data analytics approach
2021 **Shyam Kamal Babu** Impact of COVID19 on air quality of France
2021 **Yash Madhogaria** COVID-19 and its analysis with the meteorological data in Indian districts
2021 **Umesh Kumar Paikra** Analysing the climatic parameters and checking the involvement of COVID-19 in Russia
2020 **Inumula Sai Nived** Assessment of ambient air quality in a large opencast coal mine project
2020 **Deepak Prasad Nayak** Variation of fine particulate matter in opencast mine
2020 **Navdeep Jain** Statistical relationship between particulate matter concentration and categories of vehicles
2020 **Prashant Patrey** Impact of lockdown on various air pollutants
2020 **Surabh Singh** Study of correlation between COVID-19 death rate with temperature and air pollutants
2019 **Vaibhav R Rengde** Assessment of particulate pollutant exposure of workers around a surface coal mine
2019 **NNVS Praneeth** A comparison of personal exposure to PM in different modes of travel on road from Kharagpur to Midnapore
2019 **PVNS Kartheek** Comparison of respirable PM exposure by commuters using rail transport in different micro-environments
2018 **Soumyadeep Baidya** A comparison of particulate matter emission from road junction with free section
2018 **Nishank Biswas** Air pollution assessment in academic and residential area
2018 **Gautam Kumar** Estimation of influence of speed breakers on airborne particulate matter level
2017 **Vivek Kumar Jha** Particulate matter concentration around a screening plant
2017 **Ajay Kumar** Measurement of air pollution level due to shovel dumper operation in an opencast mine
2015 **Abhishek Kumar Vatsa** Monitoring of air pollution caused by traffic inside IIT Kharagpur campus
2015 **T Nagendra Leela Nirup** Particulate Pollutant Characterization inside IIT Kharagpur Campus
2014 **Ankit Sharma** Carbon sequestration potential of Indian forests
2014 **Chetan Singh Netam** Estimation of particulate matter generation due to different activities in a surface mine
2013 **Aproov Sarf** Study of effect of geomechanical properties on hand-arm vibrations during drilling
2013 **Manoj Mane** Dust dispersion modeling in open cast mines using Stella software
2011 **Sidhartha Sankar Sahu** Assessment of particulate matter emission from traffic inside the IIT Kharagpur campus
2010 **Ajeet Singh** Study of soil and water contamination in coal and iron ore mine
2010 **Manjeet Chowdhary** Effect of synthesis parameters on the mechanical properties of fly ash-based geopolymers

BTech Project (Completed-46; Ongoing-4)

2022… **Ratul Pan** (Under progress …)
2022… **Rasure Rajneesh Ravindra** (Under progress …)
2022… **Safeen Subhan** (Under progress …)
2022… **Shubaham Shubhadarshi** (Under progress …)
2020 **Shyam Kamal Babu** Change in air pollution level in red zone areas as the lockdown period extended
2020 **Sachin Singh Rajput** Effect of temperature and humidity on daily deaths and new cases of COVID -19 in different countries
2020 **Abhinav** Analysis on effect of lockdown due to COVID-19 outbreak on ambient air pollution in Indian cities
2020 **Yash Madhogaria** Analysis of outdoor air pollutants in counties of United States of America during COVID -19
2019 **Manish Kumar Singh** Analysis of Delhi pollution data
2019 **Prashant Patrey** Relationship between vehicle count and particulate air pollution
2019 **Sourabh Singh** Impact of Mining on regional air quality – A case study
2019 **Dharamsoth Sai Ram** Particulate matter exposure from traffic
2018 **Sangani Aakash** Assessment of contribution of festivals for the increased value of PM value in ambient air
2018 **PVNS Kartheek** Assessment of respirable particulate matter concentration in ambient air in Kharagpur
2018 **NNVS Praneeth** Assessment of respirable PM status in ambient air at road traffic junctions of Kharagpur
2017 **Ajay Kumar** Estimation of emission of greenhouse gases from opencast coal mines
2017 **Arvind Tutti** Assessment of airborne particulate matter inside a hospital campus
2017 **Chakranghi Sai Hitesh** Study of particulate matter levels at Kharagpur railway station
2017 **M Santosh Reddy** Effect of particulate matter concentration in ambient air at IIT Kharagpur
2017 **Gautam Kumar** Estimation of greenhouse gases from underground coal mines
2017 **Mrityunjay Kumar** Estimation of greenhouse gases from metal mine
2017 **P Vidyadhar Study** of PM2.5 in ambient air at IIT Kharagpur
2017 **Soumyadeep Baidya** An analysis of particulate matter emission from haul roads in open cast mine
2015 **Rajesh Dalai** Comparison of particulate matter concentration at different construction sites inside IIT Kharagpur campus
2015 **Anoop Muppalla** Pollution generation in traffic: assessment of particulate matter

2015 **Punj Rajan** Assessment of particulate number concentration using handheld particle counter
2015 **Ankit Gupta** Variation of particulate matter concentration of construction dust inside IIT Kharagpur campus
2015 **Arpan Naik** Assessment and characterization of traffic pollutants in IIT Kharagpur campus
2014 **Karn Satyarthi** Estimation of carbon footprint of IIT Kharagpur campus
2014 **Rahul Jain** Source apportionment/intersectoral air pollutants in Kharagpur town
2014 **Rahul Khanna** Estimate of GHG emission from an iron ore mine
2014 **Abhishek Kumar Vatsa** Estimate of GHG emission from an opencast coal mine
2014 **T Nagendra Leela Nirup** Particulate pollutant characterization inside the IIT Kharagpur campus
2014 **Armaan Hatwal** Estimation of carbon footprint of Kharagpur town
2013 **Utkarsh Agrawal** Particulate matter generation inside a mine and its escape from the mine periphery-an approach for estimation
2013 **Rahul Suhane** Greenhouse gas emission estimate from an underground coal mine and an opencast Iron ore mine
2013 **Jijin Sebastian** Temporal and spatial distribution of particulate pollutants from deeper parts of surface mines
2013 **Vetsa Prithvi Pavan Kumar** Assessment of haul road dust generations
2012 **Pratik Sahu** Determination of mixing height and wind speed profiling using Stella Software
2012 **Manoj Mane** Dust dispersion modeling in open cast mines using Stella software
2012 **Abhishek Jain** Estimation of greenhouse gas emissions from opencast mine
2011 **Rishabh Pandey** Suitability of Indian coals for the coal to liquid (CTL) process
2011 **M Santosh Kumar** Profile of air borne dust inside IIT Kharagpur campus
2011 **Priyank Jain** Forecast of GHG emissions reduction through penetration clean coal technology in thermal power plants in India

2010 **Samrat Dhar** Study of dust dispersion models and development of dispersion model for point sources of emission
2010 **Shiv Shankar Kumar** Pollution due to dust emissions from mines
2010 **Kumar Chandra Rohit** Preliminary study of the mechanical properties of composite concrete and mortar with the presence of iron ore tailings and fly ash

MBA Project

2007 **Arnab Banerjee** Marketing of R&D: A case study on Central Institute of Mining and Fuel Research, Dhanbad **Meghanad Saha Institute of Technology, Kolkata**

(20) Professional memberships

Fellow: Mining Engineers' Association of India (MEAI)
Life Fellow: Institution of Public Health Engineers (IPHE)
Life Member: Indian Science Congress Association (ISCA)
Life Member: Society of Geoscientists and Allied Technologists (SGAT)
Life Member: IME Journal Readers' Forum
Life Member: Mining, Geological and Metallurgical Institute of India (MGMI)
Life Member: Indian Institute of Chemical Engineers (IIChE)
Member: Institution of Engineers (India) (IE)

(21) Administrative experience

2019	Smart India Hackathon 2019 Grand Finale (8-12 July 2019, Jury member)
2018-2019	President, Technology Mining Engineering Society, IIT Kharagpur
2018	International research collaboration with University of New South Wales, Sydney
2016…	Co-coordinator, IIT collaborative consortium for Coal India projects
2012-2015	Assistant Warden of LBS Hall of Residence
2011-2015	International research collaboration with Imperial College London
2010-2012	President, Technology Mining Engineering Society, IIT Kharagpur
2010…	Associated faculty, School of Environmental Science and Technology, IIT Kharagpur
2009-2015	Department ERP faculty-in-charge
2009-2011	International research collaboration with South Illinois University Carbondale, USA

Career Summary

Dr. Aditya Kumar Patra is an Associate Professor in Air Quality and Health at the Department of Mining Engineering at Indian Institute of Technology Kharagpur, India. His primary area of research is measurement and modeling of fine and ultrafine air borne particulate matter in mine, traffic and industry environment. The air pollution research group under Dr. Patra's supervision has conducted several studies on traffic emission and emission from surface mining operations. His work on commuter exposure to fine and ultrafine particles during long-haul journeys on Indian highways is the first of its kind in India and follows only a couple of studies carried out elsewhere. He has for the first time explained the determinants of commuter exposure on highways and explained its difference from exposure during in-city travel. In case of mines, he has quantified and modelled the in-pit and beyond-pit dispersion of respirable particles. He is more interested in understanding the dispersion of respirable particles generated during surface mining operations, particularly in deep mines where mine workings at greater depth leads to poor dispersion and increased workers' exposure. The overall aim is to estimate workers' occupational exposure to particulate matter in the mine, evaluate exposure variation with mine geometry, work schedule/rest break and local meteorology so that appropriate actions are taken to reduce the exposure. He has completed about 35 research and consultancy projects sponsored by mining and allied industries as well as by Government of India. He has completed three international projects funded by Greater London Authority, Untied States Environmental Protection Agency and the European Commission on urban paved road particle dispersion, assessment of methane resource in sealed off areas of coal mines, greenhouse gas recovery from coal mines and unmineable coal beds and conversion to energy, respectively. Dr. Patra has published more than 45 research papers in journals and conference proceedings and three book chapters. He has edited three conference proceedings and is author of two books. He is a member of several professional bodies of mining and environment. Dr. Patra is a member on the expert panels of several ministries and departments of Indian government including the Ministry of Science and Technology and Ministry of Coal. He has a total of 25 years of experience in academics and research. He has an outstanding academic career for which he is being awarded with Rourkela Steel Plant Gold Medal, Institution of Engineers (India) Gold Medal and ISM Gold Medal for topping the university merit list in Diploma, BE and M Tech respectively. He is a recipient of Commonwealth Scholarship (2002-2006, UK), Commonwealth Academic Fellowship (2015-16, UK) and Endeavour Executive Fellowship (2018, Australia).

[Last updated: September 2021]