

A. Research Interests and Specialties:

My research interests encompass geotechnical and geo-environmental engineering also modeling in geotechnical engineering. Mainly,

- Soft /peat soil characterization and stabilization using different chemical stabilizers,
- Contaminant transport, landfill liner design & leaching studies using column and sequential batch test,
- Physical, chemical, mineralogical and geotechnical characterization of PFA (Pulverized Fuel Ash) from coal based thermal power plant,
- Zeolitization of coal ash and heavy metal retention studies,
- Thermal resistivity of FTB (Fluidized Thermal Bed),
- Artificial Neural Network (ANN) modeling for computation of settlement of soft soil, and

My M.Eng. thesis was focused towards experimental study to find the side-friction effect in consolidation test by using large diameter especially Teflon coated ring.

During my Ph.D. studies, I have used various sophisticated instruments e.g., XRF, XRD, ICP, AAS, FTIR, SEM-EDAX, Blain's apparatus, TGA and DTA analyzer etc. I also have an experience in small Geotechnical Drum Centrifuge with 1.5 m diameter at IIT Bombay.

I fabricated a miniature compactor & the details applications have been published in Journal of Testing and Evaluation, ASTM, 2001, Vol. 28(6) and used 'C' Programming for studying the thermal resistivity of FTB (Fluidized Thermal Bed). I also fabricated soil sampler, especially for the highly organic or peat soil sample, for Rowe cell consolidation test.

New patent application, "Devise for Sampling of peat and soil", Taib, S. N. L.; Sii, H. Y., Kolay, P. K., Othman, A. and Junaidi, E.; *Patent application no. PI 2013702432*, Malaysia, December 2013 (*Status-pending*).

B. Current Projects:

1. "Bearing capacity of geosynthetic reinforced sand and clay system"
2. "Unsaturated soil characteristics and Estimation of SWCC through weighted residual approximations"
3. "Electrical and Thermal properties of Illinois soil"
4. "Estimation of settlement using PLAXIS software"
5. "Characterization of Recycled Concrete Aggregate (RCA) for the use in sub-base in flexible pavement"
6. "Cyclic behavior and long term durability of recycled concrete aggregate"
7. "Resilient modulus of recycled concrete aggregate and recycled asphalt pavement material"
8. "Liquefaction potential of local Illinois soil"
9. "Shrinkage and swelling potential of expansive soil"
10. "Soil stabilization using liquid polymer"

C. Grants Received: (Total Amount: US \$568,862)

1. "Effect of Soil Conditions on Geotechnical Site Response and Liquefaction Potential", Submitted to Holcomb Foundation Engineering, Carbondale, Illinois, USA, Kolay, P. K. and Kumar, S., US \$ 16,000, Spring 2017.
2. Funding for Undergraduate Research "Use of recycled concrete or asphalt aggregate to prepare high strength cement concrete with metakaolin and micro silica fume" from ORDA, SIUC, Kolay, P. K., US \$9,600, August 31, 2016 to May 13, 2017.
3. "Recovery of Rare Earth and other Strategic Materials from Coal Ash, Phase I" from US EPA, Mohanty M. K., Kolay P. K., Mondal K., Lefticariu L., F. Brett Denny, and Lefticariu M, US \$14,750, August 15, 2015 to August 14, 2016.
4. "Shear Wave Velocity Measurements and Liquefaction Analysis", from Holcomb Foundation Engineering, Carbondale, Illinois, USA, Kolay, P. K., Kumar, S., and Jha, P., US \$25,000, August 25, 2015 to August 24, 2016.

5. Funding for Undergraduate Research “Characterization and Freeze Thaw Durability of Recycled Aggregate samples from Southern Illinois” from ORDA, SIUC, Kolay, P. K., US \$4,800, August 31, 2015 to May 13, 2016.
6. Funding for “Undergraduate Research” from ORDA, SIUC, Kolay, P. K., US \$9,600, August 18, 2014 to May 15, 2015.
7. “Site Specific Geotechnical Site Response and Liquefaction Study”, from Holcomb Foundation Engineering, Carbondale, Illinois, USA, Kolay, P. K. and Kumar, S., US \$8,000, 2013-2014.
8. Funding for “Undergraduate Research” from ORDA, SIUC, Kolay, P. K., US \$4,800, August 20, 2013 to May 10, 2014.
9. “Offering Master of Engineering (M.E.) in Civil Engineering Online”, CTE, SIUC, Kolay, P. K. and Kumar, S., US \$13,000, 2012-2013.
10. “Sustainable Utilization of Coal Combustion Byproducts through the Production of High Grade Minerals and Cement-less Green Concrete-Phase II”, U.S. Environmental Protection Agency (EPA); Mohanty M.K., Kolay P. K., Kumar S., Akbari H., Heller T., Wiltowski T., Rimmer S., Shin S., Bhusal S., Jha P., Yang X., Culbreth N. and Rehman M., Total Project Cost; US\$ 157,630; Agency Request: \$89,943, 2012-2013.
11. “Building a Bridge for Young Minds' Journey to Careers in Transportation”- Carbondale, submitted to FHWA (Federal Highway Administration), Viswanathan, R., Kolay, P. K., Kumar, S., and Pearson, C., US \$64,970, 2012-2013 (*SIUC decided not to accept this grant*).
12. Funding for “Undergraduate Research” from ORDA, SIUC, Kolay, P. K., US \$4,800, August 20, 2012 to May 10, 2013.

13. "Development of a New Air Classifier System to Collect Cenospheres and their Characterization for Industrial Applications" from ORDA, SIUC, Kolay, P. K., US \$ 13,474.25, 2011-2012.
14. "Building a Bridge for Young Minds' Journey to Careers in Transportation", FHWA (Federal Highway Administration), Viswanathan, R., Kolay, P. K., Kumar, S., and Pearson, C., US\$ 59,529, 2011.
15. "Engineering Technician Training (ET2) for Construction Industry", Illinois Department of Transportation (IDOT) and Southern Illinois University Carbondale, CFDA No. 20.205, Vishanatham, R., Kolay, P. K., Kumar, S., Pearson, C., Jha, P., US\$ 155,200, 2010-2011.
16. "Optimizing Sarawak Peat as Potential Fuel Source for Domestic Use", Fundamental Research Grant (FRG), UNIMAS, Taib, S.N.L, Kolay, P. K., Junaidi, E., Yusof, M., Nazeri, A., RM 6,000 (US \$2,000), 2009-2010. (RM = Ringgit Malaysia)
17. "Construction on Peat Soil – Stabilizing the Soil and Proposing Light Weight Foundation through Experimental and Numerical Approach", *E-SCIENCE, Ministry of Science Technology & Innovation (MOSTI), No. 03-01-09-SF0032, Mohd Zain, M.I.S., Kolay, P. K., Taib, S.N.L., and Kamal, A. A., RM 304,800 (US \$101,600), 2008-2010.
* Equivalent to National Science Foundation (NSF) Grant
18. "Improvement on Particle Image Velocimetry (PIV) analysis on Simple Soil-Structure Interaction", Ministry of Higher Education (MOHE), No. FRGS/02(03)/644/2007(09), Taib, S.N.L, and Kolay, P. K., RM 34,400 (US \$11,467), 2007-2009. (RM = Ringgit Malaysia)
19. "Stabilization of Local Peat soil by using Pulverized Fuel ash (PFA)", Fundamental Research Grant (FRG), No. 02(76)/581/2006(14), Kolay, P. K., Taib, S.N.L., RM 29,903 (US \$ 9,968), 2006-2008. (RM = Ringgit Malaysia)

20. "Characterization of fly ash for its disposal and utilization with respect to environmental protection and potential as soft soil stabilizer", Fundamental Research Grant (FRG), No. 02(51)/459/2004(196), Kolay, P. K., Singh, H., RM 19,084 (US \$6,361), 2004-2006. (RM = Ringgit Malaysia)