

SHAHRYAR KHALIQUE AHMAD

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RESEARCH INTERESTS Remote Sensing
Land Surface and Weather Forecast Modeling
Geospatial Data Analysis in Google Earth Engine
Machine Learning Applications
Web-based GIS development

EDUCATION **University of Washington, Seattle** 2018 - present
Doctor of Philosophy in Civil and Environmental Engineering
Hydrology and Hydrodynamics Program
Advisor: Dr. Faisal Hossain

University of Washington, Seattle 2016 - 2017
Master of Science in Civil and Environmental Engineering
Hydrology and Hydrodynamics Program
Thesis: *Investigating the value of Weather Forecasts from Numerical Prediction Models for hydropower maximization in small to medium storage dams*
GPA: 3.97/4.0

Indian Institute of Technology, Kanpur 2012 - 2016
B.Tech. in Civil Engineering
Department Rank: 2
GPA : 9.54/10.0

RESEARCH EXPERIENCE **Graduate Research Assistant** Fall 2016 - present
SASWE Research Group, University of Washington

- Conceptualized reservoir operations optimization to maximize hydropower generation in U.S. dams using VIC-modeled inflow, forecasted with short term WRF-downscaled GFS forecasts
- Used Genetic Algorithm for optimizing daily reservoir releases using inflow forecast information employing constraints for dam safety and flood control
- Involved in development of fully automated operational web interface “South Asian Surface Water Modeling System (SASWMS)” connecting complex back-end hydrological models with user-friendly front-end GUI
- Managing web crawler and analytics-based correction system to increase predictability of satellite observations for hind/now-cast surface water flux

Student Intern, NASA Goddard Space Flight Center Jun 2017 - present
Supervisor: Dr. Sujay V. Kumar, NASA GSFC

- Developed interactive state-of-the-art web based framework, **LIS Atlas**, to visualize Land Information System (LIS)-generated model output from multiple model domains and configurations at different timescales
- Programmed initial prototype for the FEWS NET project over Central Asia and Africa to monitor snow conditions and water availability, respectively

- Implemented capabilities to generate outputs from Land surface Verification Toolkit (LVT) at various spatial and temporal scales, including quantitative evaluations of model outputs compared to observations.

MITACS Globalink Research Intern

Summer 2015

Supervisor: Prof. Anders Knudby, Simon Fraser University, Burnaby, Canada

- Applied radiative transfer model for satellite-derived bathymetry with case study of Canadian waters
- Simulated above-water reflectance to retrieve per-pixel water depth
- Employed efficient model inversion algorithms using BSP tree and ALUT
- Performed case study of Boundary Bay for field validation of depth estimates

Summer Research Internship

Summer 2014

Supervisor: Prof. Priyanka Ghosh, IIT Kanpur

- Analyzed response of axisymmetric foundations subjected to axial loads
- Adopted finite difference technique for simulations and sensitivity analysis

PUBLICATIONS

Journal Articles

1. **Ahmad, S. K.**, Hossain, F., 2017. Investigating Weather Forecasts from Numerical Weather Prediction Models for Hydropower Maximization in Small and Medium Dams. *Water Resources Research*. (In review).
2. Eythorsson, D., **Ahmad, S. K.**, Gardarsson, S.M., Hossain, F., Nijssen, B., 2017. Historic Arctic Snow Cover Frequency Trends and Changes in Köppen-Geiger Climate Classifications using Google Earth Engine. *Remote Sensing (Google Earth Engine Special Issue)* (In review).
3. Harsha, K. S., Hossain, F., Lohani, B., **Ahmad, S. K.**, Balaji, N., Tripathi, S., 2018. Satellite-Based Precision and Smart Agriculture for Marginal Farmers. *EOS (AGU)* (In review).
4. Knudby A., **Ahmad S. K.**, Ilori C., 2016. The potential for Landsat-based bathymetry in Canada. *Canadian Journal of Remote Sensing*, 42(4), pp.367-378.

Conference Proceedings

1. Knudby A., Roy D., **Ahmad S.K.**, Bird S., Ilori C., 2016. Satellite-derived bathymetry for Canada, *Canadian Hydrographic Conference, May 16-19, 2016, Halifax, Nova Scotia, Canada*.
2. **Ahmad S. K.**, Srinivasan V., Ghosh P., 2014a. Analysis of annular footings and anchors lying on elastic soil medium using finite difference technique. *5th International Congress on Computational Mechanics and Simulation (IC-CMS) 2014, India*.
3. **Ahmad S. K.**, Srinivasan V., Ghosh P., 2014b. Analysis of axisymmetric foundations subjected to axial compressive or tensile static loads on Gibson soil model. *Indian Geotechnical Conference (IGC) 2014, India*.

RELEVANT PROJECTS

Smart Decision Support System for Optimized Reservoir Operations

- Developed an operational web-based portal to provide informed decisions for optimized reservoir operations

- Automated realtime optimization for Detroit Dam, OR, using short-term numerical weather forecasts, synergized with hydrologic and reservoir model to maximize hydropower while avoiding flood damages.
- To be incorporated in operational framework by US Army Corps of Engineers for more dams in future

Effect of DEM resolution on hydrological modeling Spring 2017

- Used LiDAR data for generating the high resolution bare earth model for watershed delineation
- Processed DEM at coarser resolutions to compare relative performance of mapped stream networks
- Extracted saturated areas in watershed using TOPMODEL wetness index

Global Snow Cover Area Evaluation using remote sensing data with Google Earth Engine Winter 2017

- Obtained trends in global SCA frequency using MODIS data with Google Earth Engine
- Extracted trends for specific Köppen-Geiger Climate Classes over the Arctic to assess effect of climate change and topography
- Performed statistical tests to reveal significant shifts in snow cover

Interactive Visualizer for GRanD Database Winter 2017

- Facilitates visualization of data provided by GRanD database for dams and reservoirs around the world
- Developed web-based interactive GUI with embedded search functionalities

Development of web-based GIS for IIT Kanpur Spring - Summer 2016
B.Tech. Project, Supervised by Prof. Bharat Lohani

- Developed the first ever web-based GIS for IIT Kanpur community
- Programmed various spatial queries using feature layers from GIS database
- Built interactive GUI using HTML, CSS, JavaScript, and PHP

Developing desktop based applications for Campus GIS Spring 2015
Supervised by Prof. Bharat Lohani

Developed standalone desktop-based GIS applications using VB.NET

Implementation of various filters in Image Processing Spring 2016
Term project, Mentored by Prof. Onkar Dikshit

Segmentation and Classification of LiDAR data Spring 2016
Term project, Mentored by Prof. Bharat Lohani

SKILLS

Software/Languages - MATLAB, Python, C/C++, Google Earth Engine, C#, ArcGIS, FlowMaster, CulvertMaster, EPA SWMM, PondPack, L^AT_EX, AutoCAD, Microsoft Office

Analytical - Hydrological Modeling (VIC, SWAT), Numerical Weather Forecast (WRF), Remote Sensing, Web-GIS development, Machine Learning, Image Processing, Optimization and Data Assimilation

Web Development - HTML, CSS, JavaScript, Node JS, PHP, SQL

SELECTED
AWARDS

- **Grow with Google Challenge Scholarship, Mobile Web Specialist track**, 2018
- **Washington State AWRA Student Fellowship**, 2017
- **Ivanhoe Foundation Fellowship**, 2017
- **Mitacs Globalink Graduate Fellowship**, 2016
- **Academic Excellence Award**, 2015 and 2014, awarded to top 7% students of batch, IIT Kanpur
- Nominated by Ministry of Human Resource Development, India, for **Commonwealth Scholarships, UK**, 2016
- **Merit-cum-Means scholarship**, 2013-14, IIT Kanpur
- Best Executive Award, **Alumni Contact Program**, 2013, IIT Kanpur

ACTIVITIES AND
AFFILIATIONS

- **American Society of Civil Engineers (ASCE)**, Student Member, 2017-present
- **American Geophysical Union**, Student Member, 2017-present
- **American Water Resources Association**, Webmaster, 2016-present
- **Freshwater Initiative**, Steering Committee Member, 2017-present
- **American Water Resources Association**, Student Member, 2016-present
- Webmaster and Coordinator in **Techkriti'14** (inter college technical festival), IIT Kanpur, 2014
- Show Management Executive in **Udghosh'13** (inter-college sports festival), IIT Kanpur, 2013