Open position with the Environmental Solutions Initiative
Natural Climate Solutions Program

Project: "UAVs/Drones for Equitable Climate Change Adaptation: Participatory Risk Management through Landslide and Debris Flow Monitoring in Mocoa, Colombia"
Faculty Advisor: Professor John E. Fernández
Direct Supervisor: Sean Anklam, Remote Sensing Engineer MIT Lincoln Labs
Project period: January 2022 to December 2022
Appointment type: Half-time Research Assistant with tuition

ESI's Natural Climate Solutions Program is seeking a graduate Research Assistant for our flagship research project developing a participatory monitoring system to identify landslide risks using LIDAR data from drone flights in the city of Mocoa, in the Colombian Amazon Piedmont.

Colombia has experienced significant landslide disasters, including the 2017 landslide in Mocoa that killed over 300 people and the 1985 Armero disaster which killed more than 20,000 people, being the country's most deadly landslide disaster to date. The country has made progress in recent years in terms of policies and planning instruments for disaster risk management, exemplified by its 2015-2025 National Disaster Risk Management Plan which is directly linked to its national legislation and which aims to reduce disaster mortality by 2025 while also reducing the negative impacts on livelihoods from recurring climate-related hazards such as floods, droughts, landslides and forest fires. However, the implementation of these measures is slow at the local level. Surrounded by mountainous rainforest and with six rivers running through and around Mocoa, a city in the Colombian Amazon piedmont, the town's topography and location makes it prone to mudslides and flash floods. This danger is exacerbated as a result of deforestation in the upper mountainous region for cattle ranching and other agriculture, removing protection against flooding and landslides. This project aims to provide an effective and robust landslide monitoring system that combines data collected by Unmanned Aerial Vehicles (UAVs) with the development of an innovative algorithm using machine learning and artificial intelligence to model and predict landslide probability and establish key factors in land displacement and risk mitigation scenarios. Moreover, a community engagement process and a publicly accessible decision support web tool will be conducted and developed to gather community-feedback and for an interactive visualization of results to inform local adaptation strategies.

The Research Assistant will assist with designing and implementing a methodology to analyze and predict landslide probability from LIDAR data, multi-modal satellite imagery, weather data, and geographic information systems using machine learning methods.

Requirements:

- Deep Learning experience with special emphasis on geometric data and feature detection
- Experience with 3D Convolutional Neural Network
- Experience in LSTM Recurrent Neural Network and Bayesian Inference
- Probabilistic models
- Bachelor's degree in computer science or similar field

To apply, email your resume to Marcela Angel, Natural Climate Solutions Program Manager at marcelaa@mit.edu