Center for infrastructure, Sustainable Transportation and Urban Planning (CiSTUP)
Indian Institute of Science (IISc)

Winter Internship Program 2023

The Centre for infrastructure, Sustainable Transportation and Urban Planning (CiSTUP) at IISc invites applications for the "***Winter Internship Program 2023"*** to work on various projects.

General

1. The stipend for students with/or pursuing a Bachelor's degree is Rs. 15,000 a month, and for those with/or pursuing a Master's degree is Rs. 20,000 a month. An internship certificate will be provided upon successful completion of the program.
2. Selected candidates will have to arrange their accommodation.
3. Preference will be given to candidates who can join immediately and for a longer duration of time.
4. Applicants can apply for one or multiple projects mentioned below.
5. All internship positions are in-person only.
6. Based on the performance of the candidates during the internship, we also offer long-term research collaboration opportunities (such as semester-long projects) and permanent positions (Project Associate/Assistant, Research Associate, and Junior Research Fellow).

Responsibilities

1. Candidates should be motivated to learn new skills/software and willing to work on computational and experimental projects. Strong programming/debugging skills and an understanding of mathematical modeling are advantages.
2. Read and implement research papers and perform literature reviews for the assigned project.
3. Analyze data, conduct experiments, and contribute to research publications in leading journals and conferences.

How to Apply: Submit your application by using the following Google Form: Link

Selection Procedure: Candidates will be initially short-listed based on their eligibility criteria and relevant experience. The selection process will include a skill test and an interview round. If needed, an additional interview can be conducted for shortlisting final candidates.

Application Timeline:

Date	Event
8th November 2023	Last date to submit your application
8th November 2023	Results from preliminary screening
9th-11th November 2023	Commencement of Round 1
13th November 2023	Declaration of Round 1 results
14th-15th November 2023	Round 2 Results
17th November 2023	Round 3 (If needed)
18th November 2023	Final results

Project Specifics

1. Network Optimization Models for Traffic and Transit (C++ Developer)
   - **Description**: This research aims to develop an open-source tool to simulate transit systems and predict crowding/ congestion accurately. It can answer several "what-ifs" related to public transit systems, such as how passengers react in case of a decrease in ticket price, events like delays and cancellations, and how the collective selfish choices of agents translate to flows and crowding in transit systems. The proposed framework is designed especially for dense large-scale networks like Bangalore. For more details, refer (video), (website)
   - **Project In-charge**: Prateek Agarwal (link), Dr. Tarun Rambha (link)
   - **Eligibility:** The candidate should be available for at least two months with strong programming skills in C++. Familiarity with advanced data structures, OpenMP/MPI, and algorithms in advantages.

   Contact for any clarifications: Prateek Agarwal (link)

2. Video Developer
   - **Description:** As an intern, you will work closely with our research team to develop animations visually conveying complex research findings and concepts. Your responsibilities will include conceptualizing animations, storyboarding, producing visuals, and collaborating with the research team to ensure accurate and engaging content.
   - **Project In-charge**: Prateek Agarwal (link), Dr. Tarun Rambha (link)
   - **Eligibility:** The candidate should be available for at least two months and familiar with tools like Adobe After Effects, Adobe Premiere Pro, iMovie, Unity, OpenToonz, etc.

   Contact for any clarifications: Prateek Agarwal (link)

3. GUI Developer
   - **Description**: Collaborate closely with a research scholar to design and develop user-friendly Graphical User Interfaces (GUIs) to enhance the usability and accessibility of these research applications.
   - **Project In-charge**: Prateek Agarwal (link), Dr. Tarun Rambha (link)
   - **Eligibility:** Basic GUI knowledge, Familiarity with Qt/PyQt/PySide and strong programming skills in Python

   Contact for any clarifications: Prateek Agarwal (link)

4. Behavioral Study of Drivers in Parking Lots
   - **Description**: The intern will be involved in setting up simulation environments for an open parking lot using VISSIM and CARLA with Python support. This will be used for driver behavioral studies.
   - **Project In-charge**: Helen Thomas (helenthomas@iisc.ac.in), Tarun Rambha (link)
   - **Eligibility**: Proficiency in Python coding

   Contact for any clarifications: Helen Thomas (helenthomas@iisc.ac.in)

5. Data Science Intern
    - **Description:** Work closely with the research team on Data Science problems. Your key responsibilities would include (i) data preprocessing, i.e., cleaning, integrating, and transforming datasets; (ii) coding and applying methods/algorithms on preprocessed datasets.
    - **Project In-charge**: Dr. Punit Rathore (link)
    - **Eligibility**: The candidate should be available for 2-6 months. Candidate must be proficient in Python and comfortable working with libraries such as SciPy, Scikit, etc. Candidates with demonstratable proficiency in data science will have an edge.

    Contact for any clarifications: Dr. Vishwajeet Pattanaik (link)

6. Machine Learning Intern
    - **Description:** Work closely with the research team to implement and try out various state-of-the-art architectures related to Image Classification and Detection. Your key responsibilities would include reproducing results from existing research and trying them out on custom datasets.
    - **Project In-charge**: Dr. Punit Rathore (link)
    - **Eligibility**: The candidate should be available for 2-6 months. Candidate must be proficient in Python and comfortable working with libraries such as Pytorch, OpenCV, etc. Familiarity with image classification and detection tasks is critical. Experience in self-supervised algorithms will be a plus.

    Contact for any clarifications: Dr. Vishwajeet Pattanaik (link)

7. Deep Learning Intern
    - **Description:** This research position aims to develop novel deep clustering methods by leveraging the concepts from state-of-the-art contrastive and generative learning techniques (SimCLR, MoCo, SimSIan, GAN, Diffusion). Your key responsibility would include coding the algorithms/architecture and trying them on various complex image datasets.
    - **Project In-charge**: Dr. Punit Rathore (link)
    - **Eligibility**: The candidate should be available for 2-6 months. Candidate must be proficient in Python and comfortable working with libraries such as Pytorch, OpenCV, etc. Candidates with knowledge of contrastive learning/self-supervised learning will have an edge.

    Contact for any clarifications: Alokendu Mazumder (link) (alokendum@iisc.ac.in)

8. AI-in-Healthcare Intern
    - **Description:** Work on self-supervised learning (SSL) techniques for medical imaging tasks (segmentation/classification). Experiment and develop augmentation and transformation strategies for SSL in the medical imaging domain.
    - **Project In-charge**: Dr. Punit Rathore (link)
    - **Eligibility**: The candidate should be available for 2-6 months. Candidate must be proficient in Python (Pytorch framework) and comfortable working with deep learning models for image (medical) classification/segmentation. Prior knowledge of *digital image processing* is desirable. Experience in handling medical images (MRI, CT) will be a plus.

    Contact for any clarifications: Tirthajit Baruah (tirthajitb@iisc.ac.in)

9. Intrusion Detection Systems Intern
    - **Description:** This research position aims to develop a novel Machine learning model to detect cyber-attacks in a system (Intrusion Detection System). Your key responsibilities would include developing the POC of the machine learning model (coding/research) and evaluating them on various complex publicly available datasets.
    - **Project In-charge**: Dr. Punit Rathore (link)
    - **Eligibility**: The candidate should be available for 2-6 months. Candidate must be proficient in Python and know about unsupervised learning approaches using time series data. Having prior knowledge of automotive communication protocols such as CAN, LIN, etc., or communication protocols for intelligent electronic devices such as IEC 61850 will be a plus.

    Contact for any clarifications: Sudarshan Bandyopadhyay (sudarshanban@iisc.ac.in)