



# Indian Institute of Technology Gandhinagar

## Advertisement for Junior Research Fellow in the discipline of Electrical Engineering

IIT Gandhinagar invites applications for the position of **Junior Research Fellow (JRF)** in a research project sponsored by the Gujarat Council of Science and Technology (GUJCOST), Government of Gujarat.

### **Project title:**

High-sensitivity detection of atmospheric pollutant gases to monitor the effects of industrial emissions on urban air quality

### **Principal Investigator:**

Dr Arup Lal Chakraborty  
Associate Professor, Electrical Engineering  
Indian Institute of Technology Gandhinagar  
Gandhinagar – 382355, Gujarat

### **Project description:**

A high-sensitivity gas sensing system is currently under development to detect hazardous gases in the atmosphere. This activity is part of a research project sponsored by the Gujarat Council of Science and Technology (GUJCOST), Government of Gujarat. The objective is to develop a system that can measure the mole fraction of various oxides of nitrogen (NO<sub>x</sub>), carbon dioxide and carbon monoxide for real-time ambient air quality monitoring. The system uses the powerful modern techniques of tuneable diode laser absorption spectroscopy (TDLAS) and photoacoustic absorption spectroscopy (PAS). Mid-infrared quantum cascade laser diodes will be used to detect the gases. TDLS is ideally suited for this purpose because the measurements are absolute in nature (no calibration required), high-sensitivity (low ppm to ppb), in situ, non-invasive concentration measurements of the four gases can be made simultaneously with very low cross-sensitivity. The project will use recently developed calibration-free first harmonic (1f) and second harmonic (2f) wavelength modulation spectroscopy (WMS) algorithms that we have developed in our lab.

The selected candidate will work with other lab members specifically on the full-scale development of a robust sensor system that will then be taken to various parts of Gujarat for in situ measurements. This will involve building electronic driver circuits for laser diodes and photodetectors, performing experiments to implement WMS techniques on the laser, perform digital signal processing of data, execute extensive laboratory tests of the system to establish the detection limit, write software for automatic control all equipment and relay information to cloud-based systems. The candidate will also participate in writing periodic reports to document the progress of the project. The candidate must be energetic and organized.

### **Required background/skills:**

The successful candidate will work in an inter-disciplinary environment in the Photonic Sensors Lab at IITGN ([www.photonicsensorslab.com](http://www.photonicsensorslab.com)). The work will be at the intersection of photonics and electronics. The following skill set is required –

- a) proficiency in developing embedded systems (Arduino, Raspberry Pi etc)

- b) knowledge of data acquisition and instrument control using LabVIEW
- c) programming skills using Python and/or MATLAB
- d) practical experience of experimental work photonic sensors would be useful but not essential

**Eligibility Criteria:**

The selected candidate would satisfy the following conditions –

- a) A Bachelor's degree in Electronics Engineering/ Electronics and Communications Engineering/ Instrumentation / Electrical Engineering from a recognized academic institute in India
- b) Qualified the NET or GATE.

**Compensation:**

As per the norms of GUJCOST for the salary for the JRF position is as follows –

- a) Qualified NET/GATE qualified: Rs 25000 + 20% HRA
- b) Not qualified NET/GATE qualified: Rs 18720 + 20% HRA

**Duration of appointment:**

The appointment will initially be for a year with the possibility of renewal for up to one more year depending on the performance. This will be at the discretion of the appointing authority.

**How to apply:**

Those interested are required to download the application package from <http://www.iitgn.ac.in/job.htm> and send the email the application a **single zipped file** to [arup@iitgn.ac.in](mailto:arup@iitgn.ac.in). The application must contain-

- (i) Curriculum vitae highlighting your expertise and experience
- (ii) a 1-page statement of purpose: outline why you consider yourself suitable for this position and include skills and details of projects you have executed that are relevant to this opening.
- (iii) List of referees who can comment on your skills and their contact details

Please note that a **single zipped file** should be named as **<your last name>\_serb\_srf\_iitgn.zip** and the **subject line of the email should be "GUJCOST-JRF-IITGN"**. Candidates shortlisted for the interview would be required to submit the hardcopies of all these documents if they are selected. Incomplete application forms i.e. resumes only without the application form and applications without statement of purpose will be rejected.

**Deadline:** The last date for application is **30 Nov 2020**.

Prospective candidates may contact Dr Arup Lal Chakraborty by email ([arup@iitgn.ac.in](mailto:arup@iitgn.ac.in)) for clarifications in this regard.