

Recruitment Advt. No: IITDH/R&D/BioCyTiH/RRM/2022-23

Date: 24.01.2023

Farms of future

National mission on interdisciplinary Cyber-physical system, Department of Science and Technology (NMICPS, DST) aims to develop and exploit CPS technologies in services and manufacturing sectors; in agriculture, water, energy & traffic management; health, environment etc. This will help to achieve translation of CPS technologies for societal and commercial use and also produce next generation technocrats in CPS technologies.

As part of achieving the above mentioned goals, the NM- ICPS, DST funded BITS BioCyTiH foundation, a Section 8 non-profit company hosted by BITS Pilani. The mandate of the company is to fashion a platform that would foster translational research, innovation, skill development and training in areas of bio-cyber-physical systems (Bio-CPS) related to healthcare, agriculture, water and environment.

To the BITS BioCyTiH foundation, IIT Dharwad has recently joined as spoke institute and received funding under the project titled “Farms of Future” to deliver technological solutions to some of the agricultural problems. The proposed solutions are expected to increase the income of small and marginal farmers by reducing their input costs (by means of targeted delivery of pesticides/fertilizers) and crop wastage (using sensors, advisory, diagnostics), extending post-harvest shelf life of farm produce (using solar dryers), and ensuring fair grading of the produce.

IIT Dharwad invites applications for 10 research positions such as junior/senior research fellows, project assistant/associate who will contribute to the execution of the above mentioned project. For details of project, qualification, job description and monthly fellowships please refer to the following table and the content thereafter.

How to apply: Please apply using the google form against each position

- Select the position from the drop down menu
- Please submit separate application for each positions

For queries on the application process please write to rajesh@iitdh.ac.in or ruma@iitdh.ac.in

Application details

Project code	Subproject title	Area of expertise and the available positions	Detailed advt.
FF1A or FF1B	Development of resistive sensors for early detection of crop infestation	Electrical Eng. JRF - 1 (FF1A) Chemistry JRF/SRF - 1 (FF1B)	Subproject 1A:Page-3 Subproject 1B:Page-4
FF2	Developing Efficient Communication Infrastructure for Connecting Sensors to Cloud	Electrical Eng. JRF-1	Subproject 2:Page-5
FF3	Smart Variable Rate Technology (VRT) application to agricultural spray drones for accurate pesticide delivery	Mechanical Eng. JRF - 2	Subproject 3:Page-6
FF4A or FF4B	Fruit quality assessment using depth imaging augmented by conventional RGB imaging	Mechanical Eng. Project assistant-2 (FF4A) Project associate-2 (FF4B)	Subproject 4:Page- 8&9
FF5	A solar-based and CPS-assisted smart dryer for post-harvest grain storage systems	Mechanical Eng. JRF - 1	Subproject 5:Page-11

Application link	https://www.jotform.com/220951115443448
	Important note: Please mention the project codes as per column number 1 of the above table in the “ In a few sentences describe why you think you are a good fit for project staff position ” field of the “ Department choices ” tab. This is extremely important.
Application start date	24 th January 2023
Application end date	17 th February 2023
Shortlist announcement	21 st February
Interview date	To be announced along with shortlist
Mode of interview	Offline (venue- IIT Dharwad, WALMI campus)

FF1A: Subproject title: Development of resistive sensors for early detection of crop infestation

Project description: The project aims to synthesize metal oxides based resistive sensors for the sensing of the volatile emitted by the plants. In this regard, several metal oxides of different morphologies will have to be synthesized and thoroughly characterized. These will be used as the sensing layers towards the gases which are emitted by infested crops.

S. No.	Particulars	Details
1.	Name of the Position	Junior Research Fellow (On Contract)
2.	Number of Positions	1
3.	Essential Qualification	M. Tech. in Electronics/VLSI/Nanotechnology/Digital Electronics/ Embedded Systems or equivalent with minimum 60% of marks or equivalent in the qualifying degree OR B.Tech. in Electronics and Communication Engineering or allied areas with minimum 60% of marks and qualification of any National Eligibility Test – CSIR-UGC NET including lectureship (Assistant Professorship) OR GATE
4.	Desirable Qualification	Knowledge of/interest in experimental research. Strong orientation towards electronic devices, sensors and instrumentation
5.	Consolidated Emoluments	INR 31,000/- + 16% HRA per month
6	Duration of the tenure	Maximum 2 years
7.	Tenure of appointment	The appointment for the above contractual position will be initially for a period of 01 years, which may be extended or curtailed, based on the performance of the candidate, availability of funds in the project, requirement in the project. The appointment will be co-terminus with the project.
8.	Age Limit	Not exceeding 28 years as on the date of selection process.
9	Job Description	The student is expected to learn the concepts related to gas sensors, signal processing algorithms (data classification) and microcontrollers. This project includes device fabrication, synthesis of nanomaterials, characterizations and thorough gas tests and analysis of the data

FF1B: Subproject title: Development of one-dimensional and two-dimensional organic polymers based chemiresistive sensors for plant emitted volatiles

Project description: The project aims to develop organic polymer based resistive sensors for the sensing of the volatile emitted by the plants. In this regard, several semiconducting organic polymers will be judiciously designed and developed and thoroughly characterized. The materials will be used as the sensing layers towards various analytes.

S. No.	Particulars	Details
1.	Name of the Position	Senior Research Fellow or junior research fellow (On Contract)
2.	Number of Positions	1
3.	Essential Qualification	For JRF: M.Sc. degree in Chemistry with a specialization in Organic/Inorganic /physical with GATE/CSIR-UGC NET (LS). For SRF: 1) M.Sc. degree in Chemistry with a specialization in Organic/Inorganic /physical with GATE/CSIR-UGC NET (LS). 2) Minimum two years of research experience
4.	Desirable Qualification	Strong knowledge in organic chemistry and the synthesis of organic p-conjugate compounds and polymers Knowledge in organic and molecular spectroscopy
5.	Consolidated Emoluments	For SRF: 35,000/- + 16% HRA For JRF: 31,000/- + 16% HRA Accommodation can be given based on the availability in the hostel. If the hostel accommodation is given, then HRA will not be applicable.
6.	Duration of the tenure	Maximum 2 years
7.	Tenure of appointment	The appointment for the above contractual position will be initially for a period of 01 years, which may be extended or curtailed, based on the performance of the candidate, availability of funds in the project, requirement in the project. The appointment will be co-terminus with the project.
8.	Age Limit	Not exceeding 30 years as on the date of selection process.
9.	Job Description	Performing research literature review and understanding the research challenges associated with the project. <ul style="list-style-type: none"> ● Synthesis and characterization of the organic polymers for sensing volatile organic compounds emitted by the plants. ● Formulating research problems in the realm of organic polymer based sensors ● Documenting research output including analysis, maintaining records, drafting technical/progress reports and papers. ● Presentation of work at conferences, at internal and external seminars, colloquia and workshops. ● Any administrative activities related to the project.

FF2: Subproject title: Developing Efficient Communication Infrastructure for Connecting Sensors to Cloud

Project description: The project aims to develop efficient communication infrastructure by assembling off-the-shelf low-cost accessories for collecting sensor data and transmitting, developing energy efficient communication network and algorithms for optimal placement of IoT devices and adopting remote sensing (drone or satellite-based) and signal processing techniques for efficient interpolation of data at places where the data are not sampled.

S. No.	Particulars	Details
1.	Name of the Position	Junior Research Fellow (On Contract)
2.	Number of Positions	1
3.	Essential Qualification	B.E. or B.Tech. degree with GATE. Minimum one year of research experience
4.	Desirable Qualification	Strong knowledge of embedded systems, deep learning and remote sensing
5.	Consolidated Emoluments	31,000/- + 16% HRA to Scholars who are selected through GATE.
6.	Duration of the tenure	Maximum 2 years
7.	Tenure of appointment	The appointment for the above contractual position will be initially for a period of 1 year, which may be extended or curtailed, based on the performance of the candidate, availability of funds in the project, requirement in the project. The appointment will be co-terminus with the project.
8.	Age Limit	Not exceeding 32 years as on the date of selection process.
9.	Job Description	<ul style="list-style-type: none">• Developing and installing solar-powered, energy-efficient IoT devices in suitable locations and collecting frequent data for a long amount of time spanning different seasons.• Combining data with remote sensing data for interpolating and extrapolating• Displaying the data in appropriate format and application for seamless exploitation

FF3: Project title: Smart Variable Rate Technology (VRT) application to agricultural spray drones for accurate pesticide delivery

Project description: The project aims to characterize and develop drone-based pesticide sprayers for agricultural applications.

S. No.	Particulars	Details
1.	Name of the Position	Junior Research Fellow (On Contract)
2.	Number of Positions	2
3.	Essential Qualification	B. Tech or M. Tech degree in Mechanical, Aerospace or other allied Engineering streams selected through a process described through any one of the following: A. Scholars who are selected through National Eligibility Test – UGC NET including lectureship (Assistant Professorship) or GATE. B. The Selection process through National level examination conducted by Central Govt. Departments and their agencies and Institutions such as DST, DBT, DAE, DOS, DRDO, MHRD, ICAR, ICMR, IIT, IISc, IISER, etc.
4.	Desirable Qualification	1. Background in experimental fluid mechanics or aerodynamics. 2. Strong orientation towards performing experiments and analysing data.
5.	Consolidated Emoluments	i) 31,000/- + HRA to Scholars who qualify for process mentioned in 3(A) above. ii) 25,000/- + HRA for others who do not fall under 3(A) above.
6	Duration of the tenure	Maximum 18 months
7.	Tenure of appointment	The appointment for the above contractual position will be initially for a period of 01 years, which may be extended or curtailed, based on the performance of the candidate, availability of funds in the project, requirement in the project. The appointment will be co-terminus with the project.
8.	Age Limit	Not exceeding 32 years as on the date of selection process.
9	Job Description	<ul style="list-style-type: none"> ● Performing research literature review and understanding the research challenges associated with the project. ● To carry out comprehensive spray characterisation, such as penetration, drop size, and spray cone angles, by recreating scaled actual field conditions ● Development of novel spraying techniques such as variable geometry nozzles, twin fluid nozzles wherever feasible. ● Approach the configuration of agricultural spray UAVs ground-up for effective fluid delivery to the target. ● Come up with innovative design configurations such as dedicated designs for field crops and plantation crops ● Characterize the aerodynamic interaction of propeller air-jets with sprays and utilise the dynamics to our advantage

		<ul style="list-style-type: none">• Build compensatory mechanism for self-adjusting ability of sprays to overcome cross-winds• VRT application of sprays depending on crop-health and soil-health monitoring data, which in turn shall be obtained through aerial surveys and image processing
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FF4A: Subproject title: Fruit quality assessment using depth imaging augmented by conventional RGB imaging

Project description: Using the depth imaging in addition to the RGB spectrum highly objective and consistent quantification of the fruit quality is targeted. It will ensure a consistent method of grading the quality of fruits based on visual and morphological information across the food supply chain (farmer, trader, and consumer) which in turn will ensure fair pricing. It is a scalable approach and remote interaction with necessary additional infrastructure is possible.

S. No.	Particulars	Details
1.	Name of the Position	Project Assistant
2.	Number of Positions	1
3.	Essential Qualification	B.Sc. / 3 Years Diploma in Engineering & Technology
4.	Desirable Qualification	Inclination for hands-on mechanical assembly and working with drawings, Expertise in MS word, excel, powerpoint Fluency in Kannada Hands-on experience in working with plants and agricultural community Mechanical and agricultural background will be preferable. Candidates are expected to be flexible in terms of work and work load allocation
5.	Consolidated Emoluments	20,000/- + HRA Increment of 15% for 3 years of experience with maximum ceiling of 4 such revisions i.e. up to 12 years of experience.
6.	Duration of the tenure	Approx.. 2 years subject to availability of funding and satisfactory performance.
7.	Tenure of appointment	The appointment for the above contractual position will be initially for a period of 01 years, which may be extended or curtailed, based on the performance of the candidate, availability of funds in the project, requirement in the project. The appointment will be co-terminus with the project.
8.	Age Limit	Not exceeding 50 years as on the date of selection process.
9.	Job Description	<ul style="list-style-type: none">● Procurement and organization of samples● Billing and reimbursements● Lab admin work● Working with R&D equipment for data acquisition and processing● Cleaning of samples, hands-on work with soil and mud.

FF4B: Subproject title: Fruit quality assessment using depth imaging augmented by conventional RGB imaging

Project description: Using the depth imaging in addition to the RGB spectrum highly objective and consistent quantification of the fruit quality is targeted. It will ensure a consistent method of grading the quality of fruits based on visual and morphological information across the food supply chain (farmer, trader, and consumer) which in turn will ensure fair pricing. It is a scalable approach and remote interaction with necessary additional infrastructure is possible.

S. No.	Particulars	Details
1.	Name of the Position	Project Associate
2.	Number of Positions	2
3.	Essential Qualification	<p>(i) Master Degree in Natural or Agricultural Sciences/ MVSc or bachelor's degree in Engineering or Technology or Medicine from a recognized University or equivalent; and</p> <p>(ii) 2 years' experience in Research and Development in Industrial and Academic Institutions or Science and Technology Organisations and Scientific activities and services</p> <p>Note – Candidates who do not meet criteria (ii) above can still apply. In case suitable candidates are not found, candidates without necessary work experience may be considered for lower designation with applicable emoluments</p>
4.	Desirable Qualification	<p>Programming Skills</p> <p>Inclination for hands-on mechanical assembly</p> <p>CAD modelling</p> <p>GATE qualification will be preferable</p>
5.	Consolidated Emoluments	<p>(i) Rs. 35,000/- + HRA to Scholars who are selected through a process as mentioned below:</p> <p>a) National Eligibility Test – CSIR-UGC NET including lectureship (Assistant Professorship) or GATE</p> <p>OR</p> <p>b) A selection process through National level examinations conducted by Central Govt. Departments and their agencies and Institutions.</p> <p>(ii) Rs. 28,000/- + HRA for others who do not fall under 5(i) above</p> <p>If item 3 (ii) of the Essential Qualifications is not fulfilled, following will be applicable:</p> <p>(i) 31,000/- + HRA to Scholars who qualify for process mentioned in 5(i) above.</p> <p>(ii) 25,000/- + HRA for others who do not fall under 5(i) above</p> <p>Note - Accommodation can be given based on the availability in the</p>

		hostel. If the hostel accommodation is given, then HRA will not be applicable.
6	Duration of the tenure	Approx.. 2 years subject to availability of funding and satisfactory performance.
7.	Tenure of appointment	The appointment for the above contractual position will be initially for a period of 01 years, which may be extended or curtailed, based on the performance of the candidate, availability of funds in the project, requirement in the project. The appointment will be co-terminus with the project.
8.	Age Limit	Not exceeding 35 years as on the date of selection process.
9	Job Description	<ul style="list-style-type: none"> ● Review of the literature and prior art in the field ● Instrumentation and arrangement of the mechanical set-up to acquire data from one or more sensors. ● Researching suitable techniques and coding for Machine learning, data analysis as well as system level operations. ● 3D Visualization of data and derived metrics ● CAD modelling of the project set-up ● Lab maintenance & administration work ● Procurement process and inventory management ● Coordinating Technical event, meetings, and field surveys ● Porting project code on specialized hardware and mobile handsets.

FF5: Subproject title: Solar-thermal CPS based Metallic silos dryer

Project description: The project will focus on applied research to translate the Solar-thermal assistance for grain storages in silos.

This is an experimental work for building a prototype.

S. No.	Particulars	Details
1.	Name of the Position	Junior Research Fellow (On Contract)
2.	Number of Positions	1
3.	Essential Qualification	MTech. degree in Mechanical with a specialization in Fluid Mechanics and/or Thermal Engineering with GATE score in ME. Or BTech degree in Mechanical with GATE score in ME paper.
4.	Desirable Qualification	Strong knowledge in fluid mechanics and heat transfer
5.	Consolidated Emoluments	(i) 31,000/- + HRA to Scholars who are selected through GATE. (ii) 25,000/- + HRA for others who do not fall under (i) above (Accommodation can be given based on the availability in the hostel. If the hostel accommodation is given, then HRA will not be applicable.)
6.	Duration of the tenure	Maximum 18 months subjected to the availability of funds
7.	Tenure of appointment	The appointment for the above contractual position will be initially for a period of 01 years, which may be extended or curtailed, based on the performance of the candidate, availability of funds in the project, requirement in the project. The appointment will be co-terminus with the project.
8.	Age Limit	Not exceeding 32 years as on the date of selection process.
9.	Job Description	<ul style="list-style-type: none">● Performing research literature review and understanding the research challenges associated with the project.● The project will focus on applied research to translate the Solar-thermal assistance for grain storages in silos.● Major focus will be on the designing the flow paths for optimal use of solar energy for non-intrusive heating for removal of the moisture from the grains storage, metallic silos.● Integration of various sensors, measurements and analysis of operational data would help to further refine the design.