Department of Mechanical Engineering
NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA, SURATHKAL

Ref. No. 644/NITK/DST-SEED/MECH/HK/2021-22/A9 **22/04/2022**

Advertisement for Junior Research Fellow (JRF)

Applications are invited for the position of Junior Research Fellow (JRF) in a research and development project **(DST -SEED-TIDE**) with following details:

Title of the project:

"Design and Development of Semi-active Prosthetic Knee using costeffective Magneto Rheological Brake to assist Trans-femoral Amputees"

Principal Investigator:

Dr. Hemantha Kumar,
Associate Professor, Department of Mechanical Engineering,
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Co-Principal Investigators:

Dr. Arun M,
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Name of the position: Junior Research Fellow (JRF)

No. of Positions/Vacancies: One

Qualifications:
Essential Qualifications:- **M.Tech./M.E. in Machine design / Thermal Engineering/ Mechatronics / Control Engineering / Automobile Engineering / Machine Dynamics or any other allied areas** with a minimum of 60% aggregate score (6.5/10 CGPA). Proof of M.Tech./ M.E certificate has to be provided during the time of interview. **Candidate must have qualified GATE examination (old gate score is also considered).**

Desired Skills:-

- Basic exposure to software such as MATLAB, ADAMS, ANSYS, LabView, CFD.
- Ability to work in a team, good communication skills and experience in experimental research for fabrication of setup.

Age Limit:-32 years (Preferrable)

Salary:-

Rs. 31,000/month (for JRF) + HRA (16%)

Duration: 0**1year (approx.)** or up to the termination of project, subject to annual performance review. **The candidate is encouraged to apply for Ph.D. at NITK, Surathkal.**

How to apply: Interested candidates must apply with the following documents (1) Cover letter (2) Bio-data with passport-sized photograph, (3) Scanned copies of educational certificates and mark sheets, class XII onwards (4) GATE qualified certificate and (5) Scanned copies of Proof for research experience, special achievements and publications, if any.

The soft copies of all the above documents (pdf format) must be **emailed to the P.I., Dr. Hemantha kumar (hemantha@nitk.edu.in) by 28th May 2022**. The email address for correspondence is given above. Only shortlisted candidates will be intimated by email and called for **Online/Offline interview**. The position is available immediately. Interview is most likely to be held during **1st week of June 2022**.The appointment will be on a purely temporary basis co-terminus with the project.

About the project:

Total duration: 2 YEARS (2022-2024)

Funding Agency: Dept of Science and Technology, Board - SEED, Scheme:- Technology Interventions for Disabled and Elderly (TIDE)

Project summary:

Trans-femoral amputees face a lot of challenges physically and mentally post-surgery. Physical challenges include locomotion disabilities, gait deviation etc. Broadly knee prosthesis can be classified as active, passive and semi-active types. Active knees are the most effective in terms of providing natural gait to TF amputees. Further, active knees have their own limitations such as the large power requirement for the actuator. On the other hand, passive knees are of least cost and are of wide variety. Knees with only mechanical joints such as single axis knee joint or the polycentric knee, Jaipur foot are widely used by a large population in India. Also, passive knees with hydraulic damping are also available in the market, but again at a larger price. Recent trend of knee prosthesis based on semi-active elements such as variable orifice damper, MR dampers and brakes are also available with an intermediate cost between the active and passive knee joint. Therefore, in this project we propose a multi-plate MR brake for a semi-active prosthetic knee joint.

The commercial MR brake uses more than 60 plates separated by a micron level gap. This small gap restricts the flow of MR fluids, for which they have used a bi-modal MR fluid made of Nano and micron level carbonyl particles owing to large cost of MR fluid. In this study, the effects of the gap size on the brake will be explored and an increased gap size will be facilitated. This provides an alternative to use MR fluid with particles size ranging from 1 to 10 μm , thus reducing the cost of MR fluid. The increased gap size will also have a positive effect on the manufacturing tolerances and thus reducing the manufacturing cost too. Further to reduce the cost of the brake component, low cost materials with higher magnetic permeability will be explored.