



Prof Dibakar Sen receives the Prestigious Abdul Kalam National Technology Innovation Fellowship 2021



Design of a biofidelic Prosthetic Arm is inherently complex as the natural arm has over 20 degrees of freedom for performing dextrous tasks. The mechanical complexity arises from the need to grasp objects of varied size, shape, and weights; the complexity of control arises from the need to use multiple motors and provide intuitive user interfaces for driving the motors. As the level amputation increases, the number of motors necessary in the prosthesis increases; but, the muscles from which the control signals can be obtained decreases. Consequently, most available prostheses have limited capability, require extensive pre-usage training and cause in-usage fatigue. This eventually leads to high rejection rate of even advanced prostheses. There is a need to significantly improve the user interaction to enable highly intuitive usage through minimization of active involvement of the user in the control of individual motors. The aim of the proposed work is to develop a system to support autonomous orientation of wrist of a trans-radial prosthetic arm, in the first stage. Subsequently attempt will be made for autonomous movement of the elbow joint of a transhumeral prosthesis for common tasks.

Prof. Sen is a faculty member at CPDM since 1998, when the department was established. He has been engaged in product development predominantly in healthcare and agriculture for the last two decades, apart from his scientific research in human factors, kinematics, and computer-aided design. Four products developed under his supervision have been granted Indian patent; 3 applications are patent-pending. His earlier work on a trans-radial prosthetic arm (patent-pending), PURAK, was funded by the Wellcome Trust (UK) for developing it further to a commercial level product in collaboration with the University of Oxford during 2014-2019. It resulted in the start-up Grasp Bionics (<https://www.graspbionics.com/>), which is currently incubated in SID. Another product for hand-harvesting cotton also led to a start-up, Sickle Innovations (<https://sickle.in/>), now a well-established company, noted for design intervention for improving conventional farming practices for small farmers.

Indian National Academy of Engineering (INAE) awards the Abdul Kalam Technology Innovation National Fellowship. The Fellowship is instituted to recognize the importance of translational research by individuals to achieve excellence in engineering, innovation, and technology development in India. The focus is the realization of application potential, including design and development of a deployable prototype or pilot-scale demonstration that could eventually emerge as a commercialized technology providing a huge benefit to the country. To know more about the Fellowship, see <https://www.inae.in/research-innovation/abdul-kalam-technology-innovation-national-fellowship/>