

## Design and development of force sensor for measurement of tactile friction

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### ABSTRACT

The sense of touch, along with the other senses, decides the perception of world around us. We touch, grip, and wear various products in our day-to-day life, be it the constant interaction we have with our mobile phones, the interaction with various machinery at our workplace or the clothes we wear all the time. It is necessary to quantify these interactions between skin and the product surfaces to be able to design the products for comfortable and desirable experience. Coefficient of friction (CoF) can be a good indicator of frictional characteristics and touch-feel perception of a surface. Friction is the resistance to the relative motion of bodies in contact, when one of the interacting bodies is human finger-pad the friction is termed as tactile friction.

The present work is focused on designing the force sensors for measurement of tactile friction. Strain-gauge based force sensor is studied for its ability to measure CoF and characterize the surface. The observations have been discussed and limitations of strain-gauge based sensors for tactile applications have been highlighted. With focus on better dynamic performance, sensitivity, low cost and simplified manufacturing, Capacitive sensing principle has been selected for force measurement. Design of various mechanical components and selection of electronics used to develop the Parallel-plate Capacitive Normal Force sensor is presented. Experiments done on the sensor for characterization of sensor and measurement of force has been discussed. Based on this experience a 2D force sensor for simultaneous measurement of normal and tangential forces has been designed.

### ABOUT THE SPEAKER

Raghvendra Murdande completed his bachelor's from the Vishwakarma Institute of Technology, Pune. He joined IISc in 2018 and worked with Prof. M S Bobji in Force Microscopy Lab, Department of Mechanical Engineering. His primary research focus is design of instruments for tribological measurements and applications.

