

PROJECT REPORT ON
“EXPERIMENTAL INVESTIGATION ON
PIEZOELECTRIC BASED PROTOTYPE ACTUATOR”

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ABSTRACT

Piezo-actuators are widely used in different engineering applications because of their high dynamic response, higher positioning accuracy, high stiffness and compact design. The displacement of the piezo-actuator which is proportional to the applied voltage is limited which makes them suitable only for micro and nano positioning systems. The present positioning applications demand macro positioning range with micro/nano positioning accuracy.

In the proposed project, an effort is being made to investigate the displacement amplification of a piezo-actuator using hydraulic amplification principle. Hence the objective of this project work is to develop a piezo-actuator with hydraulic displacement amplification mechanism and experimentally investigate its static and dynamic behavior. The actuator connected to a diaphragm is supplied with certain voltage causing displacement. As the actuator displaces, it pulls the diaphragm with it. The oil in between the diaphragm and the piston occupies the displaced volume causing hydraulic displacement of piston upwards. The oil displacement is such that it moves from larger cross-sectional area to smaller cross-sectional area causing amplification of the piston displacement which is recorded using a measuring instrument. This prototype actuator with hydraulic amplification can be used for micro/macro applications widening the limits of the actuator.