Micro Electro Mechanical Systems (MEMS) is a technology of miniaturization that has been largely adopted from the integrated circuit (IC) industry and applied to the miniaturization of all systems (i.e., not only electrical systems but also mechanical, optical, fluidic, magnetic, etc). Miniaturization is accomplished with micro fabrication processes, such as micromachining, that typically use lithography, although other non-lithographic precision micro fabrication techniques exist (FIB, EDM, laser machining). Due to the enormous breadth and diversity of the field of MEMS, the acronym is not a particularly apt one. However, it is used almost universally to refer to the entire field (i.e., all devices produced by micromachining). Other names for this general field include “Micro Systems”. The Applications of MEMS include all the fields from aerospace to bio with various types of MEMS sensors.

In this thesis, a novel proof-mass based structure has been designed, simulated and analysed. The proposed proof mass-based MEMS sensor is to detect very low frequencies i.e 3Hz to 8Hz which is the resting tremor frequency of patients suffering from Parkinson’s Disease.

An approach has been proposed to design a miniaturized MEMS based Sensor to identify Parkinson’s Disease(PD) at an early stage using its tremor frequency 3Hz to 8Hz. To Design and optimise a novel proof-mass based capacitive MEMS SENSOR in terms of dimensions and materials. Simulations on Capacitive MEMS sensor by various structures and materials are done and compared the results with theoretical values of capacitance and voltage. Analysis of capacitance and voltage for proposed sensor is done.

Initially the proposed structure is examined for displacement sensitivity, later a pull in voltage is applied and the output voltage is calculated and measured. Finally, the capacitive actuation has been chosen for analysing the output capacitance.