



## **A PID BASED ANFIS & FUZZY CONTROL OF INVERTED PENDULUM ON INCLINED PLANE (IPIP)**

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*Abstract- The objective of this study is to present an offline control of highly non-linear inverted pendulum system moving on a plane inclined at an angle of  $10^\circ$  from horizontal. The stabilisation was achieved using three different soft-computing control techniques i.e. Proportional-integral-derivative (PID), Fuzzy logic and Adaptive neuro fuzzy inference system (ANFIS). A Matlab-Simulink model of the proposed system was initially developed which was further simulated using PID controllers based on trial and error method. The ANFIS controller were trained using data sets generated from simulation results of PID controller. The ANFIS controllers were designed using only three membership functions. A fuzzy logic control of the proposed system is also shown using nine membership functions. The study compares the three techniques in terms of settling time, maximum overshoot and steady state error. The simulation results are shown with the help of graphs and tables which validates the effectiveness of proposed techniques.*

**Index terms:** PID, ANFIS, fuzzy logic, inverted pendulum, Matlab, simulink.