พิมพ์ต้นฉบับบทคัดย่อวิทยานิพนธ์ภายในกรอบสีเขียวนี้เพียงแผ่นเดียว

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Fuzzy control techniques are implemented on an inverted pendulum system. Both hybrid and fuzzy control schemes are studied and experimented. The controlled motions are devided into 2 paths in both cases. The first path is nonlinear control which covers the motion (θ) range between 150 degrees and 150 degrees measured form the lowest position of the pendulum arm. Both hybrid and fuzzy control schemes have the same fuzzy control algorithm which used for swinging the pendulum arm from lowest position (θ=0) to θ within $\pm$30 degree form upper position (θ=180). The second path is approximated with a linear system which cover the range between 150 degrees to 210 degrees reference from the lowest position of the pendulum arm. For the second path, the linear state variable feedback control base on the pole placement control is used for the hybrid control scheme. For the fuzzy control scheme, both paths are controlled by fuzzy algorithms.

The result from the experiments for both control schemes shown very similar. Less than 2% of 180 degrees of the vertical control for the pendulum arm can be achived. The X position control of the cart has some difficulties because of the mechanical defects such as the alignment among the motor shaft, gearbox and pulley and the elasticity of the sling. These mechanical defects cause the ansymmetrical motion of the inverted pendulum in the vertical plane. The X-position control can be improved as the resolution of the X-axis encoder increased.

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