CHAPTER FIVE

CONCULUSION AND RECOMMENDATIONS

5.1 Conclusion

Modeling of inverted pendulum shows that the system is inherently unstable without applying any external control forces; a full state feedback controller is proposed to swing the pendulum to an upright position. The system is analyzed and stabilized by using pole placement technique, the system considered is completely state controllable then the closed loop poles are placed at desired locations by means of state feedback through an appropriate state feedback gain matrix to obtain stable response.

The system desired performance achieved by choosing a pair of poles as the dominant poles and other remaining poles when the real poles go farther to the left from the real part of the dominant pole so that they are far to the left of the dominant closed loop poles for faster response. The effectiveness of state feedback controller is analyzed using MATLAB/ SIMULINK environment and 'm-File' as a run script for defining plots of response, the physical parameters and control gains. The performance was analyzed by comparing the plots of step response of pendulum's angle and cart's position in versus tests. The results show that the proposed controller specified excellent performance.

5.2 Recommendations

For a future work the following recommendations are hereby made:

-To use fuzzy logic system and comparing the result with pole placement results.

-To use pole placement method for planner inverted pendulum.

References

[1] Johnny Lam,” Control of an Inverted Pendulum”,

[2] Saleem Ata, Jameel Ahmad, **“**Design and Implementation of Control System for Inverted Pendulum”,

[3] Xiumin Diao, Ou Ma,“Rotary Inverted Pendulum **”,** Full Version, July 2006.

[4] Joshua szczudlak, Firas Fasheh, “Pendulum Control”, February 2012

[5] Katsunhiko Ogata,”Modern Control Engineering”, Fourth Edition, Aeeizb, 2002.

[6] Hadi Saadat,”Computational Aids in Control Systems using MATLAB**”,** McGraw-Hill.1993

[7] Richard C. Dorf, Robert H. Bishop,” Modern Control Systems”, Twelfth Edition, Prentice Hall, 2010

[7] Khalil Sultan” Inverted Pendulum, Analysis, Design and Implementation”, IIEE Visionaries**,** Document Version 1.0, July 2003.