CHAPTER 6: CONCLUSION

6.1 Conclusion

The first half of this thesis discusses the principle of operation of CW laser diodes, focussing on the need for a driver to operate the diode. The typical reasons for the failure of the diode including electrical transients, ESD, and temperature effects are reviewed as part of the process of designing a suitable laser diode driver. The process of selection of the various components of the laser diode/fiber system is presented. The fabrication of the laser system and its evaluation are discussed. The 690 nm laser system that is developed has a power output of 15.435 mW and a coherence length of 8 mm. The system is delivered to DCS Corporation to be used in their Areal Mapper.

The second half of this thesis discusses the design of the driver for the SLM used in the LIM. The principle of operation and the device characteristics of the SLM selected for the LIM are described. The experiments performed to evaluate the SLM-beamsplitter combination and their results are discussed. The design of the various subsystems of the SLM driver including the hardware and software interface is analyzed. The wire-wrap board implementation of the driver is delivered to DCS Corporation for evaluation.

6.2 Future Work

A crucial feature that affects the commercial viability and usefulness of the LIM system is its output power. The power output of the LIM depends on the power output from the laser source and the power efficiencies of various optical subsystems used in the LIM. Building a high power laser source is one of the solutions to improve the power output from the LIM. The output power from the laser system designed in this thesis is 15mW. Using a high power laser diode and improving the efficiency of the coupling system will increase this output power. Use of a high power diode might result in the need for a detailed design of a heat sink to keep the temperature within allowable limits. This might lead to an increase in the size of the laser

system. Hence, care should be taken to maintain the size of the laser system to a minimum while the power output is increased.

The performance of the LIM can be improved by increasing the array size of the SLM used. Increase in array size leads to an increase in the information contained within a given area and consequently improves the accuracy of the system. Use of a higher array size SLM might result in the increase in the LIM, which is not desirable. Thus, any future design might incorporate an SLM with an improved performance but of a smaller size compared to the one that was used in this thesis.