

CHAPTER 5

CONCLUSION AND SUGGESTION

5.1 Conclusion

Emergency door car entry system can be implemented using FPGA board. The design is using Altera Quartus II. The structure of the code itself mainly depends on the design requirements. This project has utilized the process design and simulation over simulation. A vast research on security methods had been done for ideas on design. This gave a lot of useful information not only on the study, but also on information gathering.

Realizing the design ideas into source code requires a lot of knowledge on Verilog syntaxes. Past reference books and related library books were used to advance the level of Verilog skills. The project had been carried out from software to hardware which depicts the real circuit easily. Although there are some disadvantages using the board, due to unfamiliarity with the board, it had somehow an effective way to apply theoretical knowledge into reality, using the simplest method, FPGA board.

A complete version of the auto keyless entry system has been designed. It is proven that it meets the earlier determined requirements, in terms of entry method, security level, and ease of use for end users. The hardware simulation runs properly, which depicts the real circuit is going to be ready for further expand or upgrades.

5.2 Recommendation for Future Project

In order for further improvement of this work, a few complementary and follow-ups have been proposed by the author, as follow:

- i. Application of proposed circuit models in simulating biometric based entry method.
- ii. Add alarm for false input.
- iii. Multi user support for a single security system.
- iv. Wireless entry system with cost effective components.
- v. Authorization and authentication based system, which determines the level of the accessed user's power.
- vi. Adding EEPROM as a memory holder for FPGA.
- vii. Add more output function, such as to run the car without any key, making the car itself keyless.

5.3 Commercialization Potential

The auto keyless entry system is a marketable product. It can fit the majority lines of already existing security system. However, a good marketing strategy is required for it to take place in the marketing world.

5.3.1 Advantages

The main attraction for the product is the cost is very much low yet effective. It is due to the simple design but covers all the most important issues in security world. FPGA is programmable making it easy to reconfigure the circuit without having to redo the wiring of the whole car's system. The system itself is compatible with most modern cars. It can be integrated with the internal car security system to work together for a better security and function.

It is designed to work well in any environment, since the general pins can be connected to almost any access zone. The buttons can be planted at the car's door. Almost anyone can use the product and due to its simplicity, anyone is able to use it on the fly.

The system itself is expandable since it is programmed on field programmable chip, programmers can expand the function of the chip to upgrade the function, if one requires functions that is not available on the product. Upgrades such as increasing user limit are among the functions that can be improved.

FPGA requires maximum 5V to run itself. This uses the least battery power to operate the system. It generates very little heat with low current flows through it. This could help added functionality but not heat in the car, which will be an added bonus for end user.

5.3.2 Strategy for Commercialization

The emergency door car entry system is a product with potential for commercialization, if chance is given to it. However, a good strategy must come up to expose the product to the market world. This involves financial, strategy selection and even business philosophy.

5.3.2.1 Financial

Plans are nothing. Planning is everything. There must be strategies to commercialize the product. The first thing to start a research or product development is concerning about financial. There is the Small Business Innovation Research (SBIR) for financial support. There are more than ten agencies in the SBIR, making it is possible to get their attention on the product.

Since they provide phased project financial support, the first phase will be covered with conceptual development. The given time for conceptual development is from one to six months, with the grant of \$100,000. Proceeding after Phase I is Phase II, which is for Prototype Development. The given time range is two years, with the grant of \$750,000.

For cases of SBIR is not interested, there are some other financial resources. Using equity method is best for entrepreneurs. This is a technique where the resources are among venture capitals, business angels, corporations and investment bankers. It mainly relies on a very good referral network in order to get their confidence for the product's potential.

5.3.2.2 Strategy Selection

It is always about risk. The iterative strategy which requires build and test can be used. Errors can happen at any stage but they can be minimized after each tries. There might be some who likes the product and some may not and that is when the outset is need to be articulated. Revisit it as the additional market data is collected. There might be some facts missing that could be useful for the competence of the product, for example. Revisit can also be done during negotiations with partners or even investors, just to gain feedback during the mean time.

5.3.3 Factors That Affects Commercialization Strategy

Among the factor that affect commercialization strategy is current situation of the marketplace. The financial strength must be powerful. The product itself must be able to sustain competitive rival with its own advantages. Market readiness must also be considered. Also, there are risks on market, management and technology, for its pace is very fast in these days.

5.3.4 Competitors

There are competitors as the new product is trying to take a place in the market. This somehow could be the advantage since it gives the opportunity for the product to show its strength. It should also broaden the customers' base since they are given more choice than ever, since the product itself must be totally different and unique than other line ups. Other than that, this could also give a new opportunity of new services that could be provided for customers, such as after sale service and product's installation and management.

5.4 Summary

Overall, this emergency door car entry system has the potential for commercialization. With the strategies for commercialization given, there are chances for the product to be introduced to the market and line itself with other products of security. Aspects that have been covered are financial support, risk, strategy method selection and even handling competitors.