CHAPTER-7

CONCLUSION AND FUTURE SCOPE

The current research work is focused on four objectives mentioned in chapter-1. The first objective was modelling of sensor nodes to authenticate the ignition of two- wheeler, which is achieved by implementing the hardware through microcontroller and FPGA. The performance summary is discussed in chapter-5 & 6 (Result Analysis). Also hardware modelling is done with LabVIEW interfacing and complete system were analyzed with the help of LabVIEW GUI.

The second objective was circuit simulation and performance analysis of the model which was achieved through Proteus simulation software. Performance analysis of designed system was achieved with the help of LabVIEW and IoT, which was discussed in chapter-3 & 4.

The third objective was prototype development of the designed model, which was successfully done and an intelligent helmet was developed. Three sections were developed- Helmet section and two-wheeler section and server, which were discussed in chapter-3 & 6.

The fourth objective was testing of developed prototype, which is discussed in Chapter-5 & 6. The system is tested on age group of 18-25 years for a span of approximately one year at different time slots and weather conditions.

All the four objectives has been achieved successfully and research publications were done during the research duration, which has been discussed in chapter-8 to support the validity and novelty of the research work.

Major outcomes and future scope for the developed system are discussed in this chapter for both the approaches taken for the current work.

7.1 Major Outcomes

The focus of the developed system is to provide an authentic and practical solution to the two-wheeler, in the form of an intelligent helmet to ensure the safety of driver.

- A new approach in terms of intelligent helmet has been developed for ignition of the engine of vehicle.
- A precaution against theft has been incorporated in the developed system by introducing RFID based authentication.
- The hardware simulation of the developed system was carried out with Proteus.
- The emulation of the Proteus model with LabVIEW was done using VSPE.
- LabVIEW GUI for analysis and data logging has been designed for the system for short range and IoT server has been developed for the same to access the data from anywhere in the world.
- The experimental research has been carried out for the age group of 18-25 years in order to calculate the threshold level of flex sensors, which is observed as 1.03V.
- The controller for helmet and two wheeler sections has been designed to upgrade the speed as 781.250MHz and lowering the chip area using Vertex 5 FPGA.

7.2 Conclusion and Discussion

The primary focus of the developed system is to solve the problem of increase in severe head injuries causing deaths due to not wearing helmet by the driver.

It is observed from the literature that although studies have been carried out for depicting statistical data on the death caused by accidents because of abnormal road conditions, weather conditions and effect of training on road safety, but no literature has been found on designing of the device to restrict the use of two wheeler by denying access to ignition.

The current thesis suggests development of an intelligent helmet which allows the driver to ignite the engine of vehicle only if he/she is wearing the helmet. The system is also equipped with RFID reader to provide access only to the authenticated user. Two-wheeler will be ignited only if AND operation on threshold value of helmet and RFID card gives 'one' as output.

An optimal solution for increasing the speed and lowering the size has been implemented with Vertex5 FPGA and frequency of 781.250MHz is achieved.

The system is user friendly, safe and easy to use. The system can be used in smart cities.

7.3 Novelty

- The novelty of the current work is a new approach towards safety of two-wheeler drivers in form of an 'Intelligent Helmet'.
- The novelty of the hardware system is that the authentication to start the two wheeler is done on the bases of calculated threshold value for the age group of 18-25 years.
- The novelty of software system is a new packet format with unique ID for RF module, which is used for communication between helmet and two wheeler sections.
- The sensory data is analyzed with the help of LabVIEW and IoT server in order to determine the threshold value for individuals.
- A hardware system has been developed for realizing the entire system which operates on 16 MHz. To optimize the developed system in term of size and speed, the system has synthesized in high speed Xilinx Vertex5 FPGA with the frequency 781.250 MHz.

7.4 Future Scope

In the future IoT based system can be designed to calculate threshold value of sensor to detect the accident and generate alert signal from anywhere of the world. Network Security can also be proposed by using Encryption/ Decryption

technique. Life time and material analysis of helmet can be done. Accident Impact analysis can also be incorporated in the future research. emergency message facility to some pre-defined numbers in case of accident can also be implemented with the system to make it more useful.