CHAPTER THREE

SYSTEM DESIGN

3.1. Overview

This chapter explainsthe approach taken in order to achieve the objectives of this project and how the project is completed.

3.2 System Block Diagram

Block diagram of Figure 3-1 shows the components of the system and the way they are connected.

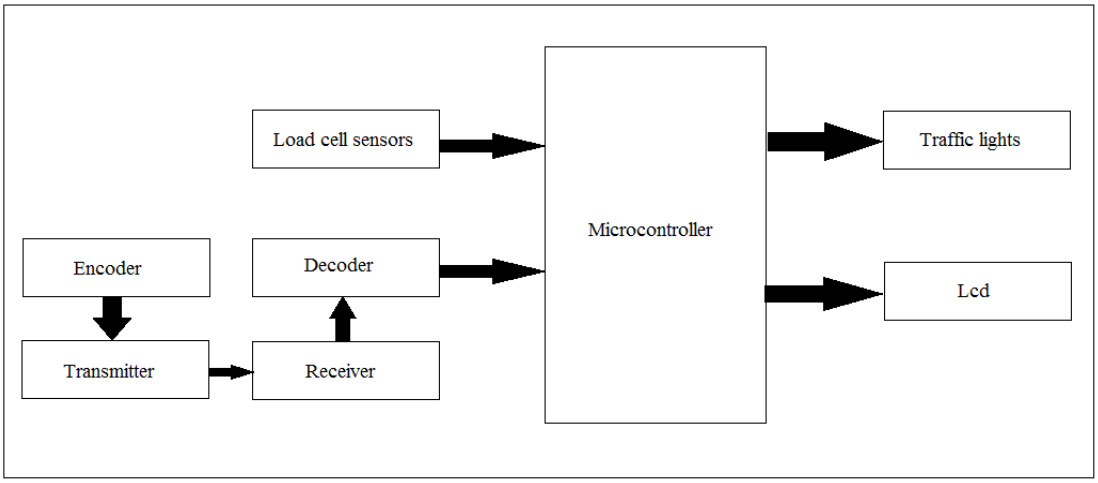

Figure 3-1: System Block Diagram.

Load cell sensor: to calculate the density of the road by converting the force to levels of voltages.

Microcontroller: to read analog values of voltages from sensors and convert it to digital form then applies fuzzy rules.

Transmitter, Receiver, Encoder and Decoder: represent RF circuit which used for emergency cases.

LCD: To display all of the activities that the microcontroller is working on.

3.3 Pins Configuration

Table 3-1 shows theATMEGA16 microcontroller pins that are used in the system.

Table 3-1: ATMEGA16 Pins in System Function

Pin	**Function**
40	Sensor 1input
39	Sensor 2 input
38	Sensor 3 input
1	D7 of LCD
2	D6 of LCD
3	D5 of LCD
4	D4 of LCD
5	D3 of LCD
6	D2 of LCD
7	D1 of LCD
8	D0 of LCD
37	E of LCD
36	RS of LCD
32	Connected to VCC (AREF)
22	Output of traffic light 1

23	Output of traffic light 1
24	Output of traffic light 1
25	Output of traffic light 2
26	Output of traffic light 2
27	Output of traffic light 2
28	Output of traffic light 3
29	Output of traffic light 3
14	Output of traffic light 3
18	Output of decoder
19	Output of decoder
20	Output of decoder
21	Output of decoder

3.4. System Design

The objective of this project is implementation of an intelligent traffic light controller. The system works as follows:

In this project three Load Cell sensors are used, thesesensors have been put on specific distance from the traffic light; when the vehicle has pressed the sensor that means the Wheatstone bridge is non-equilibrium because of changing in variable resistance, thenATMEGA16 microcontroller receives the signals from sensors and converts it from analog form to digital form, and changes the traffic light status according to fuzzy rules. A transmitter placed on an emergency vehicle transmits a signal to the receiver positioned at the traffic lights whenever it is on emergency mode. This received signal interrupted microcontroller and changed the sequence of the output.There is

intersection of three roads, road A has the highest priority, B has the medium priority and C has the lowest one. A load cell sensor positioned in each road. Traffic lights sequence change depending on the signals from load cell sensors or RF circuit.When there is no emergency the traffic lights change according to the density of each road.When logic state 1 is on that means ATMEGA16 microcontroller has been interrupted which is an interrupt service routine or ISR, is a call back function in microcontroller firmware (ignore sensors information) and an emergency vehicle in one of the roads is detected. When logic state 2 is on, emergency vehicle in road A. When logic state 3 is on, emergency vehicle in road B .When logic state 4 is on, emergency vehicle in road C. In case two or more states are on at the same time the road selected according to their priorities.

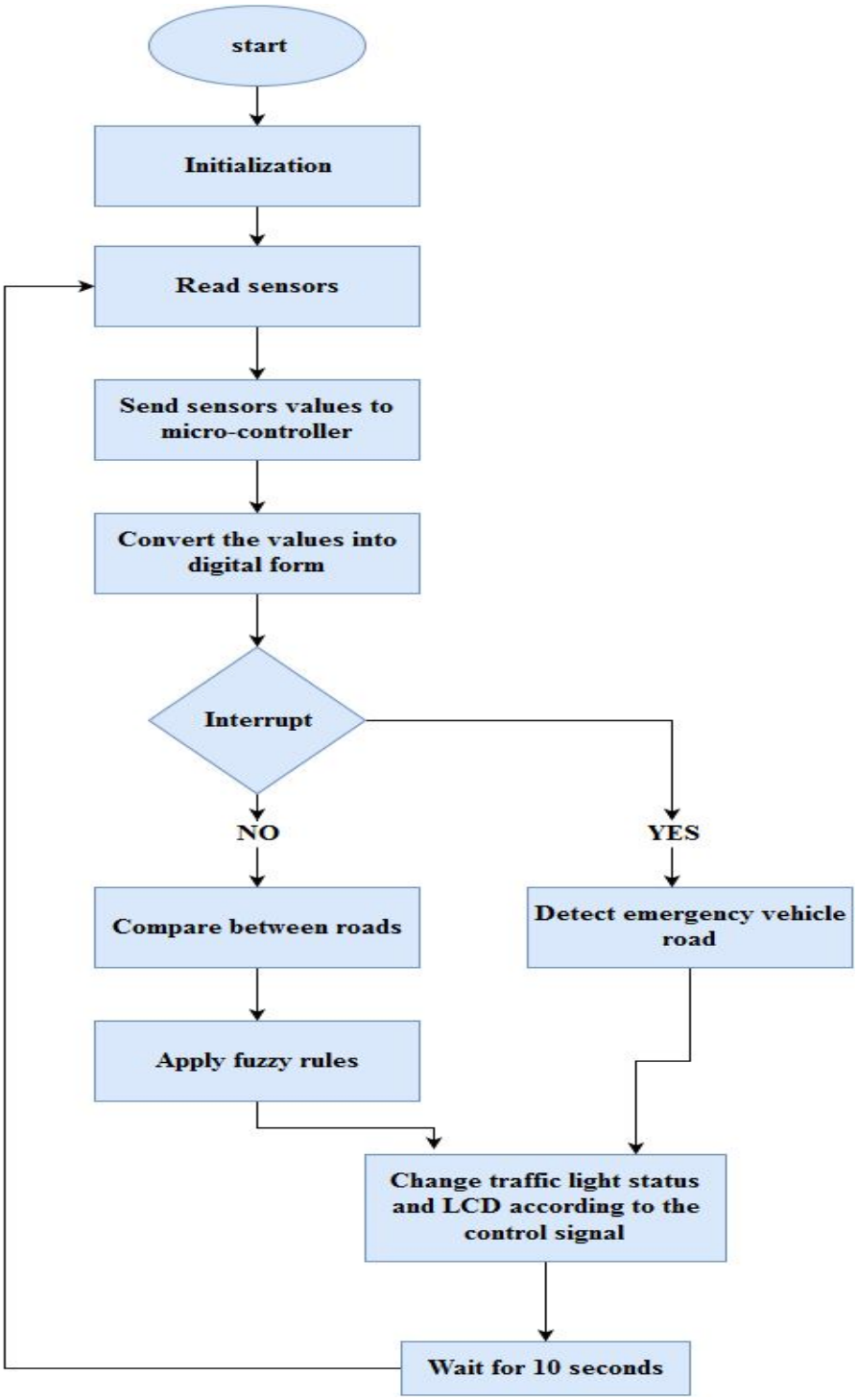

Figure 3-2: System Flow Chart.