

CHAPTER 4

ANALYSIS AND DESIGN

4.1 Analysis

This project is automatically determine the vehicle class by counting the number of tire axles. Sensor will be used in project is Laser detector, LDR sensor, IR obstacle, LCD display, Servo, Ultrasonic sensor.

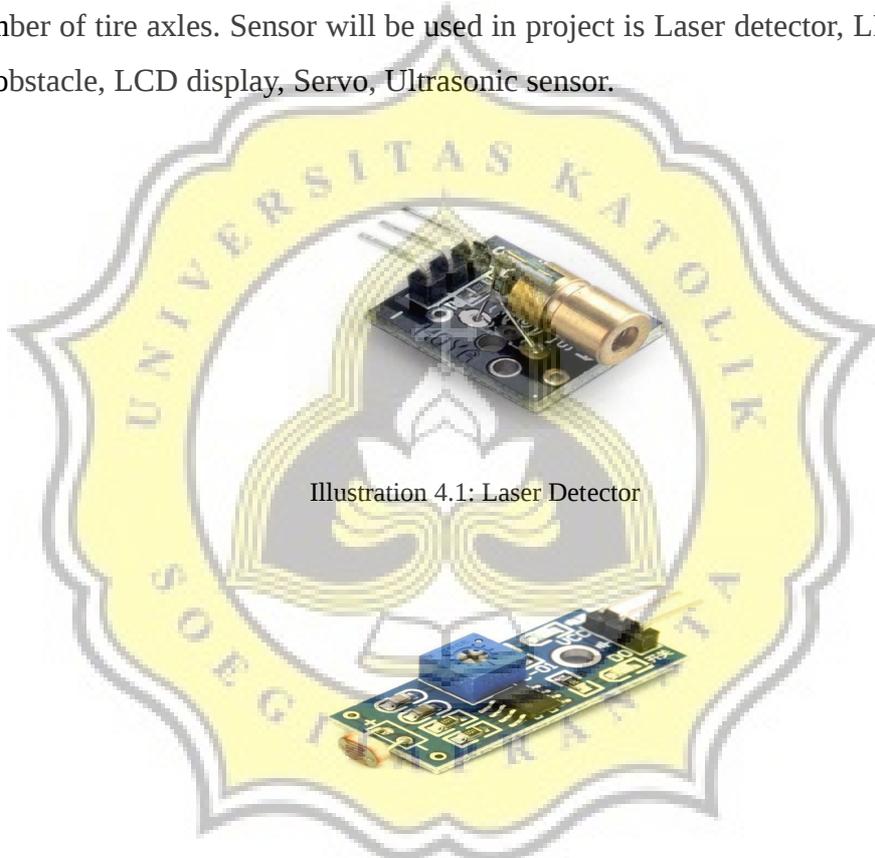


Illustration 4.1: Laser Detector

Illustration 4.2: LDR sensor

Laser detector (figure 4.1) is a device that emits electromagnetic radiation. Light from the laser can be seen or can not be seen by humans. In this project laser detector will be used to emit light into LDR sensor. The laser detector to be used is a laser ky008. Laser ky008 already module to connect into Arduino uno Mikrokontroler, ky008 has 3 pins are vcc, gnd and output.

LDR sensor (figure 4.2) is a type of resistor whose resistance value is influenced by light, Then LDR can be used as a light sensor. LDR sensor can be disconnect and connect the power supply based on received light. LDR sensor resistance value will reach 200 Kilo Ohm ($k\Omega$) in dark conditions and decrease to 500 Ohm (Ω) on brigh condition. In this project LDR will be to catch light from laser, to detect if a vehicle passes through a toll gate.

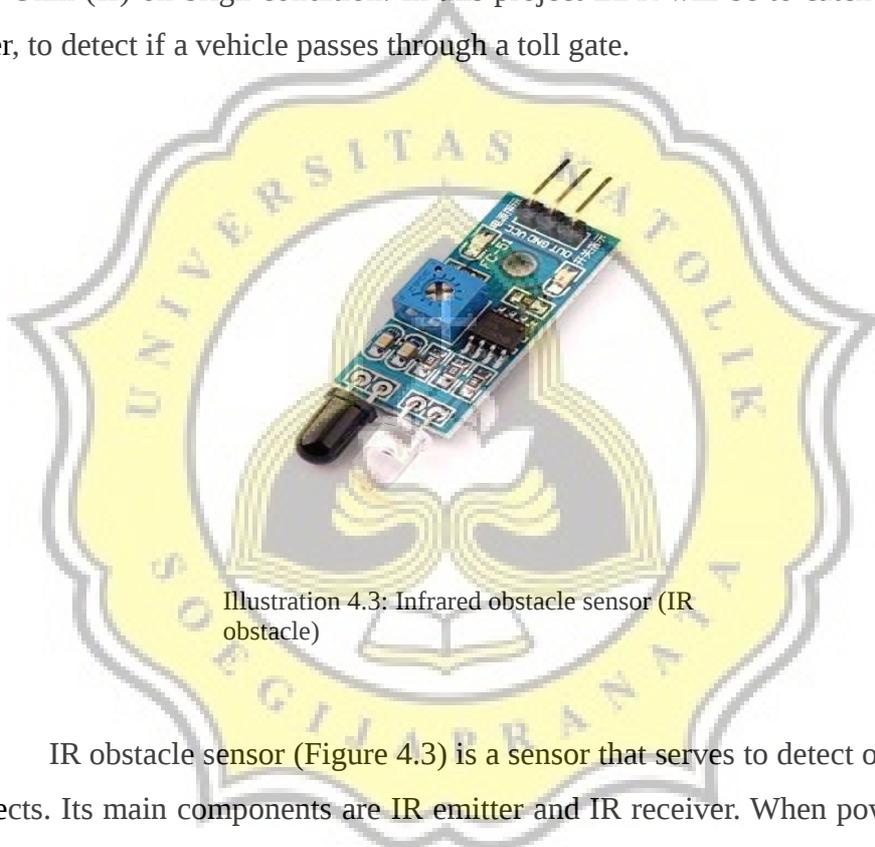


Illustration 4.3: Infrared obstacle sensor (IR obstacle)

IR obstacle sensor (Figure 4.3) is a sensor that serves to detect obstacles or objects. Its main components are IR emitter and IR receiver. When power-up, the IR emitter will emit infrared light, then the light will be reflected by the object in front of it, then it will be received by IR receiver. In this project the IR obstacle will be used to calculate the number of vehicle axles entering the toll gate. IR obstacle has three pins vcc, gnd and output (pin)

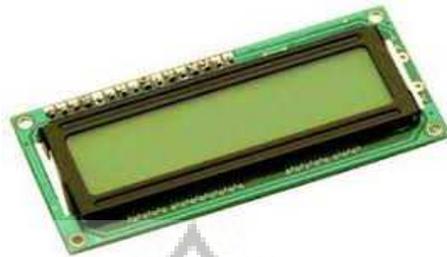


Illustration 4.4: LCD display

LCD (Liquid Crystal Display) is a type of display media that uses liquid crystals as the main part. The LCD can display the information read by the sensor without having to open the serial monitor. In this project LCD can be display result from IR obstacle.

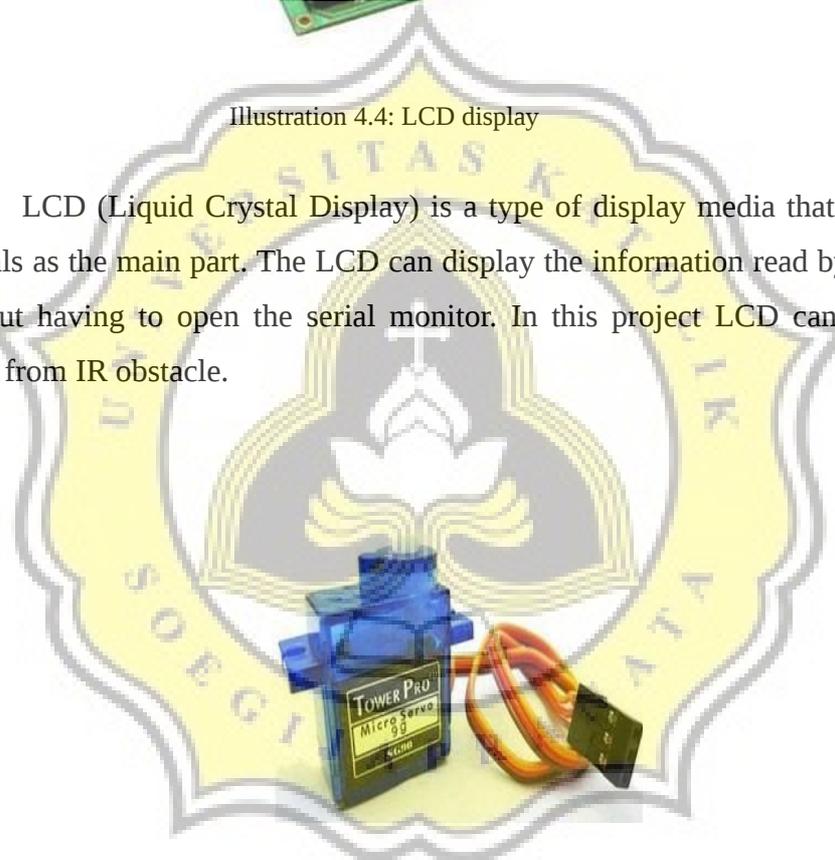


Illustration 4.5: Servo motor

Servo motor is a device designed with a control system so it can be set-up to determine the angular position of the motor output shaft. Part of servo motor are DC motor, series of gear, control circuit and potentiometer. Servo will be used as exit gate toll, servo will be connected with ultrasonic if there is vehicle out then angle servo will change to 90 degree. If there is no vehicle then the servo is at 0 degrees.

4.2 Design

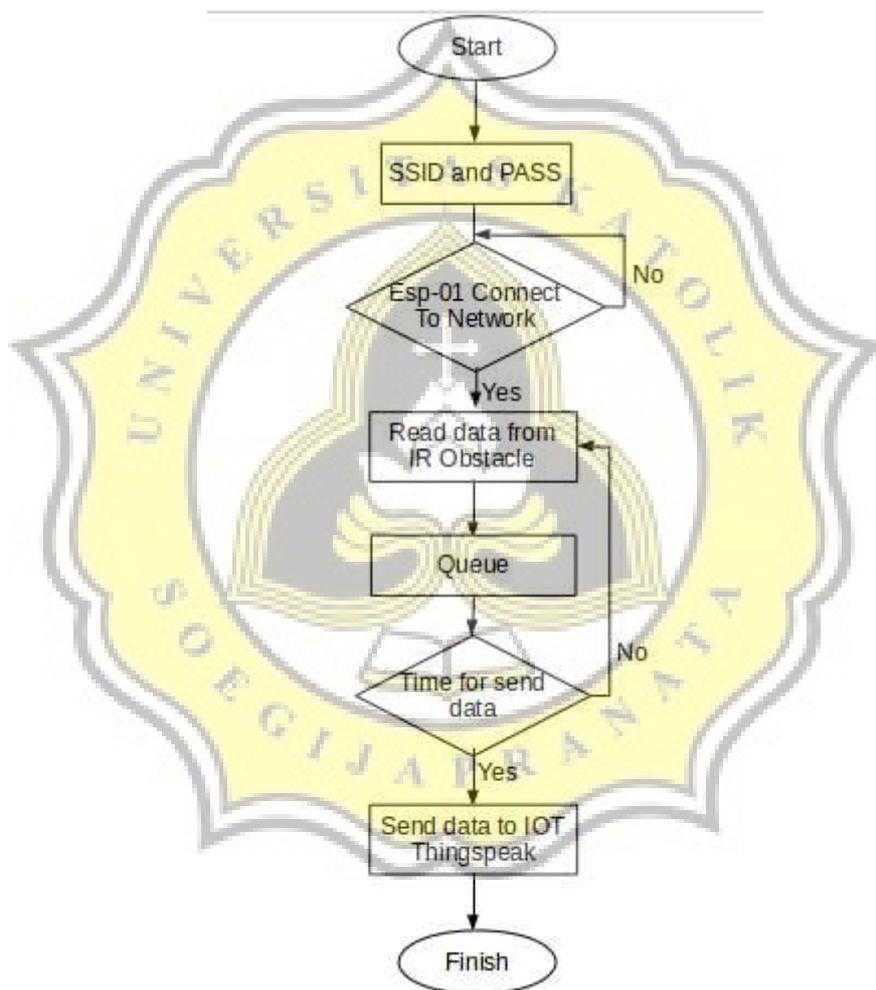


Illustration 4.6: Flowchart program

Illustration 4.6 is a flowchart program, first the sensor will be read from the vehicle entering the toll gate. IR obstacle sensor will count the number of

vehicle tire axes. The data read by the sensor will enter into arduino microcontroller. The LCD will display readable data from the IR obstacle sensor, LCD is useful to display data readable by the sensor that allows users to view the data. if the vehicle has passed the obstacle IR sensor and data information appears to the LCD, the servo motor control will be active when the vehicle will exit the toll gate then the door will open. Data from IR obstacle will be sent to IOT server Thingspeak, then Esp-01 should get internet network to be able to connect with server Thingspeak, if it is connected with the Thingspeak server, the data from IR obstacle can be sent.

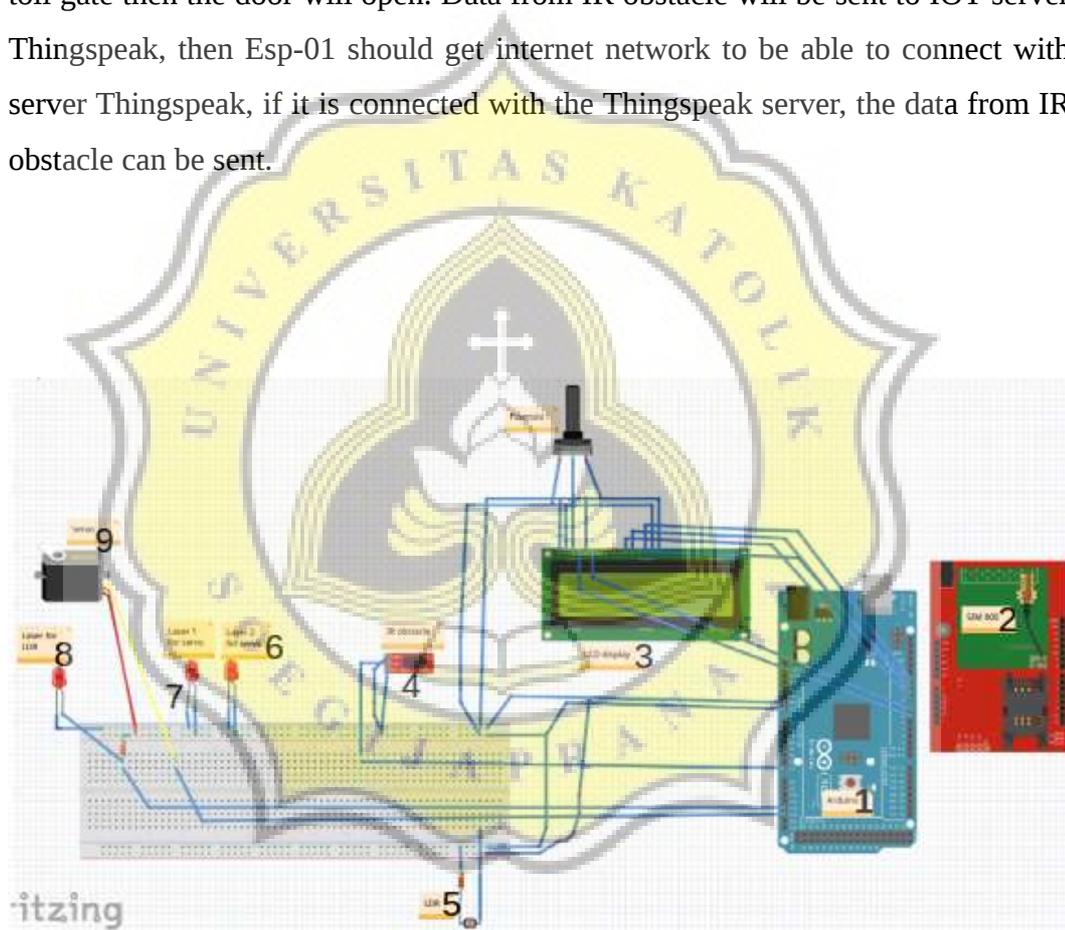


Illustration 4.7: Assembly of all sensors

Illustration 4.7 is the assembly of all sensors used in this project, the sensors are assembled using different pins. In this project requires precision to assemble all the sensors used, because the sensors are used a lot and interconnected.

Information :

1 Arduino microcontroller

2 Esp-01

3 LCD display

4 IR obstacle

5 LDR

6 Laser 1 for servo

7 Laser 2 for servo

8 Laser for LDR

9 Servo

