An AEM Course Project Report on

Speed Detection Using IR Sensor

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

BACHELOR OF TECHNOLOGY IN

"Instrumentation and Control Engineering"

OF

VISHWAKARMA INSTITUTE OF TECHNOLOGY

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UNDER THE GUIDANCE OF

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DEPARTMENT OF ENGINEERING SCIENCES AND HUMANITIES

BANSILAL RAMNATH AGARWAL CHARITABLE TRUST'S

VISHWAKARMA INSTITUTE OF TECHNOLOGY

(An Autonomous Institute affiliated to Savitribai Phule Pune University)

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CERTIFICATE

This is to certify that the Course Project titled "Speed Detection Using IR Sensor" submitted by Sanskruti Ruyarkar(12410726), Ayush Sahare(12410399), Samruddhi Shinde (12412444) , Samyak Malame (12411018) , Sameer Sangewar (12413944) is in partial fulfillment for the award of Degree of Bachelor of Technology in **Dept of Engineering , Sciences and Humanities of Vishwakarma Institute of Technology, Savitribai Phule Pune University**. This project report is a record of bonafide work carried out by him under my guidance during the academic year 2024-25.

Guide:
Prof. Shrikant S Joshi
Place: VIT, Pune
Date:29/5/2025

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PROJECT SYNOPSIS

Group No :3

Members: 5

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Academic Year: 2024- 25

Project Title: Speed Detection Using IR Sensor

Internal Guide: Prof. Shrikant S Joshi

Signature of Internal Guide

INTRODUCTION

This project is based on Speed Detection Using IR Sensors, developed as part of the AEM subject. Speed detection using IR sensors placed on one side of the road is a non-intrusive method to measure vehicle speed. Two sensors are aligned at a fixed distance, and when a vehicle passes by, it triggers the sensors sequentially. The time difference between the triggers is used to calculate speed using the formula: Speed = Distance ÷ Time. This setup is simple, cost-effective, and ideal for roadside speed monitoring.

COMPONENTS

- Arduino Uno: Acts as the main controller to process sensor input and control outputs.
- IR Sensors (x2): Detect the passing object to measure the time taken between two points.
- 16x2 LCD with I2C: Displays the calculated speed and system status clearly.
- Green and Red LED: Indicate normal and overspeed conditions respectively.
- Resistors (x2): Protect LEDs by limiting the current flow.
- Jumper Wires: Connect all components for signal and power transmission.

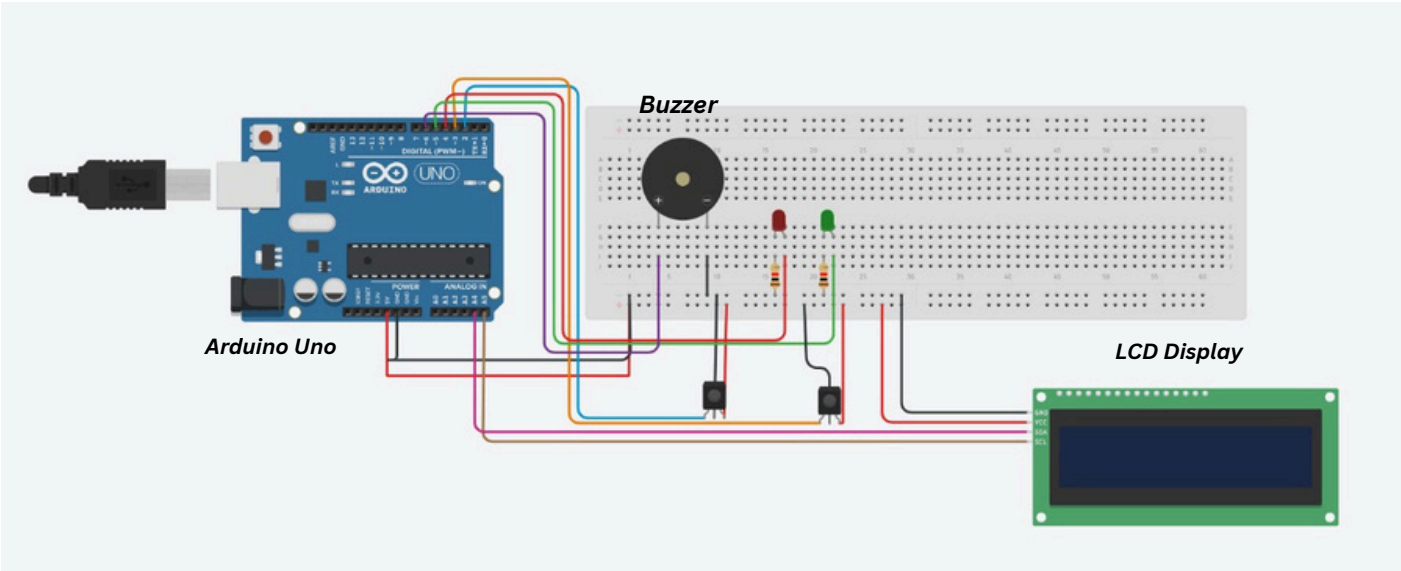
CIRCUIT DESCRIPTION

- IR Sensors (IR1 and IR2): Connected to pins D2 and D3 of the Arduino; placed at a fixed distance to detect when an object passes each sensor.
- LEDs (Red and Green): Connected to pins D4 and D5; red LED indicates overspeed and green LED indicates normal speed.
- Buzzer: Connected to pin D6; activates to alert when the object exceeds the speed limit.
- 16x2 I2C LCD: Connected via SDA (A4) and SCL (A5); displays the calculated speed and any warning messages.
- Power Supply: All components are powered by the Arduino’s 5V output, typically supplied through USB.

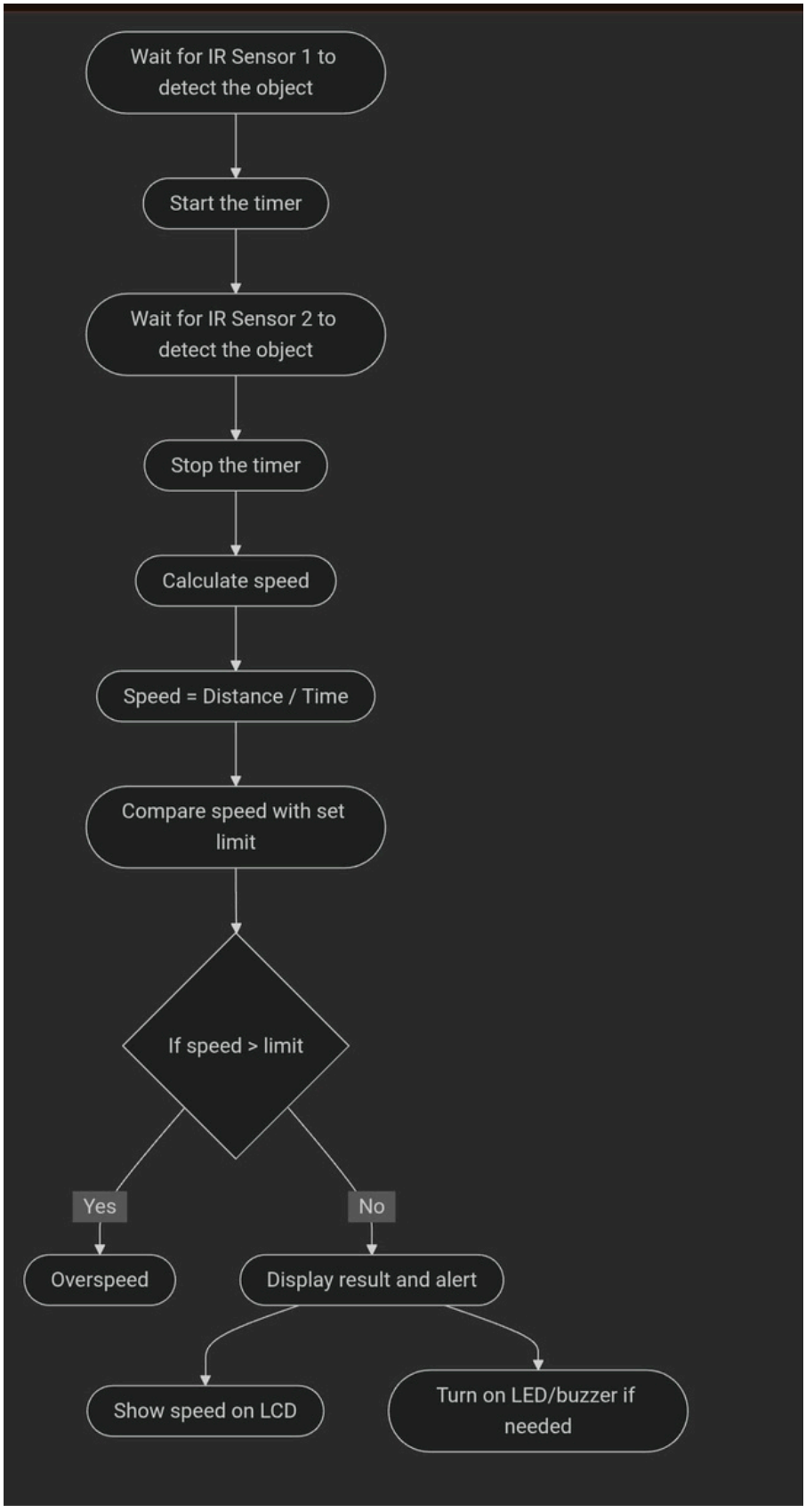
COMPONENTS CONFIGURATION

Component	Type	Power (VCC/GND)	Signal Pins	Interface/Protocol	Arduino Pin	Notes
IR Sensor (Left)	Digital Input	5V, GND	OUT	Digital I/O	D7	Pull-up enabled, triggers LOW
IR Sensor (Right)	Digital Input	5V, GND	OUT	Digital I/O	D8	Pull-up enabled, triggers LOW
LCD 16x2	I2C Output	5V, GND	SDA, SCL	I2C	A4 (SDA), A5 (SCL)	Address: 0x27 (default)
Green LED	Digital Output	GND (via 220Ω)	Anode	Digital I/O	D2	ON = System normal
Red LED	Digital Output	GND (via 220Ω)	Anode	Digital I/O	D3	ON = Sensor triggered
Arduino Uno	Controller	5V (USB/DC)	Digital/Analog I/O	-	-	Clock: 16MHz, 5V logic

CIRCUIT DIAGRAM



ALGORITHM


Wait for IR Sensor 1 to detect the object
Start the timer
Wait for IR Sensor 2 to detect the object
Stop the timer
Calculate speed
Speed = Distance / Time
Compare speed with set limit
If speed > limit
Yes
No
Overspeed
Display result and alert
Show speed on LCD
Turn on LED/buzzer if needed

APPLICATION

- Traffic speed monitoring and vehicle detection
- Speed measurement in sports training (e.g., runners or cyclists)
- Safety systems in elevators and automated doors
- Animal movement tracking in wildlife research or farms
- Drone speed monitoring during flight tests or competitions

CONCLUSIONS

Speed detection using IR sensors is an efficient, low-cost, and non-contact method suitable for a wide range of applications. By placing two sensors on one side of the road, accurate vehicle speed can be measured without disrupting traffic flow. The system is easy to implement and maintain, making it ideal for both temporary and permanent installations. With advancements in technology, it can be integrated with IoT and AI for smarter and more automated traffic management solutions.

FUTURE SCOPE

In the future, IR sensor-based speed detection systems can be enhanced with wireless communication, AI, and IoT for real-time data processing and smart traffic management. Integration with cloud platforms could enable remote monitoring and data analysis. These advancements can lead to more efficient, automated, and intelligent transportation systems.