detection using Arduino

Abstract

The safety of railway transportation heavily depends on the timely detection of track defects, which, if left unnoticed, can lead to severe accidents and loss of life. This project presents a cost-effective and efficient **Railway Track Crack Detection System** based on **Arduino**. The system employs **Infrared (IR) sensors** to identify cracks or gaps on the railway tracks. When a discontinuity is detected, the system immediately alerts through a **visual LED indicator**, ensuring real-time feedback.

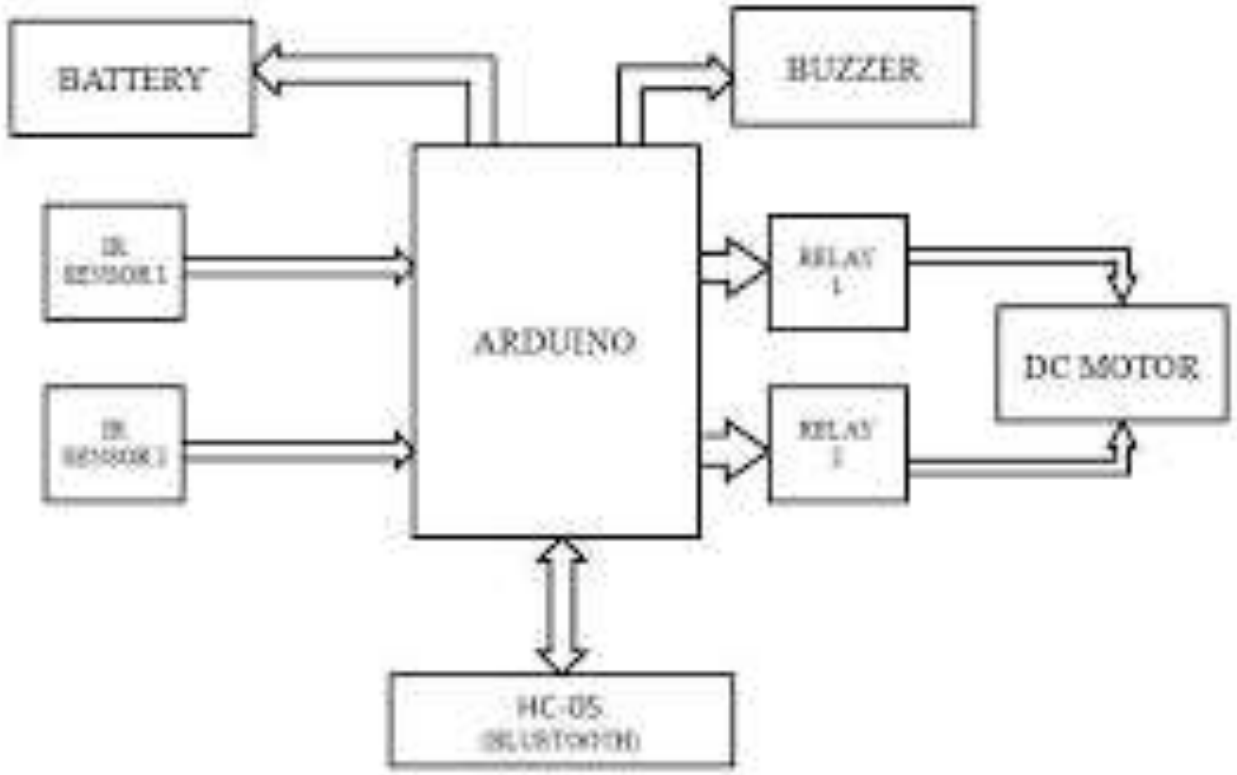
A **DC motor-driven robot** traverses the track autonomously, continuously scanning for surface-level defects. Unlike complex systems involving GPS and GSM modules, this project focuses on a simplified, educational approach ideal for demonstration and prototype testing. The system is powered by a rechargeable battery pack and is built on a lightweight chassis to simulate real-world operation.

This project aims to offer an affordable and scalable solution for railway inspection tasks, especially in developing regions, and serves as a foundational prototype for more advanced IoT and machine learning-based safety systems in the future.

Introduction

- Railway track failures are a major cause of train accidents, often resulting from undetected cracks or gaps. Traditional inspection methods are manual, time-consuming, and prone to error. This project introduces a simple, Arduino-based automated system for detecting cracks on railway tracks using IR sensors. The system alerts with an LED when a crack is found and moves autonomously using a motor-driven chassis. Designed as a low-cost prototype, it demonstrates how embedded systems can enhance railway safety through real-time defect detection.

Architectre of the system



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