REPORT

Laser-Based Security System

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* Abstract

This project presents a low-cost laser-based security system that uses Arduino Uno and a GSM module for intrusion detection and alerting. The system is designed to detect unauthorized movement by monitoring a laser beam targeted at an LDR sensor. When the laser is interrupted, the Arduino triggers the GSM module to send an SMS alert. The project offers a basic yet effective approach for securing areas like homes, banks, and vaults using easily accessible hardware.

* Introduction

Problem Statement:

Security in homes and sensitive locations is essential. Traditional systems can be expensive and complex.

Objectives:

Detect any breach in the laser line.

Alert the user immediately via GSM-based SMS.

* Scope:

Designed for indoor security systems.

Does not use facial recognition or advanced tracking.

* Importance:

Affordable, easy to implement, and scalable for small security setups.

3. Background and Literature Review

Existing systems often use motion detectors or high-end CCTV systems.

Laser-LDR based solutions provide a budget-friendly alternative.

Previous studies focus on infrared detection; this system uses visible laser and GSM communication.

4. Methodology

Technology Stack:

Hardware: Arduino Uno, LDR, Laser Module, GSM Module (SIM800/900), resistors, mirrors.

Software: Arduino IDE (C Programming)

System Design:

Block Diagram: Arduino → LDR Sensor + Laser → GSM Module

Flow: Laser hits LDR → Laser breaks → Arduino reads change → GSM sends SMS

Implementation:

1. Laser continuously hits the LDR.

2. When the beam is interrupted, LDR resistance changes.

3. Arduino detects this change via analog pin (A0).

4. GSM module is triggered via serial communication to send SMS.

Hardware Setup:

LDR + 10k resistor in voltage divider configuration.

GSM module powered by external 5V supply.

Reflectors placed to expand coverage.

Software Integration:

Arduino code reads analog value from A0.

If the value drops below a threshold, it sends a serial command to GSM to send an alert.

5. Results

Testing:

Beam interruption reliably detected.

SMS received within 2-3 seconds.

Performance:

High accuracy in indoor conditions.

False alarms reduced using a narrow LDR tube.

Outcome:

Project met all basic objectives.

(Include your actual project photos here)

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6. Discussion

Observations:

Laser and LDR work well in low to moderate light.

GSM module needed a stable 5V power source.

Challenges:

Aligning the laser accurately.

GSM delays in poor signal conditions.

Learnings:

Hands-on experience with sensors and serial communication.

Importance of power management in hardware projects.

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7. Future Work

Add a buzzer for local alert.

Use multiple lasers/LDRs to protect more zones.

Add a camera or IoT support (e.g., ESP32)

. Conclusion

This project shows how simple electronics can create an effective security solution. It’s affordable, scalable, and suitable for small spaces. The system can easily be expanded with more features like IoT monitoring or voice alerts.