

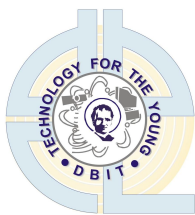
# Indoor Surveillance Bot



*A Report Submitted*  
*as Requirements for the Mini Project 1B Course of*  
**Semester IV, AY 2023-2024**

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**2023-24**



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## **Certificate**

This is to certify that the Mini project entitled **Indoor Surveillance Bot** is a work of

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"Semester IV" in "Second Year of Engineering AY 2023-2024".

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## **Mini Project 1B Report Approval**

This Mini project report entitled ‘ **Indoor Surveillance Bot**’  
by **Aakash Belgaonkar, Aryan Arde , Aditya Dabhade  
and Kartik Dandelia** is approved for the completion of Mini  
Project 1B course of **Sem IV of AY 2023-2024** in **Dept. of  
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### **Examiners**

1. \_\_\_\_\_

2. \_\_\_\_\_

Date :06/05/2024

Place : **Kurla, Mumbai**

# Abstract

An indoor surveillance bot is designed to autonomously monitor indoor spaces, ensuring security and safety. It utilizes a combination of sensors such as cameras, motion detectors, and microphones to gather real-time data. The bot employs advanced algorithms for object recognition, anomaly detection, and behavior analysis to identify potential threats or irregularities. It can send alerts, record footage, and even communicate with authorized personnel or other smart devices. Overall, the indoor surveillance bot enhances security measures by providing continuous monitoring and rapid response capabilities.

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# Chapter 1

## INTRODUCTION

### 1.1 Project Motivation

The motivation behind the indoor surveillance bot project is to enhance security and safety in indoor spaces. By using advanced technologies such as sensors, modules, and real-time analysis, This proactive approach to surveillance can help prevent incidents and ensure a safer environment for occupants [1].

#### 1.1.1 Applications

The applications of an indoor surveillance bot are as follows:

**Mobility and Flexibility:** Unlike stationary cameras, surveillance bots can navigate indoor spaces autonomously, providing dynamic and flexible coverage. They can cover wide range of area by enhancing the overall security.

**Remote Monitoring:** Surveillance bots equipped with wireless communication capabilities allow for remote monitoring and control. Users can access live video feed and control the bot's movements from a remote location via a user-friendly interface, enhancing convenience and accessibility.

**Ethical and Legal Compliance:** Implementation of privacy measures to ensure compliance with regulations and protect the privacy of individuals in monitored indoor spaces.

Integration of security features to prevent unauthorized access to the bot's controls, video feed, and data storage systems [2].

## 1.2 Project Objective

**Real-Time Monitoring:** With onboard sensors and cameras, surveillance bots can provide real-time data from indoor environments.

**Cost-Effectiveness:** Surveillance bots can potentially reduce the cost of deploying and maintaining multiple stationary cameras in large indoor areas. A single bot equipped with multiple sensors can cover a larger area efficiently, reducing the need for additional infrastructure.

**Versatility:** Indoor surveillance bots can be deployed in various indoor environments, including homes, offices, warehouses, hospitals, and educational institutions. They can adapt to different layouts and configurations, making them suitable for diverse applications [3].

### 1.2.1 Project Outcomes

Functional Indoor Surveillance Bot: Design and implementation of a fully functional indoor surveillance bot

Integration of hardware components (chassis, motors, sensors) with software algorithms

Performance Testing and Optimization: Conducting thorough performance testing to evaluate the surveillance bot's functionality, reliability, and accuracy in real-world scenarios.

Iterative optimization of hardware components, software algorithms, and system configurations to improve overall performance and efficiency. Object Detection Development of computer vision algorithms for accurate and efficient object detection in indoor environments.

### **1.3 Scope of the Project**

Home Security Helps in Monitoring homes for intruders or unusual activities while providing peace of mind to homeowners.

Business Security helps in Protecting offices, warehouses, and retail spaces from theft, vandalism, or unauthorized access.

Elderly Care for Keeping an eye on elderly family members to ensure their safety and well-being.

Camera Module: A camera module in indoor surveillance systems captures high-resolution video footage of monitored areas, providing visual evidence and enabling remote monitoring. It's essential for real-time surveil-

lance, identifying intruders, and ensuring security in indoor environments.

# Chapter 2

## Project Implementation

### 2.1 BLOCK DIAGRAM

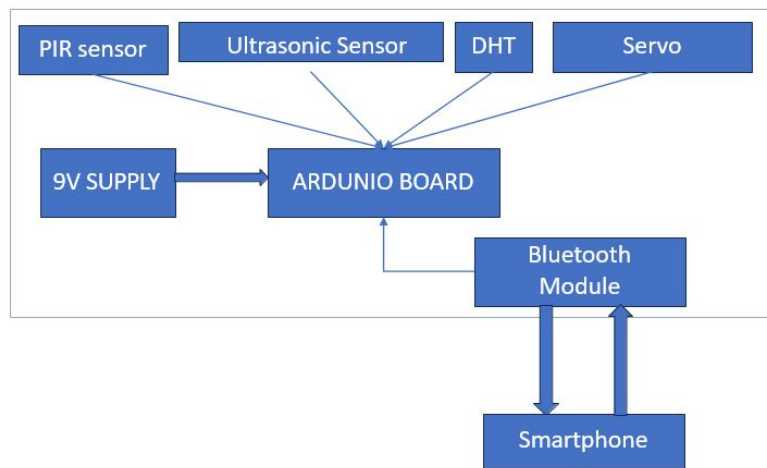


Figure 2.1: Block Diagram of Indoor Surveillance Bot

The block diagram explains about the working of the indoor Surveillance bot and the functioning of each sensor and modules that are used for building up this project. The following explanation is about the working of each sensor.

**PIR Sensor:** PIR sensors in indoor surveillance detect motion and occupancy changes via infrared radiation, enabling motion-triggered alarms, adjusting environmental systems, and facilitating activity monitoring or anti-

tampering measures. They're crucial for enhancing security and functionality in indoor spaces.

**Bluetooth Module:**A Bluetooth module in indoor surveillance systems facilitates wireless communication between devices, allowing for remote control and data transfer. It can be used for connecting sensors, cameras, or control units, enhancing the flexibility and scalability of the surveillance system.

**DHT:**The DHT sensor is a versatile component used in indoor surveillance systems to measure temperature and humidity levels. It provides real-time data that helps in monitoring environmental conditions and ensuring optimal comfort and safety within indoor spaces.

**Servo Motor:**A servo motor is used to move the bot in clockwise and anticlockwise direction and to take right-left turns.

**Ultrasonic Sensor:**An ultrasonic sensor is used to measure the distance upto a distance of 3cm [4].

## 2.2 Circuit Diagram

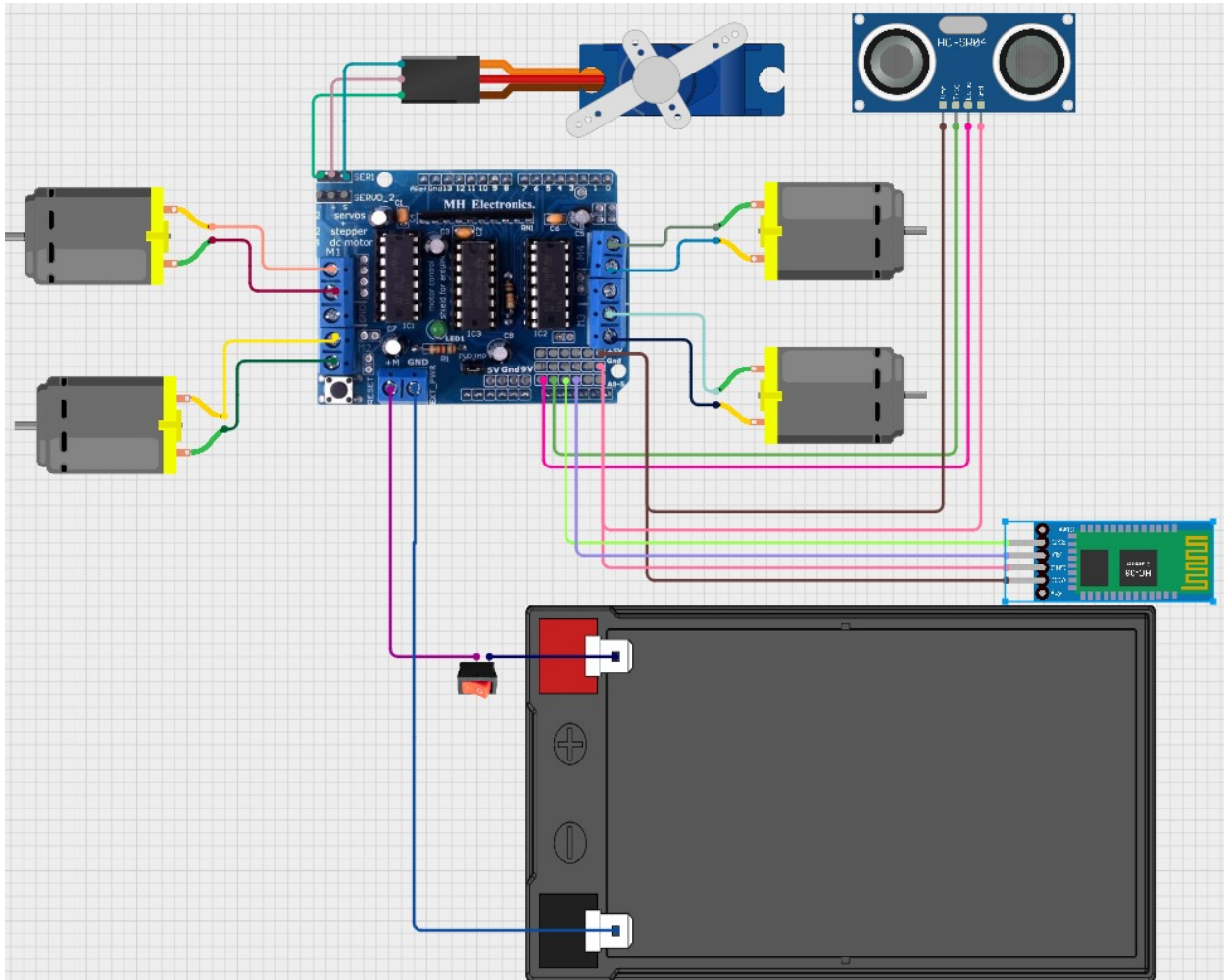


Figure 2.2: Circuit diagram of Indoor Surveillance Bot

## 2.3 List of Components

Table 2.1: List of Components

Component	Specification	Quantity	Price in Rs
Arduino MEGA	Microcontroller	01	240
DHT11	Temperature Sensor	01	60
Hc-sr04	Ultrasonic Sensor	01	40
HC-SR501	PIR Motion Sensor	01	60
ov7670	Camera Module	01	140
SG90	Sevo Motor	01	150
Motor Sheild	L293D	01	125
LED	5V SUPPLY VOLTAGE	01	05
Jumper Wires	-	30	100
Chassis	-	01	100
Buzzer	6V DC	01	10
Motor	3-12V DC	04	50
Bluetooth Module	HC-05	01	199
Total			1279

# Chapter 3

## Results

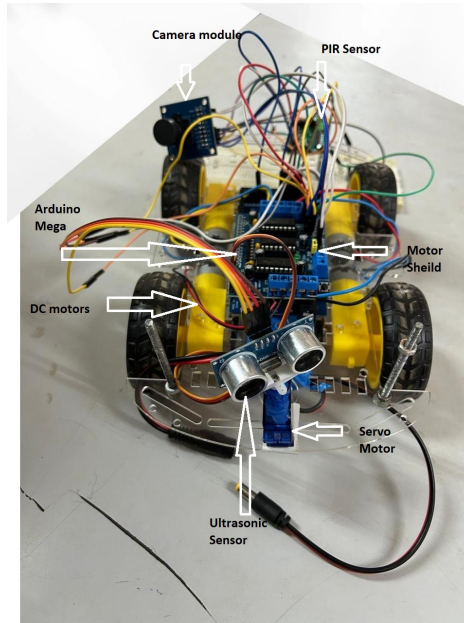


Figure 3.1: Working Indoor Surveillance Bot

Refer to figure 3.1 The indoor surveillance bot comprises of various sensors such as an ultrasonic sensor, motion detector that is PIR sensor and various other modules. The aim of this bot is the security and safety of the indoor environment. Identify potential security threats, and trigger alerts. Its robust design ensures reliable performance in diverse conditions. It provides an extra layer of security for vulnerable populations, such as the elderly or disabled, by ensuring their environments are monitored and secure.

# Chapter 4

## Conclusion

In conclusion, the project for developing an indoor surveillance bot is aimed at significantly enhancing security and safety within indoor environments. By using technologies such as PIR sensors for motion detection, camera modules for visual surveillance, Bluetooth modules for wireless communication, and DHT sensors for environmental monitoring, the surveillance bot offers comprehensive monitoring capabilities. These functionalities combined with intelligent algorithms enable real-time detection of threats, efficient data collection, and swift response mechanisms. Overall, the indoor surveillance bot project contributes towards creating secure, smart, and efficient indoor spaces.

# Bibliography

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- [3] Donato Di Paola, Annalisa Milella, Grazia Cicirelli, and Arcangelo Distante. An autonomous mobile robotic system for surveillance of indoor environments. *International Journal of Advanced Robotic Systems*, 7(1):8, 2010.
- [4] Narra Sai Krishna, Anand George, Arlene John, and AP Sudheer. Controller design for a skid-steered robot and mapping for surveillance applications. In *Proceedings of the 2017 3rd International Conference on Advances in Robotics*, pages 1–7, 2017.

# Appendix A

## Datasheets

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#### 4.0 PRODUCT SPECIFICATION AND LIMITATIONS

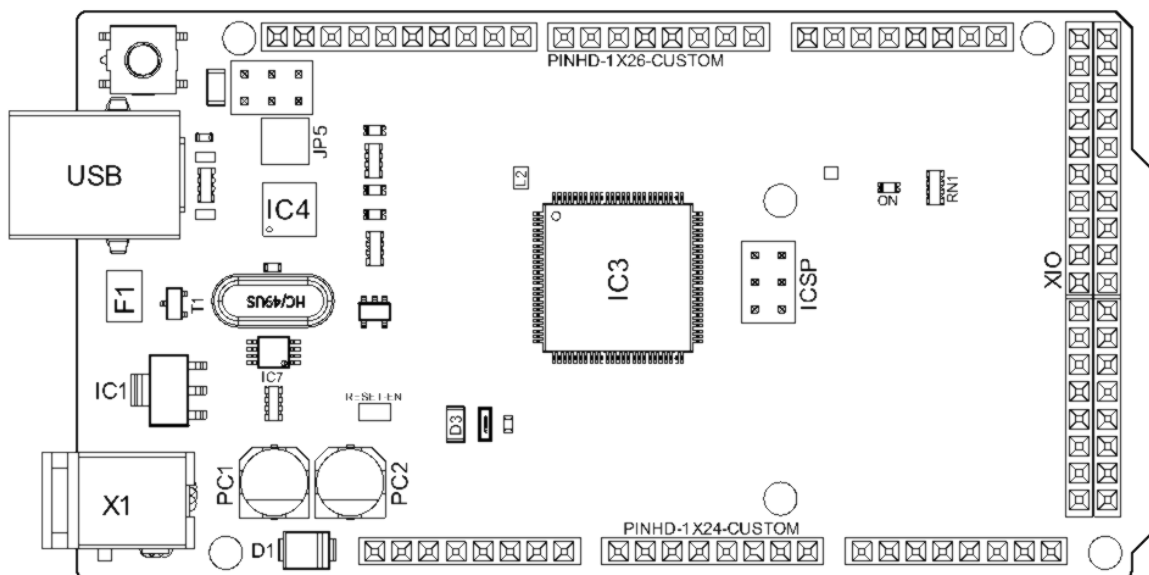
Parameter	Min	Typ.	Max	Unit
Operating Voltage	4.50	5.0	5.5	V
Quiescent Current	1.5	2	2.5	mA
Working Current	10	15	20	mA
Ultrasonic Frequency	-	40	-	kHz

## Detailed Specifications:

Parameters	Conditions	Minimum	Typical	Maximum
<b>Humidity</b>				
<b>Resolution</b>		1%RH	1%RH	1%RH
			8 Bit	
<b>Repeatability</b>			± 1%RH	
<b>Accuracy</b>	25°C		± 4%RH	
	0-50°C			± 5%RH
<b>Interchangeability</b>	Fully Interchangeable			
<b>Measurement Range</b>	0°C	30%RH		90%RH
	25°C	20%RH		90%RH
	50°C	20%RH		80%RH
<b>Response Time (Seconds)</b>	1/e(63%)25°C , 1m/s Air	6 S	10 S	15 S
<b>Hysteresis</b>			± 1%RH	
<b>Long-Term Stability</b>	Typical		± 1%RH/year	
<b>Temperature</b>				
<b>Resolution</b>		1°C	1°C	1°C
		8 Bit	8 Bit	8 Bit
<b>Repeatability</b>			± 1°C	
<b>Accuracy</b>		± 1°C		± 2°C
<b>Measurement Range</b>		0°C		50°C
<b>Response Time (Seconds)</b>	1/e(63%)	6 S		30 S

## 3.2 Board Topology

### Front View



Arduino MEGA Top View

Ref.	Description	Ref.	Description
USB	USB B Connector	F1	Chip Capacitor
IC1	5V Linear Regulator	X1	Power Jack Connector
JP5	Plated Holes	IC4	ATmega16U2 chip
PC1	Electrolytic Aluminum Capacitor	PC2	Electrolytic Aluminum Capacitor
D1	General Purpose Rectifier	D3	General Purpose Diode
L2	Fixed Inductor	IC3	ATmega2560 chip
ICSP	Connector Header	ON	Green LED
RN1	Resistor Array	XIO	Connector