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# NIGHT VISION PATROLLING ROBOT

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**ABSTRACT:** Security is one of the main problem at present surrounding. So, we proposed a security patrolling robot. The Night Vision Patrolling Robot (NVPR) is a cutting-edge autonomous robotic system designed to enhance security and surveillance operations during low-light or night time conditions. utilizing an Arduino Uno, camera module, sound sensor, ultrasonic sensor, motor driver, motors, and buzzer. The proposed robot is designed to autonomously patrol a designated area and capture images and videos of the area using the camera module. patrolling robot, it covers some certain area, if it detects any unwanted activities, it sends warning to the user. The buzzer is included to provide an audible alarm in case of any significant disturbance in the patrolling area. The robot is designed to move around and change directions using the motor driver and motors, which are operated by an Arduino Uno. This robot combines advanced technologies, including infrared imaging, machine learning algorithms, and autonomous navigation, to provide an effective and reliable solution for safeguarding critical areas, such as industrial facilities, military installations, and public spaces, when visibility is limited. the potential to improve the efficiency and effectiveness of night patrolling operations. The proposed system is developed at a low cost, making it accessible to a wider range of users. The user can controlled robot using application.

**KEYWORDS:** NVPR, Low-Light conditions, Night Vision, Surveillance, Remote Monitoring And Control, Infrared camera.

## I. INTRODUCTION

Robotics is one of the advanced technologies in this generation Robotics is one of the rapidly growing fields in today technology. Night vision patrolling robots are autonomous or semi-autonomous robotic systems equipped with night vision technology to enhance surveillance and patrolling capabilities in low-light or night time conditions. These robots play a vital role in various sectors, including law enforcement, military, security, and industrial applications, where monitoring and patrolling during the night are crucial. To do some basic surveillance-based activities like women safety, patrolling in assigned area, line following and other such things, so we need to design a robot which is cheap and efficient. Therefore, we go for this Arduino based robotic system. Night vision patrolling robots are designed to perform surveillance, reconnaissance, and security tasks during night time or in low-light conditions. Their primary objective is to enhance situational awareness, monitor areas that are difficult for humans to access or patrol, and provide real-time data for decision-making.

## II. PROBLEM STATEMENT

Traditional surveillance systems often lack adaptability and cost-effectiveness, especially in low-light conditions. This project aims to leverage Arduino-based technologies to design and implement a Night Vision Patrolling Robot capable of autonomous navigation, obstacle detection, and efficient surveillance during the night. Night time patrolling often exposes security personnel to higher risks, such as encounters with intruders or dangerous conditions. Creating night vision patrolling robots helps minimize these risks by allowing remote monitoring and intervention instead of placing humans in potentially hazardous situations.

### OBJECTIVES OF THE PROJECT:

1. Enhanced Surveillance:  
Night vision patrolling robots are equipped with infrared or low-light cameras, enabling them to monitor areas with limited visibility, such as dimly lit streets, dark alleys, or remote locations during the night.

2. Remote Monitoring:  
These robots can be controlled remotely, allowing operators to navigate them through areas without human presence, providing real-time video feedback to the operator station.
3. Detection of Intrusions:  
With the help of motion sensors or infrared sensors, these robots can detect movements or heat signatures, alerting operators to potential intrusions or unauthorized activities in secured premises or sensitive areas.
4. Data Collection and Reporting:  
Equipped with data logging capabilities, these robots can record various parameters such as patrol routes, encountered obstacles, and detected anomalies, providing valuable data for analysis and future planning.
5. Cost-Effective Solution:  
Compared to manned patrols or stationary surveillance systems, deploying night vision patrolling robots can be a cost-effective option in the long run, requiring minimal manpower and offering continuous monitoring capabilities.

## SCOPE OF PROJECT

The scope of a night vision patrolling robot project encompasses a diverse range of applications with significant potential across various industries. Primarily designed for nocturnal operations, this robotic system holds promise in enhancing security and surveillance efforts. It can be deployed for safeguarding environments such as warehouses, factories, and expansive facilities during the night, offering a proactive approach to threat detection and response. In law enforcement, the robot becomes a valuable asset for patrolling areas with limited visibility, providing real-time video feeds and augmenting situational awareness during nighttime operations. The project's scope extends to search and rescue missions, aiding in locating missing persons or navigating through disaster-stricken areas with compromised visibility. Additionally, industries such as wildlife monitoring, border patrol, and environmental conservation stand to benefit from this technology, utilizing the robot to observe nocturnal wildlife, secure borders during the night, and monitor protected ecosystems. Customization for specific industries, integration with cutting-edge technologies, and considerations for remote inspection further amplify the project's potential impact, making it a versatile solution for addressing challenges associated with nighttime patrolling and surveillance.

## EXISTING SYSTEM:

- 1) TALON (QinetiQ North America):  
TALON is a widely known and versatile military robot capable of performing various missions, including reconnaissance, surveillance, and explosive ordnance disposal. It can be equipped with night vision cameras and other sensors for night operations.
- 2) Guardian S (SMP Robotics):  
Guardian S is an autonomous outdoor security robot designed for patrolling large areas. It features advanced sensors, cameras, and night vision capabilities to enhance surveillance during the night.
- 3) K5 Autonomous Data Machine (Knightscope):  
The K5 is an autonomous security robot designed for patrolling and monitoring large public areas. It utilizes sensors, cameras, and real-time analytics to provide a comprehensive security solution, including night vision capabilities.

4) RoboteX Avatar III (RoboteX):

The Avatar III is a tactical robot designed for surveillance and reconnaissance in challenging environments. Equipped with various sensors, cameras, and night vision technology, it provides operators with critical information during nighttime operations.

**LIMITATIONS OF THE SYSTEM:**

1. Reliability :

The reliability of a modular Android-controlled system depends on the quality and compatibility of the individual modules. If one module fails or malfunctions, it can affect the entire system's performance

2. Limited Expansion:

Modular systems may have limitations in terms of expandability. Adding new modules or upgrading existing ones may not always be straightforward or cost-effective.

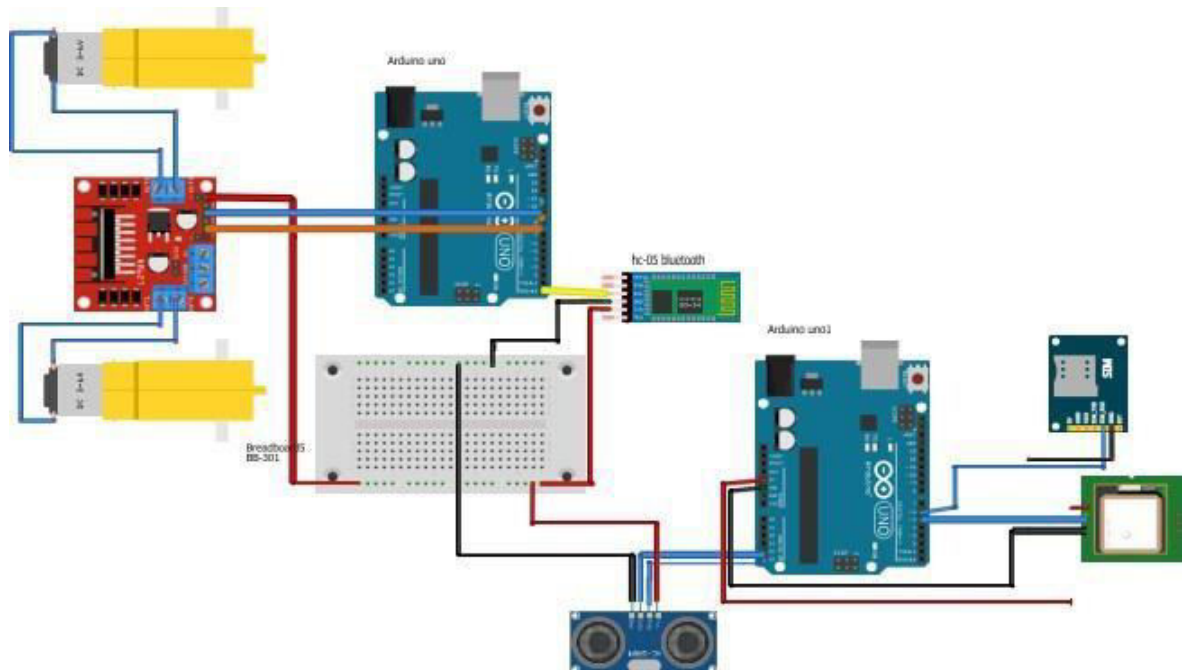
3. Integration Complexity:

Integrating multiple modules into a cohesive system can be complex, requiring expertise in both hardware and software. This complexity can lead to longer development times and potential integration issues.

4. Battery Life :

Android devices used as part of the modular system may have limited battery life, which can impact the robot's ability to operate for extended periods without recharging

**III. SYSTEM ARCHITECTURE**



System Architecture

#### ADVANTAGES:

##### Accuracy:-

Night vision patrolling robot ensures continuous surveillance during night time, improving security And allows sending message for the human detection.

##### Rapid Response:-

Enable the Night vision Patrolling Robot to quickly detect and respond to security threats, minimizing potential damage or theft

##### Environmental Adaptability:-

The Night vision patrolling robot can operate in various weather conditions and terrains, making it suitable for a wide range of applications and environments.

##### Remote Monitoring and Control:-

Security personnel can remotely control NVPRs and access real-time data, including live video feeds and sensor information. This remote access allows for more efficient resource allocation and faster response times.

##### Human risk is decreased:-

By replacing or assisting human security personnel during night time patrols, NVPRs contribute to reducing the risks associated with human presence in potentially dangerous or poorly lit areas. This is especially important for safeguarding the safety of security personnel

##### Cost Efficiency Over Time:-

NVPRs, once deployed, can be cost-effective over time compared to maintaining a human security presence during nighttime hours. They do not require overtime pay, and their maintenance costs are generally lower than hiring additional personnel.

#### IV. CONCLUSION

In conclusion, it may be a good idea to use night patrolling robots to complement security patrols. In this project, the model of robot can be described to build a robot using night vision camera run by application, robotics and wireless technologies. An embedded system based on Arduino, GSM module with GPS is designed and created to send an emergency message. Utilizing the idea of IOT, it takes care of the issue of restricted degree perception. Thus, this Robot is little in scale and moves into domains where human access is unthinkable. We can use android applications to control the robotic vehicle. We can try to sum up other features like recording audio and video. The main purpose of this project is to ensure safety and security and achieve cost-effective and user friendly device.

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