A PROJECT REPORT

ON

"Surveillance SPY ROBOT"

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SUBMITTED BY

Name of Student	Enrollment No.
1. Ahirrao Pankaj Dnyaneshwar	2001300132
2. Bhandari Vardhaman Sunil	2001300135
3. Bhor Aniket Vijay	2001300136
4. Godalkar Vishal Santosh	2001300152
5. Barmecha Jai Rupesh	2001300156

GUIDED BY

Mr. N.B. Nake

GOVERNMENT POLYTECHNIC AHMEDNAGAR

DISTRICT AHMEDNAGAR

MAHRASHTRA

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GOVERNMENT POLYTECHNIC

AHMEDNAGAR

CERTIFICATE

This is to certify that the project report entitled "Surveillance SPY ROBOT" was successfully completed by Student of sixth semester Diploma in Computer Engineering.

1) Ahirrao Pankaj Dnyaneshwar (.........)

2) Bhandari Vardhaman Sunil (.................)

3) Bhor Aniket Vijay (.................)

4) Godalkar Vishal Santosh (.................)

5)Barmecha Jai Rupesh (................................)

in partial fulfillment of the requirements for the award of the Diploma in Computer Technology/Engineering of Government Polytechnic Ahmednagar work carried out during a period for the academic year 2022-23 as per curriculum .

(Mr. N.B. Nake)   (Mr. S. D. Muley)
        Guide   HOD, Department of Computer
                                                            Engineering

(Mr.B.M.Kardile)   External Examiner
        Principal
Government Polytechnic Ahmednagar

ACKNOWLEDGMENT

(Students Name and Signature)

Ahirrao Pankaj Dnyaneshwar

 Bhandari Vardhaman Sunil

 Bhor Aniket Vijay

Godalkar Vishal Santosh

Barmecha Jai Rupesh

ABSTRACT

A robot is an integration of mechanics, electronics and software. Robot is a kind of machine that performs very complex & multiple tasks by the instructions that is stored on a programmable device automatically or by giving instructions externally. It needs an interfacing device such as Bluetooth, Wi-Fi, ZigBee etc. SPY robot is all about developing a wireless surveillance robotic vehicle which can navigate through obstacles with the help of sensors, embedded system and its programming.

It will be able to capture the footage or pictures of area with its camera eye and send them back using wireless transmission technology such as Bluetooth. Spy robot can be controlled with the help an app of Android phones. Raspberry-Pi based microcontroller is used for instruction processing and giving proper instructions. Bluetooth technology is used to interface between Raspberry-Pi and Android

Keywords – Surveillance, Raspberry-Pi. Microcontroller, SPY Robot, Wireless Camera, Bluetooth, IOT.

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CHAPTER 01

INTODUCTION

1.1 Overview

The main goal of this project development for mobile operated spy robot using Raspberry pi microcontroller. In this spy robot, the camera was mound to operate the vehicle, which acquires and sends video to mobile. The movement of vehicles is controlled by a microcontroller and camera. Our idea is to make a robot to tackle the hostage situation & the worst conditions which cannot be handled by a human being. The hostage humans are moved out from direct exposure to potentially dangerous situations. The robotic system can perform many security and surveillance functions more effectively than humans.

1.2 Objective

The objective for the surveillance SPY Robot project is to design and develop a mobile robot that can autonomously navigate in an indoor environment and perform various tasks related to surveillance and security. The robot should be able to detect obstacles, communicate with a remote operator, and transmit video data in real time. The robot should be stealthy, robust, and adaptable to different scenarios and situations. The project aims to demonstrate the feasibility and potential of using robots for surveillance and security applications in various domains such as military, law enforcement, industrial, and domestic.

Purpose of the report

The purpose of this report is to present the design and implementation of a surveillance SPY Robot using Raspberry Pi. A surveillance SPY Robot is a Mini-Computer that can perform remote monitoring and reconnaissance tasks in various environments. The Raspberry Pi is a low-cost, single-board computer that can run various operating systems and applications. The report will describe the hardware and software components of the robot, as well as the challenges and solutions encountered during the development process. The report will also demonstrate the functionality and performance of the robot through some test scenarios and results. The report also discusses the ethical and social implications of using such a device for surveillance purposes.

1.2 Organization of Project Report

Content of Objective will be here. The purpose of this project is to build an "on-line auction management system", a place for buyers and sellers to come together and trade almost anything. In fact, the system consists in a web-portal where registered users can propose new auctions, place bids in order to buy the items on auction, send messages to other users and receive automatically news via e-mail (when they receive new offers for the proposed auctions, when an auction is over etc.).

CHAPTER 02

LITERATURE SURVEY

2.1   Motivation

The motivation for developing a surveillance spy robot project is to enhance the security and intelligence capabilities of various organizations and agencies. We get our real idea from recent Russia and Ukraine war were SPY Robots are used in various purposes like detect and attack enemy targets. Using spy robots in hospitals during corona can be a way to reduce the risk of infection and improve patient care. Spy robots are robots that can perform tasks such as screening, monitoring, disinfecting, and delivering without human intervention. They can also facilitate communication between patients, doctors, and families through video and audio systems.

2.2   Existing System

We are familiar with many existing SPY Robot like ATLAS, GLADIATOR. The spy robot is basically of spherical type and its movement achieved using the concept of pendulum rotation, Raspberry-pi and Bluetooth technology. The robot uses DC motor for rotation. The wireless camera system used gives the audio and video information to the remote station. As these SPY Robot are using Artificial Intelligence hence the result that they are providing are highly accurate and efficient. These SPY Robot can help to reduce human efforts. By keeping an eye on enemy and saving the peoples life from the dangerous or forbidden places.

Limitations of existing systems:

There are several challenges in the existing systems. They are listed in the following:-

1. Time consuming for Live Streaming.
2. Costly.
3. Lack of Security of data.
4. Range of the Robot.
5. Not Flexible with all the smart Phones Only a particular smart phone whose Ear Piece Is attached can only be used

2.3   Proposed System

The main objective of the proposed system is to provide a low-cost and effective solution for surveillance and reconnaissance missions. The robot can be used for various purposes such as law enforcement, military, intelligence, security, or journalism. The robot can access places that are difficult or dangerous for humans to reach, and can collect valuable information without being detected. The robot can also interact with the target or the environment in a stealthy manner, and can escape or self-destruct if necessary.

The proposed system has several advantages over existing surveillance systems. First, the robot is small and lightweight, which makes it easy to transport and deploy. Second, the robot is agile and adaptable, which enables it to cope with different terrains and obstacles. Third, the robot is versatile and customizable, which allows it to perform various tasks and functions according to the needs of the operator. Fourth, the robot is affordable and scalable, which makes it possible to deploy multiple robots simultaneously or in coordination.

2.4   Summary

Surveillance spy robots are devices that can perform covert monitoring and reconnaissance tasks in various environments. Existing systems rely on human operators to control the robots remotely, which limits their autonomy and efficiency. Proposed systems aim to enhance the intelligence and adaptability of the robots by using artificial neural networks, computer vision, and wireless communication. These systems can enable the robots to navigate autonomously, detect and track targets, and transmit real-time data to a central server.

CHAPTER 03

PROBLEM DEFINITION AND SYSTEM DESIGN

3.1 Problem Statement

There are various types of situation where a person cannot go to check or help or to take a specific action. At those points if we can use the robots then we can solve any problems or save lives. For this we have to design a system in which we can receive signals and give it to controller by decoding it so that controller can drive the robot and there must be a transmitter (mobile phone) which can send the commands to the robot. So we are designing a system in which we can send commands wirelessly by using mobile phone and that will be received by the robot system and as per the commands robot will be driven.

3.2 Scope Of the Project

The scope of a surveillance spy robot project using Raspberry Pi is quite broad, as there are many potential applications and areas for development. Here are some examples of the scope of this project:

- Security and surveillance
- Robotics and automation
- Machine learning and AI
- Education and learning
- Innovation and entrepreneurship

In conclusion, the scope of a surveillance spy robot project using Raspberry Pi is quite vast, and it provides opportunities for learning, innovation, and entrepreneurship.

3.3 System Requirements Specification

A) Functional Requirements :

The main function of Spy robot is to roam around high sensitive region and provide video information from the required environment to the remote monitoring station. In this project, one can control the robot using Bluetooth reducing human effort. The user can continuously monitor the surrounding activities of robot location with live video streaming using wireless camera from the robot. This robot is modeled with Raspberry Pi microcontroller which control the robot behavior. The proposed spy robot is used to find smugglers infiltration, Detecting Obstacles, Survive in hazardous environment, Travel in Forbidden Places ,etc.

B) Non Functional Requirements:

Non-Functional Requirements are the characteristics or attributes of the system that are necessary for the smooth operation of the system. Those requirements are listed below.

- The system should perform the process accurately and precisely to avoid problems
- The system should be easy to modify for any updates. Any errors or bugs that are identified should be easy to mend.
- The system should be secure and maintain the privacy.
- The system should be easy to understand and use.
- Execution of the operation should be fast.

3.4 System Design

3.5 Technologies To Be Used

A surveillance spy robot is a device that can move autonomously and covertly in different environments and capture images or videos of the surroundings. Such a robot can be useful for security, military, or espionage purposes. One of the challenges of building a surveillance spy robot is to make it small, cheap, and efficient. In this article, we will discuss some of the technologies that can be used to create a surveillance spy robot using a raspberry pi as the main controller.

1. raspberry pi :

A raspberry pi is a low-cost, credit-card-sized computer that can run various operating systems and perform various tasks. It has a 40-pin GPIO (general purpose input/output) header hat can be used to connect sensors, motors, cameras, and other peripherals. It also has built-in Wi-Fi and Bluetooth capabilities that can be used to communicate with other devices or networks.

2. DC Motor :

A DC motor is a device that converts electrical energy into mechanical energy and rotates at a certain speed and direction. A DC motor can be controlled by a raspberry pi using a motor driver circuit that regulates the voltage and current supplied to the motor.

3. Camera Module :

A camera is a device that captures images or videos of the surroundings using a lens and a sensor. A camera can be connected to a rasberri pi using a USB port or a CSI (camera serial interface) port.

4. IR Sensor :

IR sensor is used to detect the obstacle and give the information in form of video to the remote device like mobile or laptop.

5. Bluetooth Module:

Bluetooth is a wireless technology that allows devices to exchange data or establish connections using short-range radio waves. A raspberry pi has built-in Bluetooth capabilities that can be configured using software tools and commands. A raspberry pi can use Bluetooth to send or receive data from other Bluetooth-enabled devices, such as sensors, speakers, keyboards, or smartphones.

3.6 Assumptions

A surveillance spy robot is a device that can move autonomously and capture images or videos of its surroundings. A raspberry pi is a small and inexpensive computer that can be used to control the robot and process the data. In this project, we will design and build a surveillance spy robot using raspberry pi and some other components. To do this project, we need to make some assumptions about the requirements and constraints of the robot.

Here are some of the assumptions:-

- The robot should be able to move on different terrains, such as grass, gravel, or carpet.
- The robot should have a camera that can capture images or videos in different lighting conditions, such as day or night.
- The robot should have a wireless connection that can transmit the data to a remote server or device.
- The robot should have a battery that can power it for at least an hour of operation.
- The robot should have a simple and user-friendly interface that can allow the user to control it or view the data.
- The robot should have a low cost and use readily available components.

3.7   Constraints

- Power:

The robot needs a reliable and sufficient power source to operate for a long time. The raspberry pi and the camera also consume power and need to be connected to the robot's battery. The power consumption and battery life depend on factors such as the speed, distance, terrain, resolution, frame rate, etc.

- Communication:

The robot needs a wireless communication channel to transmit the images or videos to the user or a remote server. The communication quality and bandwidth depend on factors such as the distance, interference, encryption, compression, etc. The communication system should be able to handle data loss, delay, noise, etc. and ensure security and privacy of the data.
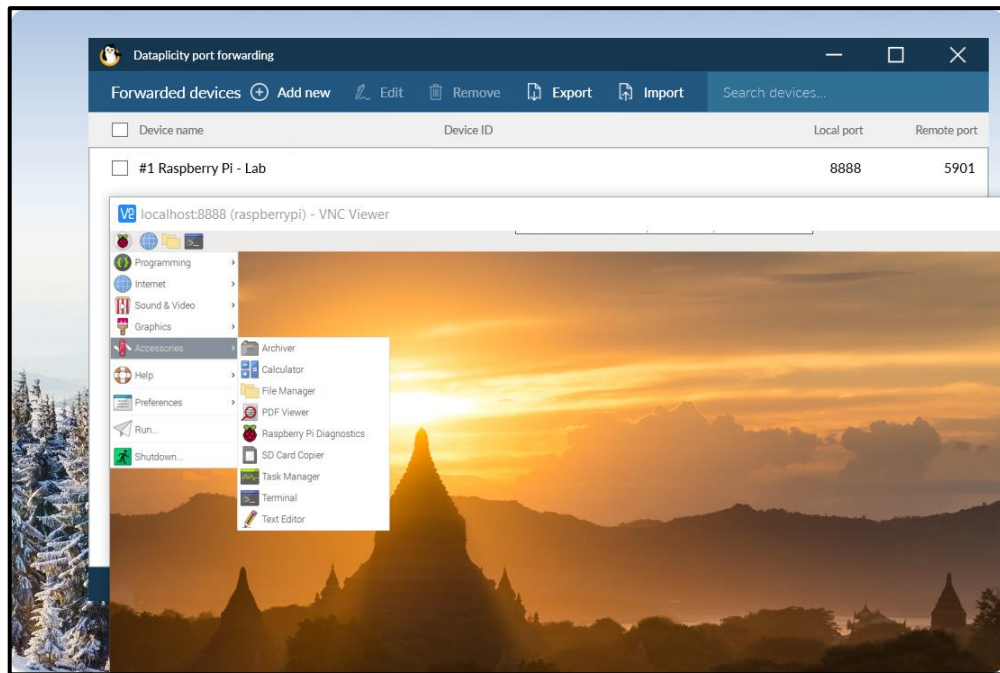
- Control:

The robot needs a user interface to receive commands from the user or a remote server. The user interface can be a web-based application, a mobile app, a joystick, etc. The control system should be able to handle different modes of operation such as manual, semi-automatic, or fully automatic.

- Navigation:

The robot needs a navigation system to move autonomously and avoid obstacles in its path. The navigation system can use sensors such as ultrasonic, infrared, camera, GPS, etc. to detect the environment and plan the optimal path. The navigation system should be able to handle different scenarios such as indoor or outdoor, light or dark, smooth or rough, etc.
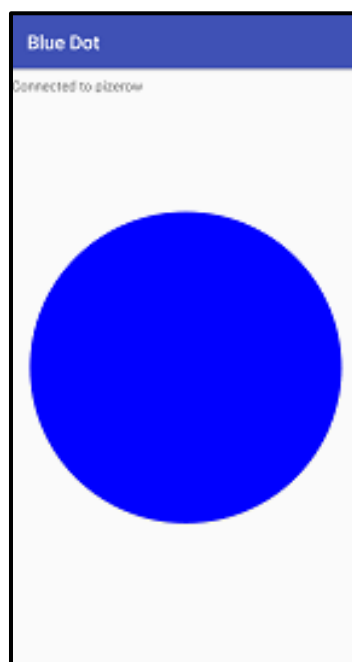
3.8   User Interface Design

1) VNC Viewer:-

(Fig.no 1.1 VNC Viewer)

2) Blue DOT:-

(Fig.no 1.2 Blue DOT)

3.9   Summary

As per our SPY Robot, we can retrieve the images and live video which is Live Streamed by the robot on a smart phone. SPY Robot assists the military and emergency situations. We can detect the obstacles in the way of SPY Robot and can search for the enemies. Making surveillance of any disaster-affected area where human beings can't go. It can survive in any dangerous situation that can occur anytime.

CHAPTER 04

OBJECT ORINTED MODEL

4.1   Need of modeling

Modeling and managing the needs of a system for a surveillance spy robot project using Raspberry Pi is essential for ensuring that the project is successful and meets the desired goals. Here are some reasons why modeling and managing the needs of the system is important:

- Understanding requirements
- Defining system boundaries
- Establishing priorities
- Risk mitigation
- Optimization of resources

In conclusion, modeling and managing the needs of a system for a surveillance spy robot project is essential for ensuring that the project is successful and meets its objectives.
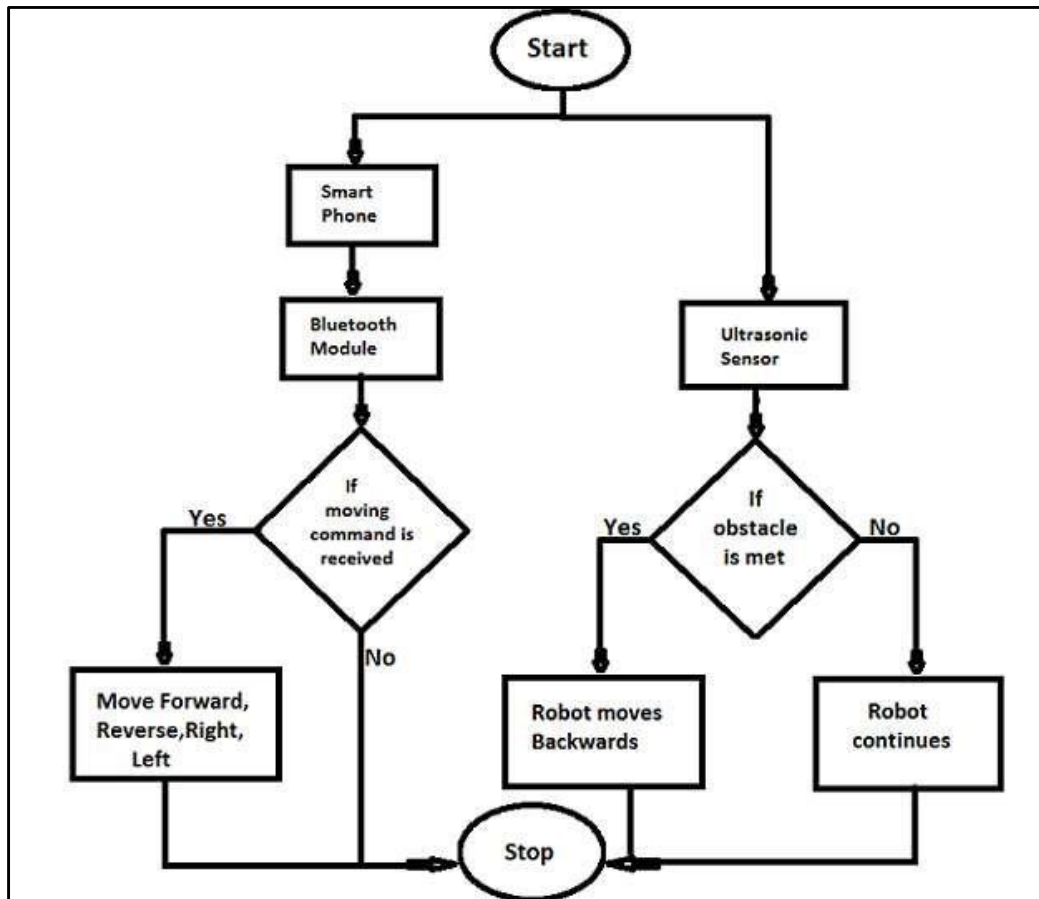
4.2   Activity Diagram

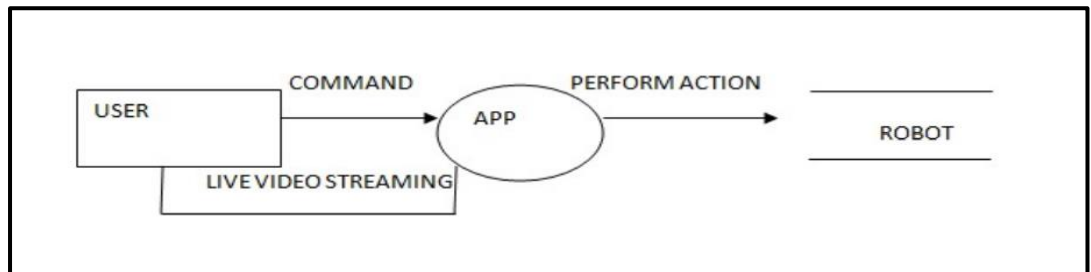Fig.no 2.1 Activity Diagram

4.3   Data flow diagram

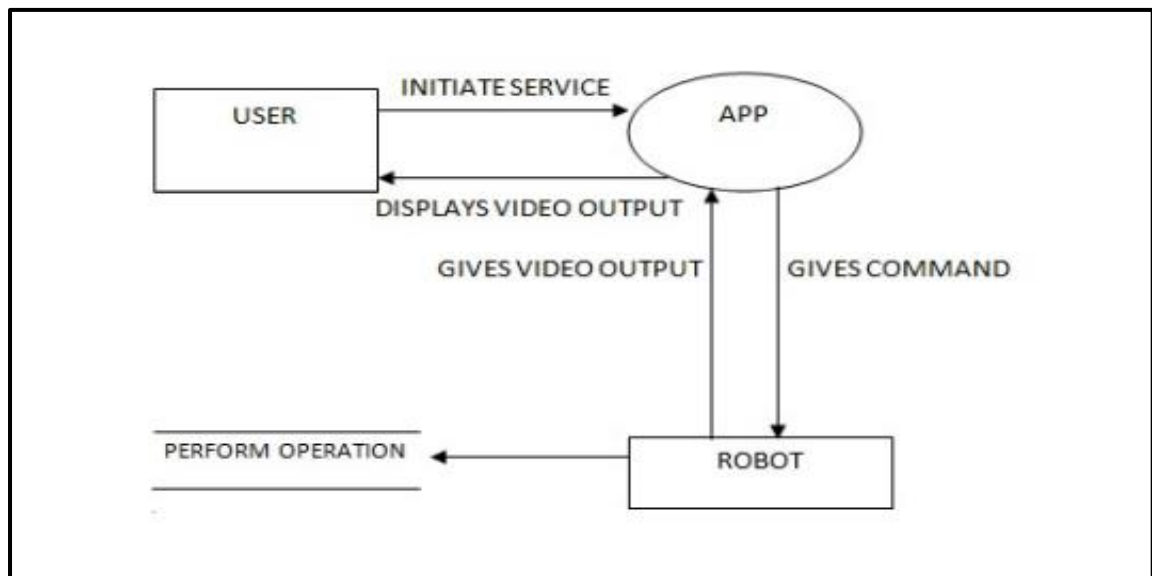DFD Level 1 :-

Fig.no 3.1 DFD Level 1

DFD Level 2 :-
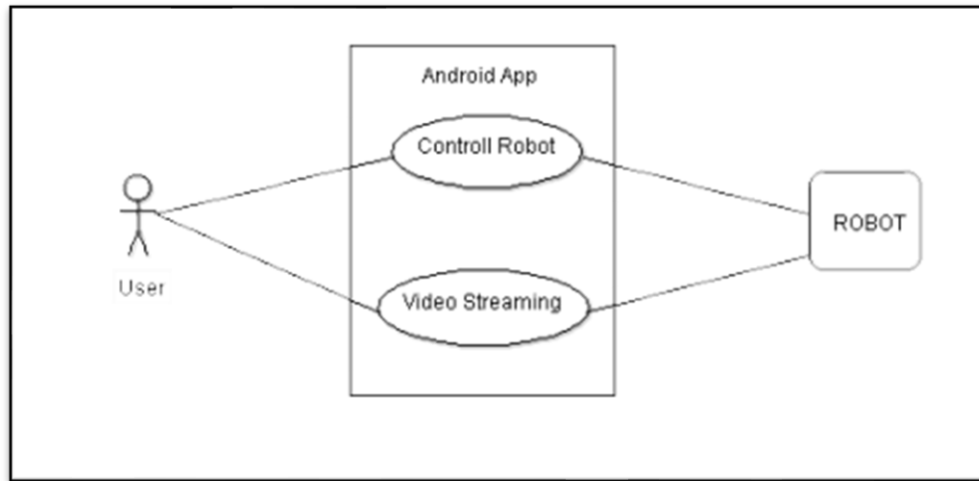

Fig.no 3.2 DFD Level 2

4.4   Use case diagram

Fig.no 3.3 Use Case Diagram

In this Project user can see live streaming on his android phone and also control spy robot by phone. He can have access of changing the direction of spy robot.
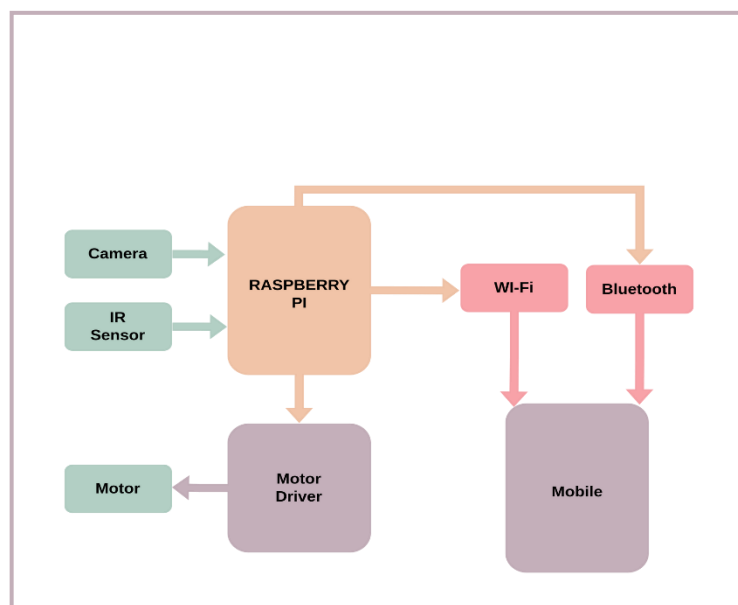
4.5 Architecture Diagram

Fig.no Architecture Diagram

4.7   Surveillance Spy Robot

(Fig.no 3.5 Surveillance SPY Robot)

4.8   Summary

Thus we have designed a smart surveillance system capable of recording video and transmitting to any portable device like smart phones and laptops. It is advantageous as it offers quick transmission of the video through Internet of Things. Necessary action can be taken in short span of time in the case of emergency such as the presence of the unwanted people in war areas who are not allowed in such areas can be determined by the IR sensor which sends a signal to the Raspberry Pi when a human-being is in the ambience of the Robot. In turn, the Pi triggers the camera immediately to capture an image and send it to the web page.

CHAPTER 05

PROJECT PLAN

5.1 Overview

The surveillance spy robot project aims to develop a cost-effective and efficient solution for monitoring and surveillance. The project utilizes a Raspberry Pi controller, IR sensors, wired camera, L293D motor driver, gear motor, WiFi module, Bluetooth module, and Python programming language to create a customizable and user-friendly spy robot. The robot is designed to detect obstacles, capture images and videos, and transmit data wirelessly to a smartphone.

5.2 Project Estimate

The estimated cost of the surveillance spy robot project is Rs. 10,000, which includes the cost of components and materials, as well as labor costs. The project is expected to be completed within 2 months.

5.3 Project Schedule

- Week 1: Planning and component procurement
- Week 2: Assembly and testing of components
- Week 3: Programming and integration of components
- Week 4: Testing and debugging
- Week 5: Final testing and documentation
- Week 6: Project completion and final report

5.4   Action Plan:

Sr. No.	Point to be covered	Planning Date (Week wise)
1	Working on reviewing the requirement analysis	01/02/23 to 12/02/23
2	System/project design process	13/02/23 to 19/02/23
3	Implementation of the proposed system	20/02/23 to 26/02/23
4	Implementation of the proposed system (continue)	27/02/23 to 05/03/23
5	Implementation of the proposed system (continue)	06/03/23 to 12/03/23
6	Testing: Unit, Integration, and system testing	15/03/23 to 31/03/23
7	Report writing	25/03/23 to 10/04/23
8	Report Writing (continue)	11/04/23 to 16/04/23
9	Report Finalization discussing with guide	17/04/23 to 19/04/23

5.5   Summary

The surveillance spy robot project aims to develop a cost-effective and efficient solution for monitoring and surveillance. The project utilizes a Raspberry Pi controller, IR sensors, wired camera, L293D motor driver, gear motor, WiFi module, Bluetooth module, and Python programming language to create a customizable and user-friendly spy robot. The project is expected to be completed within 2 months and has an estimated cost of Rs 10,000.

CHAPTER 06

TEST PLAN AND REPORTS

6.1 Goals and objectives

The goal of the test plan is to ensure the surveillance spy robot meets the project's requirements and specifications. The objectives of the test plan are to verify the robot's functionality, test its performance in different environments, and ensure its user-friendliness.

1. To design a robot for military application with live video streaming.
2. To achieve the surveillance of human activities using spy robot.
3. The ability to move in complex environments.
4. Detecting and reporting anomalies in the environment.

6.2 Test Procedure and Report

The test procedure will involve several tests to verify the robot's functionality, including obstacle detection, camera capture, and wireless communication. The robot's performance will be tested in different environments, such as indoors and outdoors, to ensure its effectiveness in various scenarios.

The test results will be recorded in a test report, which will include details of the tests performed, any issues encountered, and recommendations for improvement.

6.3 Summary

The test plan and reports aim to ensure the surveillance spy robot meets the project's requirements and specifications. The test procedure will involve several tests to verify the robot's functionality, performance, and user-friendliness. The test results will be recorded in a test report, which will provide recommendations for improvement if necessary.

CHAPTER 07

FUTURE SCOPE

The future scope of the surveillance spy robot project is to enhance its capabilities and applications in various domains. Some of the possible points are:

1. Improving the mobility and agility of the robot to navigate different terrains and obstacles.
2. Incorporating advanced sensors and cameras to capture high-quality images and videos in various lighting and weather conditions.
3. Developing autonomous and intelligent behaviors for the robot to perform tasks such as reconnaissance, surveillance, tracking, and detection without human intervention.
4. Integrating wireless communication and data transmission technologies to enable real-time and secure data sharing between the robot and the control station.
5. Expanding the use cases of the robot for military, law enforcement, disaster management, wildlife conservation, and other scenarios that require stealthy and remote observation.

CHAPTER 08

CONCLUSION

In this project, we have designed and implemented a surveillance spy robot using Raspberry Pi as the main controller. The robot can be remotely controlled by a web interface that allows the user to view the live video stream from the camera and send commands to the motors. The robot can also perform autonomous tasks such as obstacle avoidance live streaming . The robot is powered by a rechargeable battery and can communicate with the server via Wi-Fi. The robot is a low-cost and versatile solution for various applications such as security, exploration, education and entertainment.

CHAPTER 09

APPENDIX

9.1 Glossary (Definitions/ Abbreviations)

9.2 Achievements

1) **Competition Name:** A National Level Project Competition of Adsul.

   Name Of College: Sau. Sundarabai Manik Adsul Polytechnic , Chas.
   - **Prize:** 1st Prize
   - Trophy
   - Rs 501 Cash Prize

2) **Competition Name:** A National Level Project Competition of PROJIT.

   Name Of College: Jawahar Institute of Technology, Management & Research, Nashik.

   - **Prize:** 2nd Prize

   - Trophy

   - Rs 3000 Cash Prize

3) **Competition Name:** GMRT National Level Online Science Project Exhibition And Competition 2023 Of Govt. Of India

Name Of College: Giant Metrewave Radio Telescope (GMRT) Khodad (NCRA – TIFR, Pune) and Indian Institute of Knowledge (IIK), Pune.

- **Prize:** Awarded as Most Innovative Project of 2023

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