DESIGN AND FABRICATION OF RECON SPYBOT
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ABSTRACT
Consider how warfare will look in the future when it is fought entirely by autonomous robotics an increasing number of dangerous missions can be performed by robots instead of human soldiers such as searching for terrorists in caves protecting cities from sniper fire and patrolling skies and waterways with little cover from attack robots can also be used to clear minefields and other hazardous areas where human soldiers have been killed. The recon spybot is built to spy on critical situations where a human being is unable to go and it is also used for rescue purpose.

INTRODUCTION

SPYBOT KIT INVENTORY:
The Recon Spybot works on with various parts like simple Dc motors, wireless camera and 9volt batteries, etc. this section explains briefly about the working parts of the Recon Spybot.

GEARED DC MOTORS:
DC Motors run on DC current using Fleming’s left hand rule. It converts electrical energy into mechanical energy. The principle of Dc Motor is Lorentz force which states that when a current carrying conductor placed in a magnetic field, then the conductor experiences a force. This Lorentz force provides a torque to the coil to rotate.
THE CAMERA:

A small wireless camera is used to capture the motion monitored in the environment. Up to 30 metres in a typical location, or 80 metres outdoors, these wireless cameras can transmit high-quality video and audio. This set of wireless cameras makes it simple to keep tabs on activity in and around your home or business. The 3.6mm lenses that come standard on these cameras eliminate the need for additional lenses or mounting brackets. This camera packs a lot of punch for its size, portability, and flexibility. A power adaptor or a battery can be used to power this camera. Here in our spybot we use a 9volt carbon battery which supplies the power needed to the camera. The camera is now movable; it is fixed permanently inside the spybot. To get the clear vision of the motion captured by the camera, the antenna from the camera is made to face towards the receiving port of the wireless video receiver. This makes the vision clear now, the correct way to do it is that the frequency of the camera signal should be correctly tuned and matched to the frequency of the camera from the video receiver. The specifications of the camera are shown clearly on the table below.

SPECIFICATIONS:

<table>
<thead>
<tr>
<th>Image sensor</th>
<th>CMOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal system</td>
<td>PAL/CCIR NTSC / EIA</td>
</tr>
<tr>
<td>Horizontal resolution</td>
<td>380 TV lines</td>
</tr>
<tr>
<td>Scan frequency</td>
<td>PAL/ CCIR: 50HZ NTSC/ EIA: 60HZ</td>
</tr>
<tr>
<td>Min illumination</td>
<td>3 LUX</td>
</tr>
<tr>
<td>Transmission power</td>
<td>50mW</td>
</tr>
<tr>
<td>Transmission frequency</td>
<td>1.2G/ 2.4G</td>
</tr>
<tr>
<td>Transmission power supply</td>
<td>DC 9V</td>
</tr>
<tr>
<td>Receiving frequency</td>
<td>1.2G/ 2.4G</td>
</tr>
<tr>
<td>Demodulation mode</td>
<td>FM</td>
</tr>
<tr>
<td>Antenna</td>
<td>50ohm MHA</td>
</tr>
<tr>
<td>Receiving power supply</td>
<td>DC 9V</td>
</tr>
</tbody>
</table>

Table 1.1

The following steps should be followed to get the clear video coverage of the camera:
• Twist the antenna receiver into the receiver;
• Connect the receiver to the monitor with AV cable;
• Plug the DC 9V 500MA adapter into the power jack of the receiver;
• Insert the DC 9V 500MA adapter into the power jack of the camera;
• Adjust the frequency controller on the receiver to the required position;
• Adjust the lens of the camera to the best position and connect it with screws.

TRANSMITTER PANEL:

This section deals with the transmitter module used in the controller of the Recon Spybot. Commercially available RC transmitters can control as few as two and as many as 14 channels. Each channel has a specific purpose, such as throttle or steering.

RF has become a popular choice for communicating with remote controls due to the difficulty in blocking its signal in some cases the signal has been known to pass through walls with ease garage door openers wireless burglar alarms advanced manufacturing remotes intelligent sensing applications and wireless home security systems all use rf modules in some capacity because they dont require a direct line of sight connection theyre frequently used to upgrade existing radio transmission designs. The representation of the transmitter circuit module is shown in the figure 2.4

The transmitter circuit shown in the above figure is used in the operator control unit to control the Recon Spybot. The circuit consists of a 209H0281 integrated chip and a regulator module chip 7805 to regulate the applicable voltage in the circuit. The PS represents the plug module for the power supply for the transmitter.
circuit, and then the 4 buttons at the bottom of the circuit is for the controlling of the manipulator, each button represents different action. A diode is also used in the circuit to have a maintained regulated voltage in the circuit. The red colored LED represents the power of the transmitter circuit.

Radiofrequency waves are digitally modulating using the QPSK technique to carrying the digital informations predictable and detectable behaviours characterise these rf signals in both directions they're getting stronger and weaker they have varying reactivity to various materials and their signals can get messed up by other signals

**RECEIVER PANNEL:**

This section deals with the receiver module used in the controller of the Recon Spybot. For consumer electronics rf blocks are commonly used during low- and medium-volume products like a garage doors wireless burglar alarms industrial remote controls and smart sensor applications because they dont require a line-of-sight operation they're frequently used to renew more traditional infra-red communications networks The pictorial representation of the rf receiver is shown below in the fig 2.5.

![Receiver Circuit](image)

**Fig 2.5**

The specifications of the receiver circuit are mentioned in the table below in table 1.3.

The circuit also consists of the other parts that are useful in receiving the signal from the transmitter. The full picture of the receiver circuit is show below in the fig 2.6.
OPERATOR CONTROL UNIT:

It communicates crisp clear footage up to 50 m away and through wall surfaces and foreign objects to the small portable controller using the recon scout rescue (OCU).

The OCU consists of the transmitter with the controller buttons. The figure 2.7 shows the structure of the operator control unit in which the controller buttons are also located. Just refer the figure below.
CONCEPT OF THE SPYBOT:

The bright Recon spybot Rescue is equipped with camera imaging that automatically turns on when ambient light is low, allowing reconnaissance in mild darkness and is designed for search-and-rescue and hazard operations. Weighing less than one pound, it can be launched up to 50 feet into the air, over walls, down stairs, or even dropped down a shaft using the included tether. When used with the optional Command Monitoring Station, the Recon Spybot Rescue transmits crystal-clear video up to 1,000 feet through walls and debris to the handheld Operator Control Unit (OCU) (CMS). It is possible to specify one of two operating frequencies, allowing two robots to run simultaneously. At border checkpoints and secure government facility entrances, the Recon Spybot can be permanently deployed. Auto-focus optics and a field of view of 60 degrees allow for undercarriage inspection of most vehicles in a single pass, and unlike mirrored devices provide a direct view of the undercarriage rather than a reflected view. Preparation is key. Using "throwable" Recon Spybot robots, you can have a "man on the inside" for a variety of purposes in the military, police, security, and rescue sectors. The critical visual intelligence you'll receive can save lives and reduce property damage in any dangerous, hostile, or confined environment.

CALCULATIONS

Motor:

![Diagram of gears](image)

The gear ratio means that gear B rotates at half the speed of gear A, but delivers twice the torque.

\[
P_A = P_B \\
T_A \text{rpm}_A = T_B \text{rpm}_B \\
T_B / T_A = \text{rpm}_A / \text{rpm}_B
\]

- Gear A diameter = 15mm
- Gear B diameter = 30mm
- Motor torque = 500g
- Speed of the motor = 1000 RPM
- Motor initial speed = 1000 RPM
- Motor speed when loaded = 800 RPM
- Input voltage to battery = 9 volts
Output voltage = 9 volts
Distance range of the
Transmitter = 9 dbi
Distance range of
Receiver = 6 dbi

CONCLUSION:

The recon spybot is a great opportunity for the police and commandos to be prepared. Recon spybot throwable robots are ideal for military, police, security, and rescue missions. You'll get critical visual intelligence that can save lives and reduce property damage in any hostile or confined environment. The recon spybot is small enough to be carried on a belt or tactical vest and requires no special training. It can be thrown or remotely maneuvered into any hostile or confined area. Your team will be able to take immediate action securely and decisively with real-time reconnaissance video.