Robot Electronic System Overview

Power Supply

The power supply consists of a 48V 80Ah battery pack made from 18650 Li-ion cells. The pack is configured with 13 cells in series and 27 cells in parallel, totaling 351 cells. This configuration ensures:

- **Voltage:** 48V for system operation.
- **Capacity:** 80Ah, providing up to 8 hours of operation with a safety factor of 2.
- **Charging:** A 15A charger ensures efficient recharging.
- **Physical Dimensions:** Compact design with a total length of 486mm, width of 234mm, and cell height of 65mm.

Controller

The controller serves as the central processing unit and power distributor, managing all electronic components.

- **Input:** Receives signals from proximity sensors and the camera system.
- **Output:**
  - Sends control signals to the motor drivers for precise speed and direction control.
  - Distributes the required voltage to the 4 motors to ensure smooth and efficient operation.
- **Functionality:** Processes real-time data to adapt motion, avoid obstacles, manage surveillance tasks, and power external components.

Proximity Sensors

The robot is equipped with multiple proximity sensors for obstacle detection and collision avoidance.

- **Real-Time Feedback:** Provides distance and positional data to the controller.
- **Adaptability:** Enables the robot to dynamically adjust its path to avoid collisions in factory or warehouse environments.
- **Modular Design**: The system allows for the integration of additional sensors, such as:
    - **Gas Detection Sensors**: For identifying hazardous gases in industrial environments.
    - **Sound Detection Sensors**: To monitor unusual noises, enhancing safety and surveillance capabilities.

Camera System

The robot features 4 cameras strategically placed to provide comprehensive visual coverage.

- **Real-Time Footage Transmission:**
  - Wireless Communication Module: Required for transmitting live video data. Options include Wi-Fi or 4G/5G modules for high-bandwidth and long-range data transfer.
  - Compression Software: Video compression minimizes bandwidth usage while maintaining video quality.
  - Streaming Server: Captures video data and streams it to a monitoring station or cloud server.
  - Antenna System: Ensures reliable wireless communication over the operating range of the robot.
- Surveillance Capability: Enhances the robot's ability to monitor the environment, identify potential hazards, and perform security tasks.
- 360° Coverage: The 4 cameras arrangement ensures no blind spots during operation.

System Integration

The integration of the power supply, controller, sensors, and camera system ensures:

- **Efficient Power Distribution:** The 48V power supply delivers sufficient energy for all components, including motors, cameras, and wireless modules.
- **Dynamic Motion Control:** The controller sends required voltage and control signals to the motors for precise omnidirectional movement.
- **Seamless Data Transmission:** The cameras, coupled with wireless communication modules, ensure real-time video feeds are sent to monitoring systems.
- **Real-Time Data Processing**: The controller processes input from sensors, cameras, and wireless feedback, allowing the robot to adapt to its environment.
- **Reliable Surveillance:** The camera system and wireless infrastructure ensure continuous monitoring, while sensors prevent collisions, enabling seamless operation.