Sensor and Power Management

For powering our robot, we use a rechargeable Li-Ion battery pack (7.4V), which provides stable voltage and sufficient current for all components, including motors, sensors, and microcontrollers. A DC-DC converter steps down the voltage to 5V for the logic circuits, ensuring safe operation for the Arduino Nano and sensors.

Power system diagram:

Our electrical diagram includes:

- Battery pack (7.4V Li-Ion)
- DC-DC step-down module (7.4V to 5V) for powering the microcontroller and sensors
- Direct power supply to motor driver (L298N) from the battery for motors

Sensors:

The robot uses multiple sensors to gather environmental data and navigate:

- HuskyLens AI Camera for color recognition and object tracking
- MPU6050 gyroscope for measuring orientation and rotational movement
- IR distance sensors for obstacle detection and wall-following behavior
- RGB color sensor (TCS34725) (if used) for detecting lines or specific field markers

These sensors provide real-time feedback, allowing the robot to adapt its movements and avoid collisions.

Justification for sensor selection:

- The HuskyLens offers versatile recognition modes, which simplifies programming and allows for flexible tasks like identifying specific colors or objects.

- The MPU6050 provides accurate orientation data essential for precise turns and stability.
- IR sensors are reliable for short-range obstacle detection and help the robot maintain its course along the walls.

Supporting documentation:

- We provide wiring diagrams with specifications for all power and sensor connections.
- A detailed sensor map shows the positioning of each sensor on the robot for optimal data acquisition.