NAVIGATION SYSTEMS

LINE DETECTION:

To implement a navigation system with a grid of lines, it can be used a technique called line following, which involves using sensors to detect lines on the ground and adjusting the robot's movement accordingly[1].

There are several algorithms that can be used for line following, such as proportional control, PID control, and fuzzy logic control. These algorithms use different techniques to adjust the robot's movements based on sensor data and can be tuned to optimize performance in different scenarios.[2]

There are several types of sensors that can be used for line following, such as infrared (IR) sensors, reflective optical sensors, and digital cameras.

		Advantages	Disadvantages	Web page
Infrared sensors	They work by emitting IR light and detecting the amount of light reflected back from the surface. Line Following Robot Sensor (electroschematics.com)	60 kr no need algorithms but they can be used to improve the performance of the sensor	1. Infrared frequencies are affected by hard objects such as walls, doors, dust… 2. In monitor and control applications, infrared sensors can control only one device at a time 3. Have limited range	3deksperten.dk/products/tcrt5000-sensor-ir-infrared-line-track-follower-sensor?variant=43460661248220&gclid=CjwKCAjwvfmoBhAwEiwAG2tqzEU549K8unH8uRUeFtBSsxwz3xuqSfhUzPaWQFfxdKbe5mZPpfm0-RoCeFUQAvD_BwE
Reflective optical sensors	They emit a beam of light and detect the amount of light reflected back from the surface Line Follower Robot: Design and Hardware Application	IEEE Conference	More accurate than IR sensors	1. More expensive than IR sensors 2. They are susceptible to interference from environmental factors such as dust. 3. they require a clear line of sight between	Reflective Optical Sensors, CCD, CMOS Sensor	RS (rs-online.com)

1   Autonomous Mobile Robot Navigation in Indoor Environments: Mapping, Localization, and Planning | IEEE Conference Publication | IEEE Xplore
2   Line Follower Robot Algorithm & Optimizations for Better Line Following | by Jay Gupta | Medium

	[Publication	IEEE Xplore](#)		the sensor and the object being detected 4. they can be affected by changes in ambient lightning conditions such as artificial lightning 5. They have limited range compared to another type of sensors such as ultrasonic sensors or LiDAR	
Digital cameras	They work capturing images of the surface and using image processing algorithms to detect the line [How to Make a Line Follower Robot in 10 Minutes	Arduino	Maker Pro](#)	Can provide higher accuracy and flexibility in terms of line detection	More complex than IR sensors or reflective optical More expensive	

LOOK AT THIS WEBPAGES:[How to Make Line Follower Robot Using Arduino : 5 Steps - Instructables](#)