Proposal: Design of a Music-Responsive Car

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1. Introduction

We aim to design a car that can autonomously start following the tracks when it hear music playing. The car will utilize an Infrared (IR) Emitter/Detector and an Electret microphone as sensors to recognize music and respond by initiating movement along predefined tracks. This proposal outlines the position and functionality of these sensors, as well as the plan to characterize them.

2. Sensor System

a) Infrared Emitter/Detector

The IR Emitter/Detector will be positioned underneath the car, facing downwards. It will be used to detect track lines on the ground. The Emitter will emit infrared light, and the Detector will receive the reflected light. When the car is on the track, the reflected light will be at a certain level, indicating that the car is on the right path. If the car deviates from the track, the reflected light will change, triggering corrective actions.

b) Electret Microphone

The Electret microphone will be positioned on the front of the car, facing outward. It will capture music. The microphone will be used to detect the presence of music. We will use an amplifier (in Module913) to get a usable output signal. Signal processing techniques will be employed to differentiate music from other sounds, and the intensity of the music will determine the car's speed.

3. Sensor Characterization Plan

The IR Emitter/Detector will be characterized by testing its ability to detect track lines under various lighting conditions and track surface colors. The sensitivity of the Detector to different reflectance levels will be measured to ensure reliable track detection.

The Electret microphone will be characterized by analyzing its frequency response to different types of music and ambient noise. This will enable the determination of a threshold for music detection and the calibration of the car's speed based on music.

4. Electronic Circuitry

The electronic circuitry will include dedicated components for signal processing and motor control. An operational amplifier will be used to process the signal from the Electret microphone, distinguishing music from ambient noise. This will then trigger

a motor control circuit to adjust the car's speed based on the music intensity. Additionally, a comparator circuit will be employed to interpret the signals from the IR Emitter/Detector and regulate the car's position on the track.

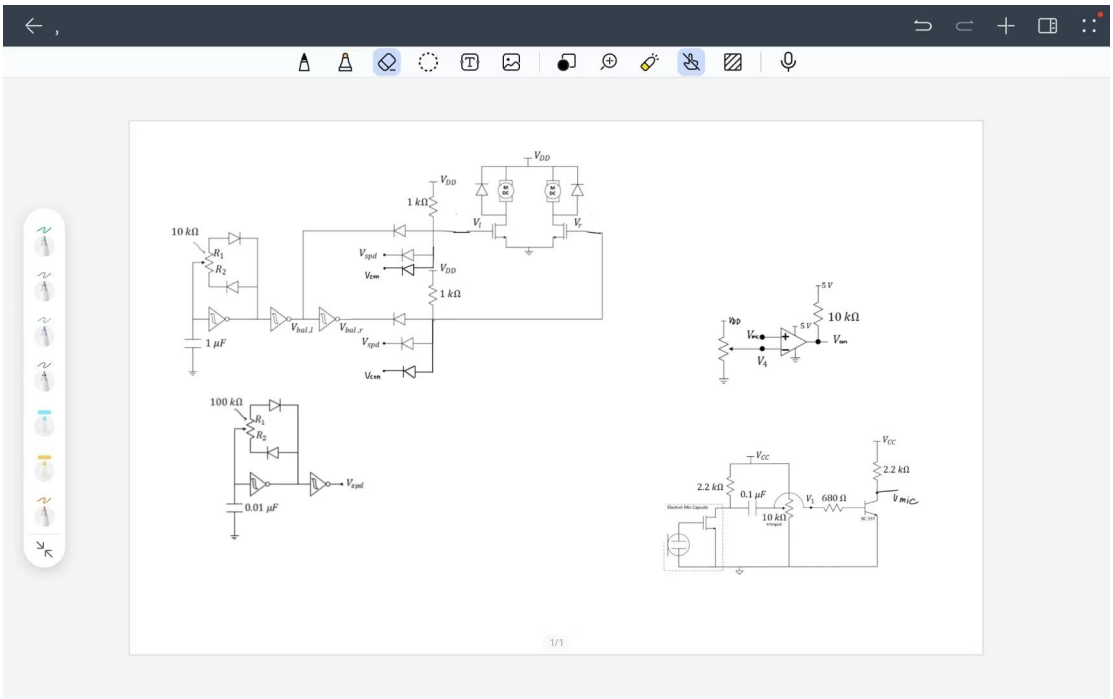

Figure1 the circuits plan

The sensor systems and electronic circuitry will be integrated to enable real-time responsiveness to music and track conditions. The signals from the sensors will be processed and translated into commands for the car's movement. The integration will involve careful calibration to ensure accurate and timely responses, allowing the car to follow tracks in synchronization with the music.

5. Conclusion

In conclusion, the proposed design will result in a music-responsive car that autonomously follows tracks based on the presence of music. The integration of specialized sensors and electronic circuitry will enable this innovative functionality.