Parking Assist System: Phase 1

Version 2

Jeffin Jacob

1 Statement

Parking assist systems are used in motor vehicles to alert drivers of obstacles while reversing. They are a hard real-time embedded system because missing a deadline may lead to catastrophic failure, a collision. Functionally, the system shall produce 1 audible beep per second while 10-15 cm away from an obstacle, 2 audible beeps per second while 5-10 cm away from an obstacle, and continuous buzzing while 0-5 cm away from an obstacle. As aforementioned, the system is hard real-time; therefore, the end-to-end response time, between the ultrasonic sensor and the buzzer, shall be no more than 50 ms, and the sampling rate of the ultrasonic sensor shall be no less than 40 Hz.

2 Use Cases

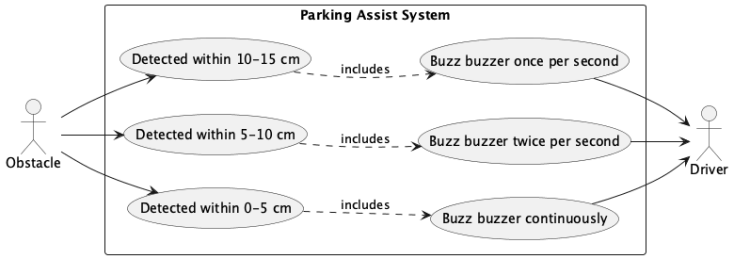

Figure 1: Use case diagram of a parking assist system

3 Classes, Responsibilities, and Collaborators

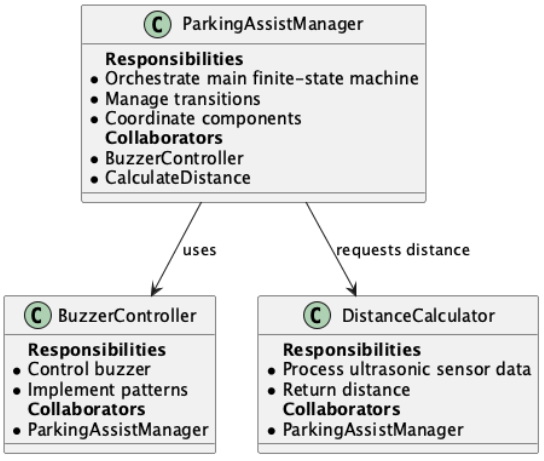

Figure 2: CRC cards for a parking assist system

4 Sequence and Structure

4.1 Process Flow

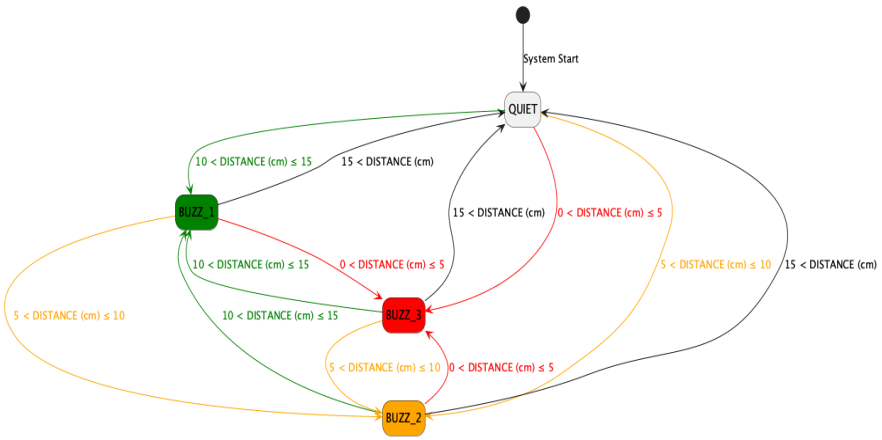

Figure 3: Finite-state machine diagram, or flowchart, of a parking assist system

4.2 Architecture

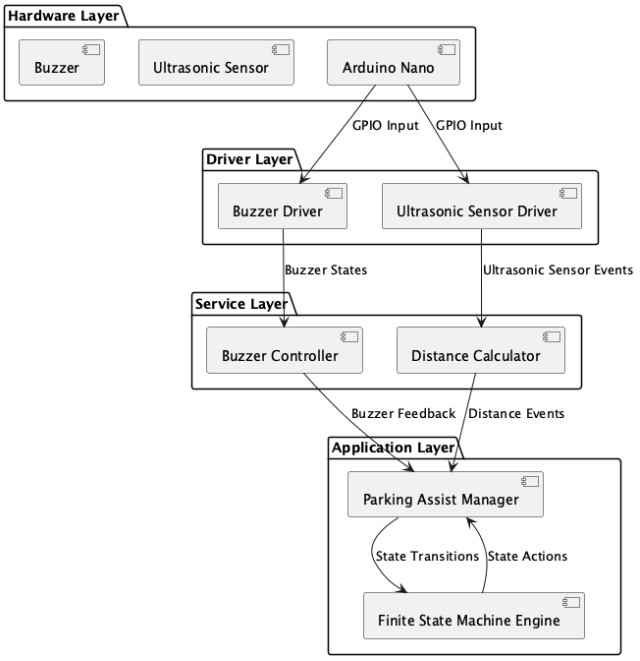

Figure 4: Architectural block diagram of a parking assist system

5 Components

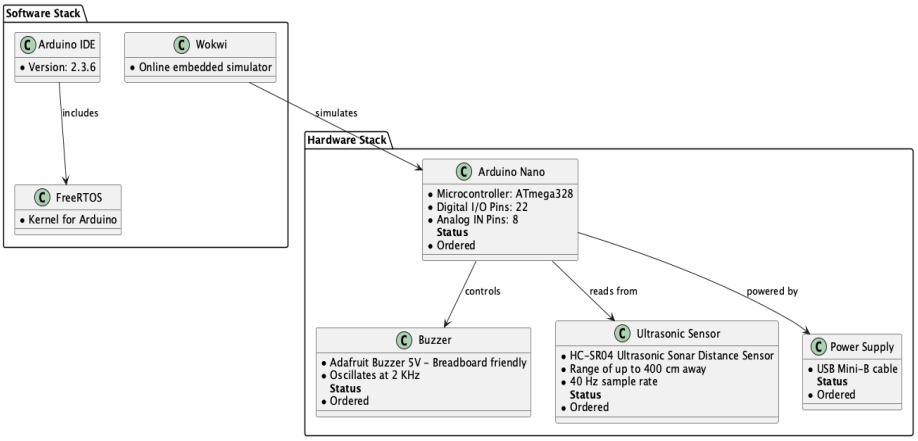

Figure 5: Component list of a parking assist system