

Car Safety System

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Introduction

The project intends to implement the general safety systems found in modern cars. These functions include, but are not limited to:

- parking sensors
- emergency braking
- throttle by wire, simulated using bluetooth control

For a better understanding of the possibilities these features allow, check out [this rundown](#) and [infographic](#) by Skoda.

General Description

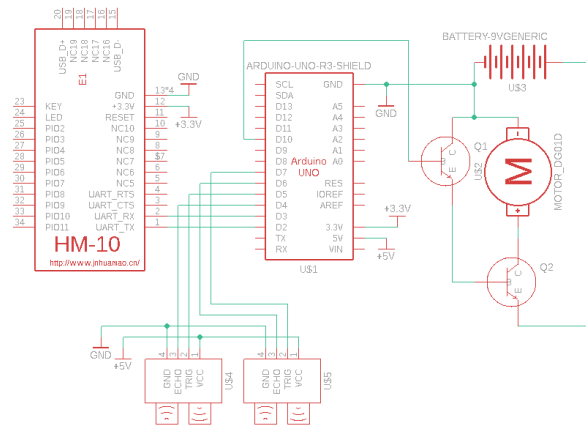
The device starts automatically in stand-by mode after connecting to a power source. Control can be achieved through low energy bluetooth using a companion mobile app or a serial usb connection. As such, aside from engine start and stop option, the user can adjust engine speed, activate emergency braking sensors and configure braking tolerances for early or late intervention.



Hardware Design

Hardware used:

- AtMega328p based development board
- HM10 bluetooth module
- HC-SR04 ultrasonic proximity sensor
- JS-50B bldc motor
- bjt darlington pair as motor-driver



Software Design

Development Environment: Arduino IDE

External Sources: SoftwareSerial.h library

Implementation:

- Device initializes a Serial connection through software with the bluetooth module and loops indefinitely awaiting for commands
- Received commands are processed and errors are filtered by a command handler
- Proximity sensors loop distances and send a flag to stop the engine in the case of emergency braking

Functions:

- setup() - called on startup, initializes modules
- loop() - loop runs function calls and commands for instant response
- update_motor() - checks oob errors for pwm and sets pwm output
- check_prox() - checks values for proximity sensors
- exec() - command handler
- check_crash() - checks datasets of proximity sensors for an accurate crash estimate

Conclusions

Car starts, runs and stops efficiently. Fail-safe functions for wireless connections should be implemented for better connectivity. Noisy or reflective environments may produce false-positives for the proximity sensors and as such, a less than adequate experience. A

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