



Smart Car Remote Starter with GPS Tracking

BY

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Problem Statement

- ▶ Why Remote Starting
 - ▶ Hot weather
 - ▶ Cold weather
- ▶ Why GPS Tracking?
 - ▶ Locating a stolen car
 - ▶ Seeking help
 - ▶ Locating a parked car
- ▶ Negative Impacts



User Requirements

- ▶ Ability to start the engine using mobile phone from long & short ranges.
- ▶ Preventing thieves from stealing a car after remotely starting it
- ▶ Locating the car location accurately from anywhere in the world
- ▶ The system must not interfere or disable the regular operation of starting the car using the key.



Technical Requirements

- ▶ GSM communication will be used as a long range connection
- ▶ Bluetooth communication as a reliable short range connection
- ▶ GPS module for accurate car locating
- ▶ External antennas for the GSM and GPS modules
- ▶ Minimizing cutting wires or performing modifications to the car
 - The car must operate normally without the system
- ▶ Using the car key to identify the owner
- ▶ Android mobile application as a user interface for the user



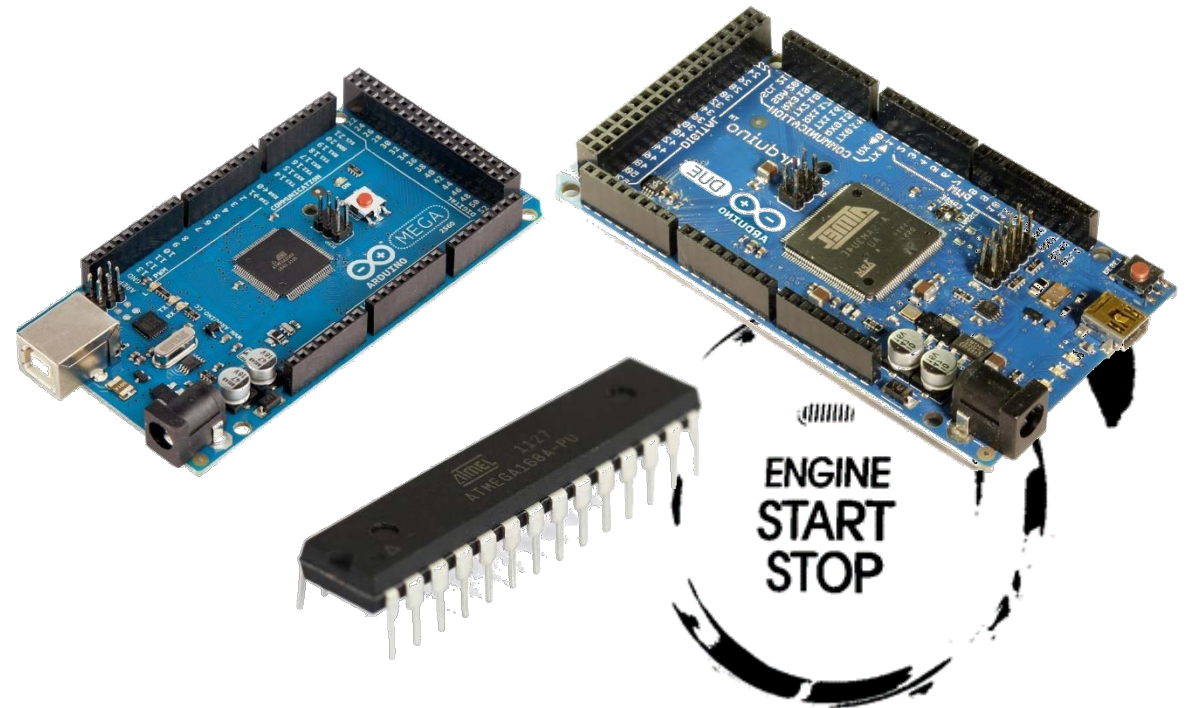
Choosing Components

▶ Controller

- ▶ Microcontroller (Arduino , PIC, ...)
- ▶ FPGA

▶ Minimum Requirements

- ▶ 2 UART Interfaces
- ▶ Low power consumption



Choosing Components

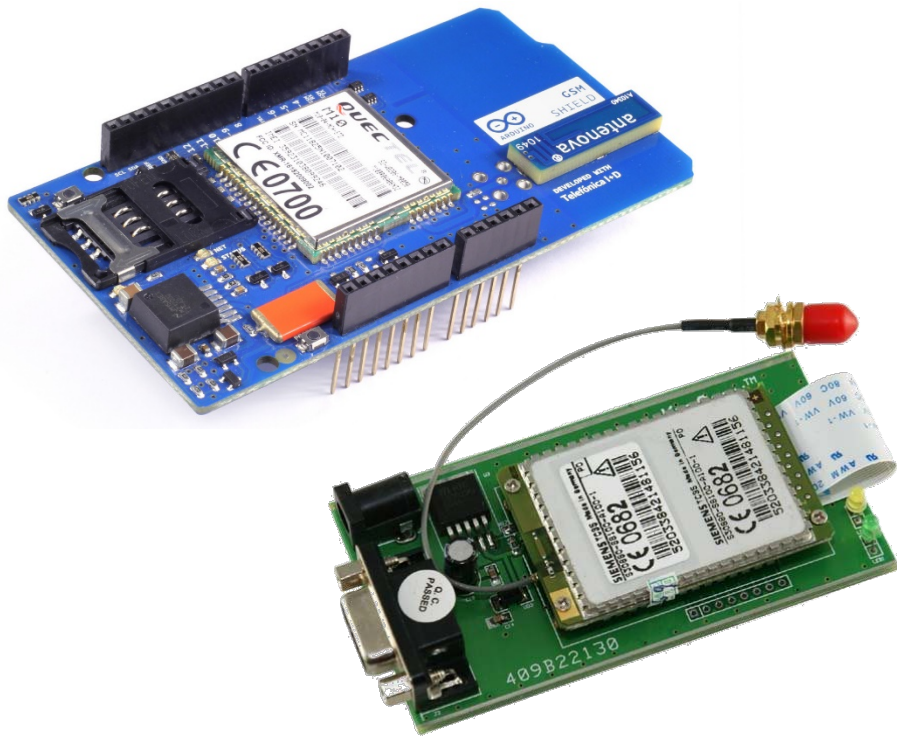
▶ Bluetooth

▶ Minimum Requirements

- ▶ Low power consumption
- ▶ Can be configured (PIN, name, ...)
- ▶ Signal indicating connection status



Choosing Components



▶ GSM Modem

- ▶ Arduino GSM shield
- ▶ SIM900
- ▶ TC35i

▶ Minimum Requirements

- ▶ Power saving modes
- ▶ Ring signal
- ▶ External antenna



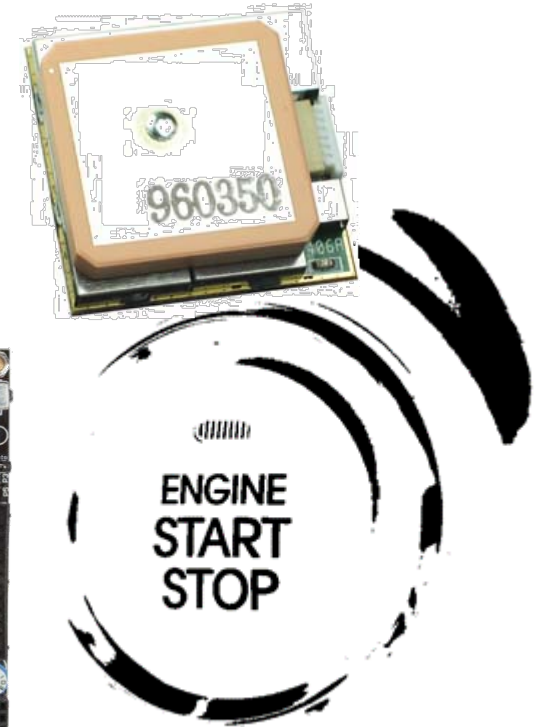
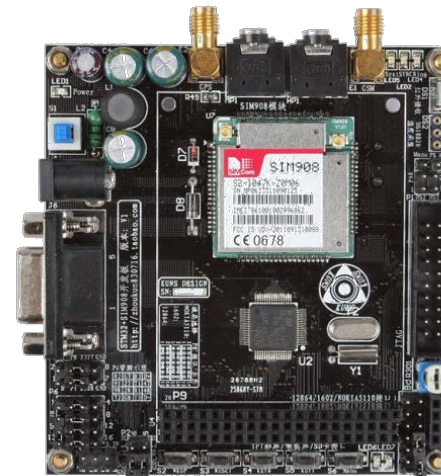
Choosing Components

▶ GPS Module

- ▶ Different modules are available
- ▶ SIM908

▶ Minimum Requirements

- ▶ Low power consumption
- ▶ Fast GPS Fix



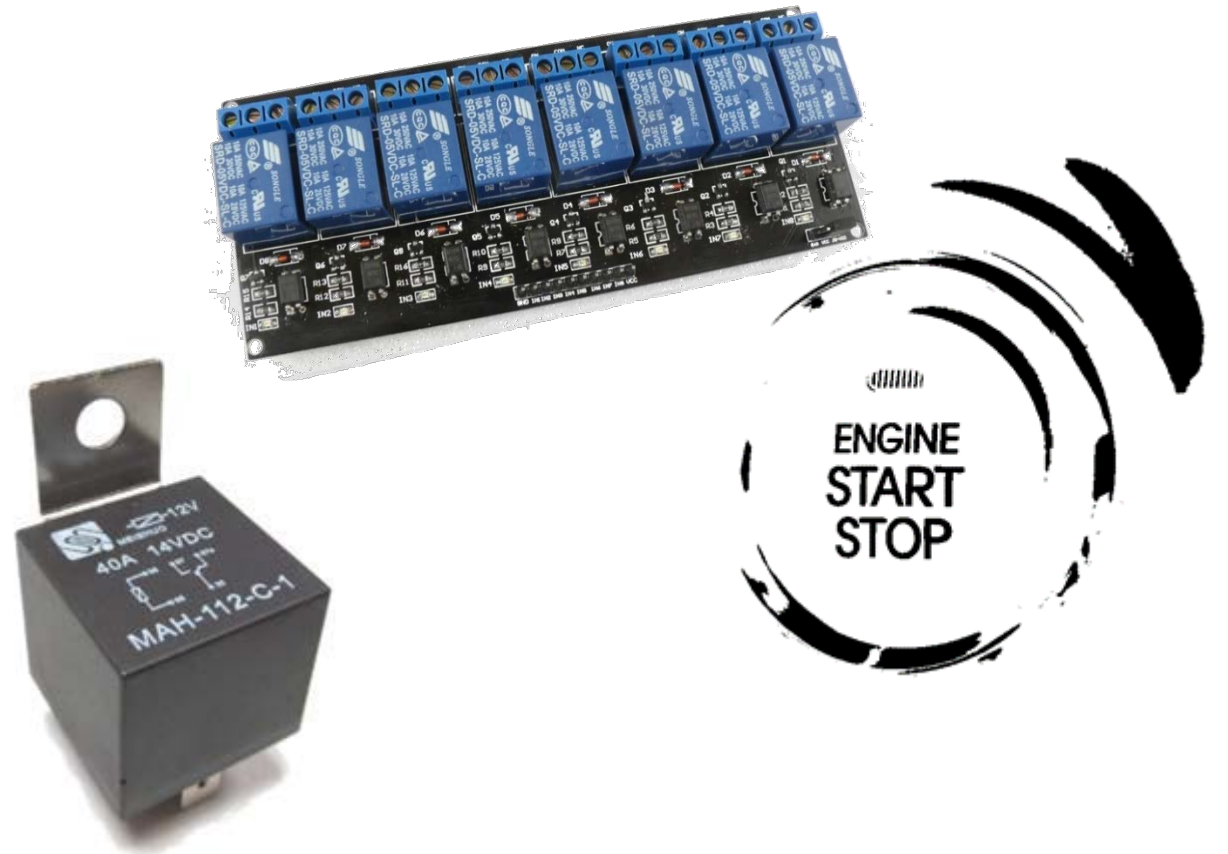
Choosing Components

▶ Relays

- ▶ Relay boards
- ▶ Automotive Relays

▶ Minimum Requirements

- ▶ Rated at high current
12V ~30-40A

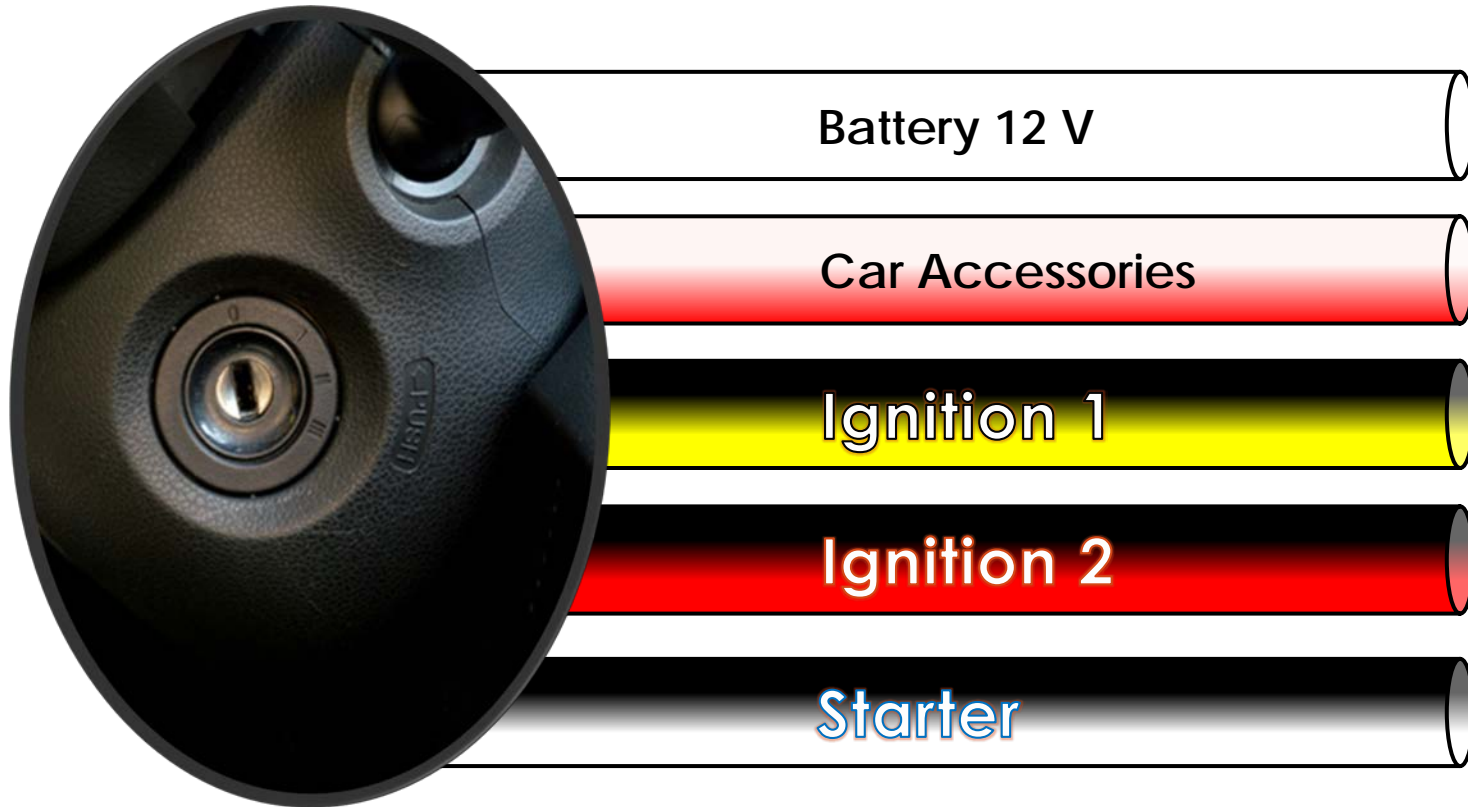


System Prototyping

- ▶ The system will be designed to work on all cars
- ▶ Prototyping will be done on
 - ▶ Honda Accord 2003



Car Ignitions Wirings



Car Security System

- ▶ The car panics at any attempt such as powering the ignition wires
- ▶ The security system must be controlled
- ▶ Security System Integrated in the driver door module
- ▶ Security System Controls the door locks as well



Door Locks Control



- ▶ Security System Controls the door locks
- ▶ Doors will be open after remote starting the car
- ▶ Relocking the doors is necessary

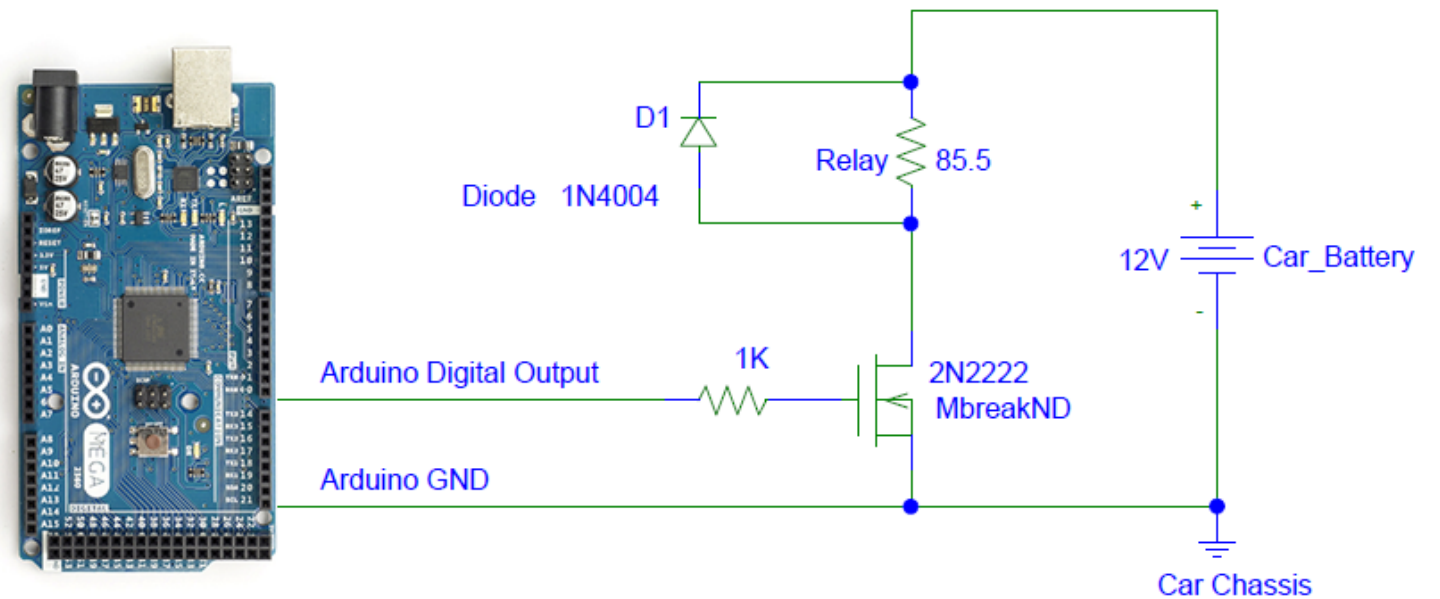
Ignition Control

Wire \ Mode	White/Red ACC	Black/Yellow IGN1	White 12V	Black/Red IGN2	Black/White Starter
OFF					
ACC	○	○	○		
ON	○	○	○	○	
Start		○	○		○



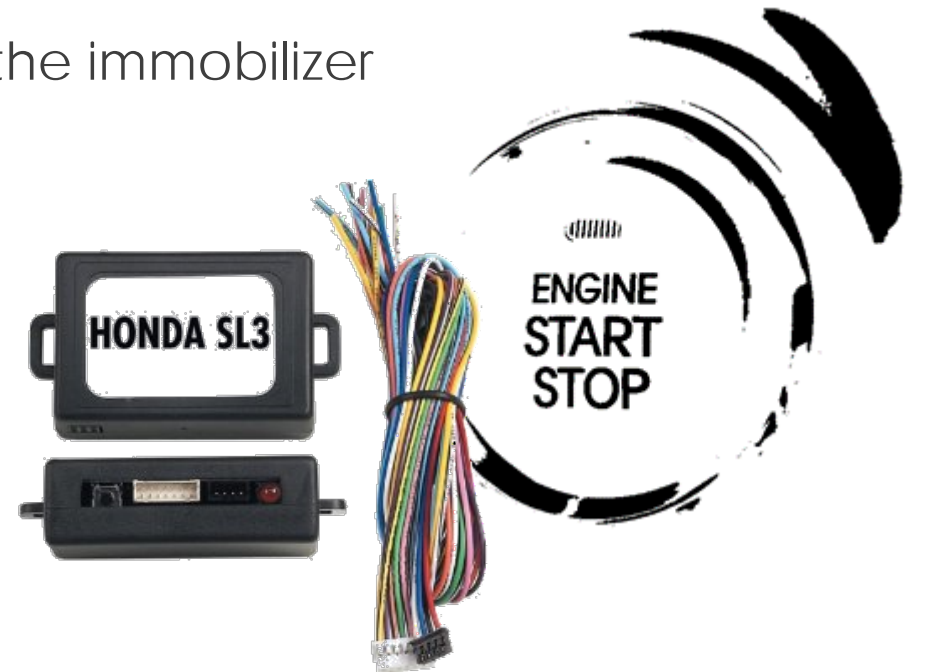
Relays Controlling Circuit

- ▶ Relay is represented by its coil resistance
- ▶ Circuit for controlling one relay
- ▶ Relay line terminals are not shown



Immobilizer System

- ▶ Prevents hot wiring the car
- ▶ Several methods were evaluated for bypassing the immobilizer
- ▶ Honda-SL3 Immobilizer is used for prototyping



Bypassing the Immobilizer System



Bypasser Module

8 Pins Connector

- Blue
- Yellow
- Black/Orange
- Purple/White
- Orange

4 Pins Connector

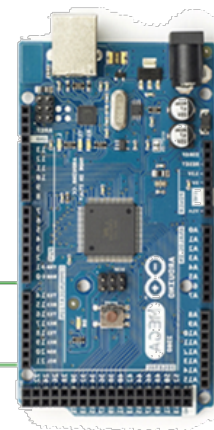
- Red
- Black

2N2222A

1K

Arduino Digital Output
Bypass Activation

Arduino Ground



Engine Starting

- ▶ Currently taken approach
 - ▶ Disable the security system of the car
 - ▶ Enable the bypasser module
 - ▶ Set the ignition mode to ON
 - ▶ An optional action of relocking the doors
 - ▶ The system may wait for few seconds (depend on car model)
 - ▶ The system will set the ignition mode to the START for ~960ms
 - ▶ After starting the car, the system should set the ignition mode of the car to the ON mode as long as the car is running without a key.



Thank you

