-IHSAN ISIK

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2012

SARAJEVO COLLEGE

SMART DRIVE

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CONTENTS

ABSTRACT

Ever paid for the traffic bill that your friend has got while driving your car? Or ever wanted to know where your car visited the week before? Of course you had some times that you wanted your car to be safe enough that no thief could try to steal. Nowadays people have a lot of problems like these. So we thought about a new, cheap and easy method for solving this kind of issues.

Imagine a system that a driver's license is a magnetic card and he shows his license to the reader in his car every time he gets in his car. So that the system easily keeps the tracks of people using his car, or when his car has been used, etc. imagine the car having GPS system keeping track of the places his car has visited, or where his car is in the moment. Imagine a car not working without a driver license shown so that thieves wouldn't try to steal cars even if they do they would easily be caught by the system sending their data to the government.

So this kind of traffic issues can easily be solved with a bunch of hardware control and a bit programming. The only thing we need to do is to work more on this project. Improve it and start using this kind of technologies in our lives.

SMART DRIVE

INTRODUCTION

We thought about a smarter traffic system, which the drivers in the system would have their unique IDs written inside their RFID cards. These cards would allow the goverenment to avoid writing bills to innocent people that gave their car to a friend, relative, etc. They would also decrease the percentage of car theft to almost o%. How that? Easily, since the cars wouldn't work without the card shown to the reader the thieves wouldn't be able to start the engine. If they show their own card to the reader the reader wouldn't accept because the Card wasn't registered on that car earlier.

By the Card management system in the car the owner would be able to allow or deny permission to drive his car to some people.

If this project is improved, even more functionality might be added. Imagine that a GPS module is added and the car can be tracked by the owner. In case that a thief stole the car somehow the owner can easily find where his car is. Or the owner gave his car to a friend and wants to know where his car is at that moment, the first thing he has to do is to go and check the GPS.

Imagine adding an RF Transmitter to the car for wireless comunication. You would be able to see the speed, location, the driver inside the car, etc. Or even more could be added. Imagine you left your car in front of your house to take you keys that you forgot before some minutes, after you take your keys you go back to your car, but what's that? someone in the car driving it away. So, what will you do now? Oh, wait you remember that you had a remote controller. You take the controller in your hand amd just stop the engine before the car goes father.

This cool project might be improved even more if more features added...

MATERIALS AND METHODS

DECIDING FOR THE PARTS

As the basic idea of the project shaped itself in our minds. We needed some help in the methods we would use. So at this point our teacher Sabahudin Husic helped us decide in which modules we would use. We decided using Arduino's Uno board and and RFID card reader module.

PARTS/MODULES USED:

-13.56MHZ RFID Reader/Writer Module
-Arduino UNO
-LCD Screen

MAKING THE RFID READER WORK

As soon as our modules arrived we started working on them. But we faced some issues on our RFID Card reader. we couldn't make it read the card. After changing some HEX values in the code, finally we made it work.

MAKING THINGS WORK TOGETHER

Now that our Reader was working through our serial connection over Arduino Microcontroller the next thing to do was to read the data sent by the reader and read the driver's information and check if the driver was known by the system and if yes print his ID on our LCD screen in the front side of our car, let the driver turn the car on...

We designed the circuit on our breadboard for testing. After some test we decided that everything was ok, and that we could start soldering everything.

STABILIZING THINGS

After the soldering process we encountered some other issues. At first our RFID reader didn't work, we thought we should desolder and solder all the wires. But after we checked everething more carefully we understood that everything was ok with the soldering, and that we should take a look at the code.

We checked the code, then removed some snippets that somehow prevented the code from functioning correctly.

Now that our RFID reader was working as needed. We proceeded with the LCD screen which turned up to be not working. We spent some time on solving the errors. Finally we found out that the problem was becouse of a potensiometer in the circuit. When we changed the potentiometer with a new one everything worked as we wanted.

1 13.56MHZ RFID Reader/Writer Module

This RFID module is desgined based on MFRC522. It is a highly integrated reader/writer for contactless communication at 13.56MHz. It supports ISO 14443A/MIFARE mode and MIFARE Classic (e.g. MIFARE Standard) products. Contactless communication using MIFARE higher transfer speeds up to 848kbit/s in both directions.

FEATURES

-Highly integrated analog circuitry to demodulate and decode responses
-Supports ISO/IEC14443A/MIFARE
-Typical operating distance in Reader/Writer mode for communication to a ISO/IEC14443A /
-MIFARE is 40~50 mm
-Supports MIFARE Classic encryption in Reader/Writer mode
-Supports ISO/IEC14443A higher transfer speed communication up to 848kbit/s
-Control by Serial UART interface: Baud rate could be 2400bps ~ 115200bps, with default baud rate 9600bps
-With the chip ISO14443, it supports MIFARE standard encryption algorithm
-Configuration data is preserved in EEPROM against power cut off
-Built-in 8K EEPROM, easy to access it by sending commands
-Easy to use, by sending simple commands users can control it to read or write cards
-In compact command, command is as short as one byte
-Excellent EMC performance
-ROSH: Lead-free

PARAMETER

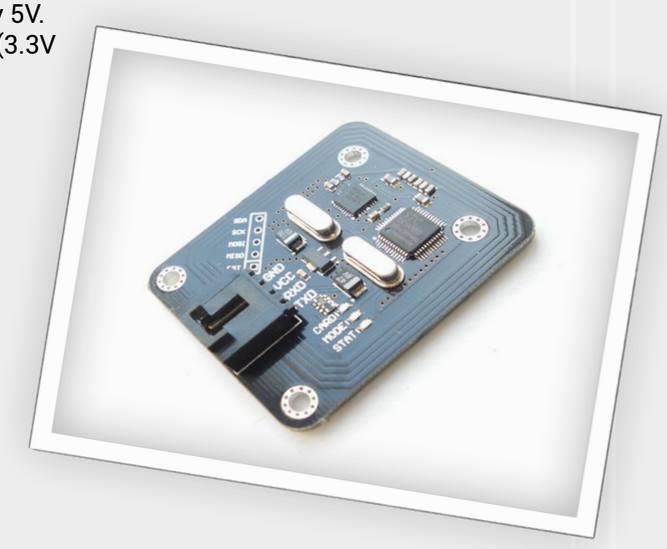
-Power Supply: 4.5V~5.5V, typically 5V.
-Interface: UART (5V TTL) and SPI (3.3V TTL)
-Size: 40mm x 50mm

USAGE

-Baud rate could be 2400bps ~ 115200bps

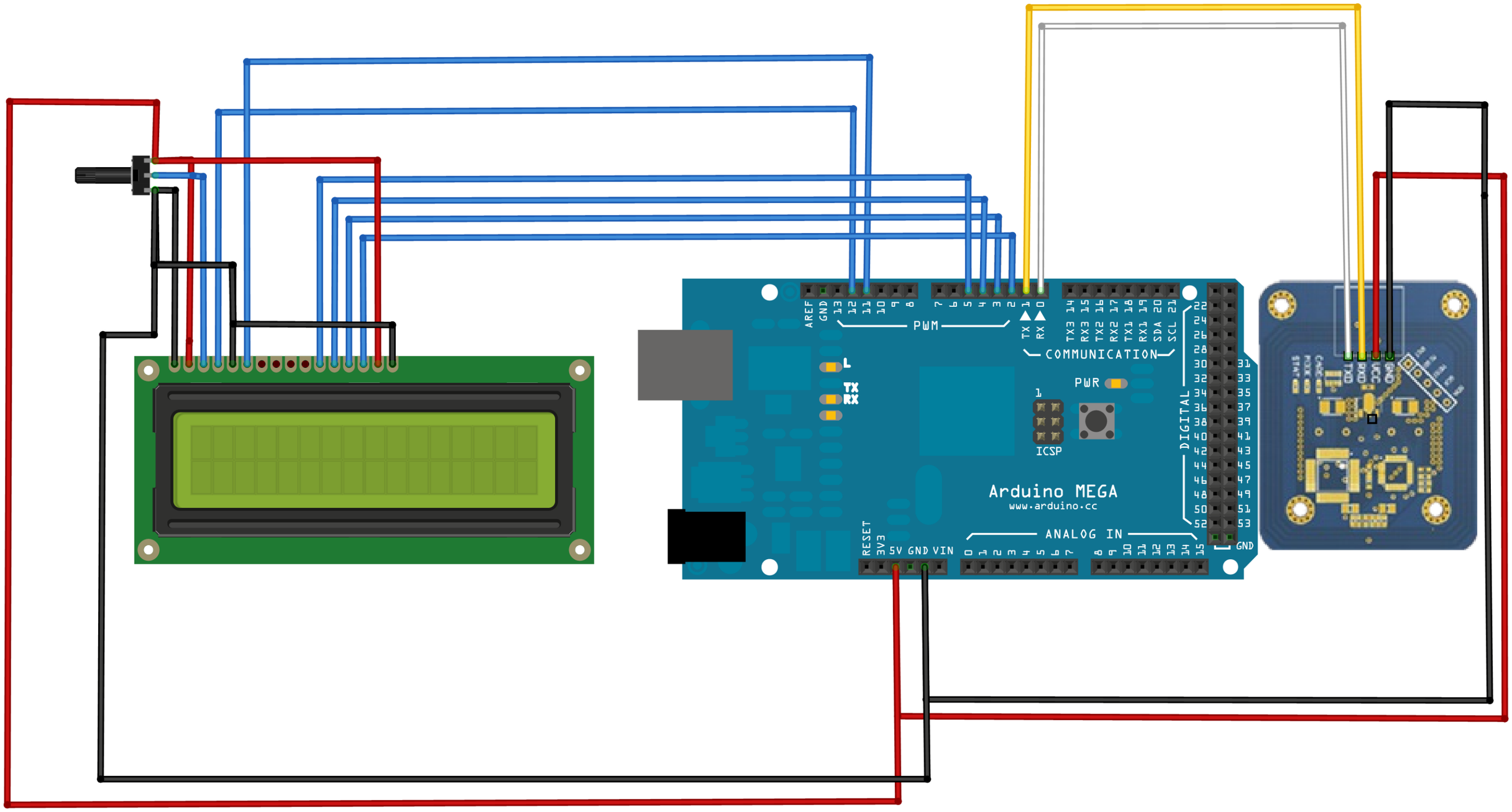
DEFAULT SETTINGS

-Baud Rate: 9600bps
-Parity bit: None
-Start bit: 1
-Data bit: 8
-Stop bit: 1



MORE INFO: http://www.elechouse.com/elechouse/index.php?main_page=product_info&cPath=90_93&products_id=2156

SCHEMATICS


AREF
GND
PWM
TX
RX
COMMUNICATION
DIGITAL
L
TX
RX
PWR
ICSP
Arduino MEGA
www.arduino.cc
ANALOG IN
RESET
3V3
5V
GND
VIN
GND

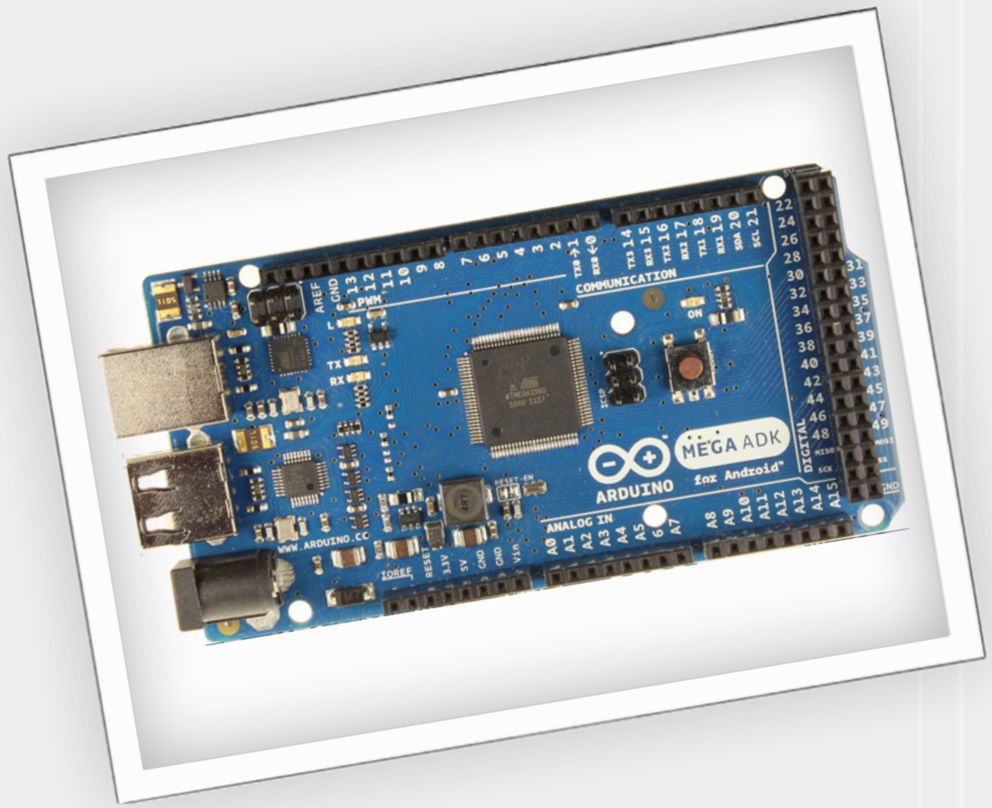
2 ARDUINO MEGA ADK

WHAT IS ARDUINO?

Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments.

ARDUINO MEGA ADK:

The Arduino ADK is a microcontroller board based on the ATmega2560. It has a USB host interface to connect with Android based phones, based on the MAX3421e IC. It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.



MORE INFO: http://store.arduino.cc/ww/index.php?main_page=product_info&cPath=11_12&products_id=144

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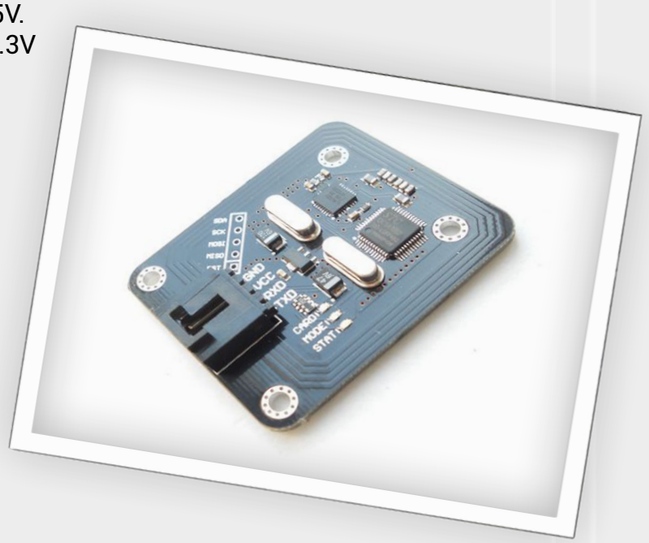


MORE INFO: http://www.elechouse.com/elechouse/index.php?main_page=product_info&cPath=90_93&products_id=2156

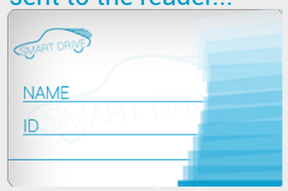
RESULT

As a result we got a fully functioning anti-theft driver identification system.

HOW THINGS WORK?

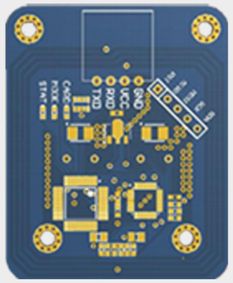
1

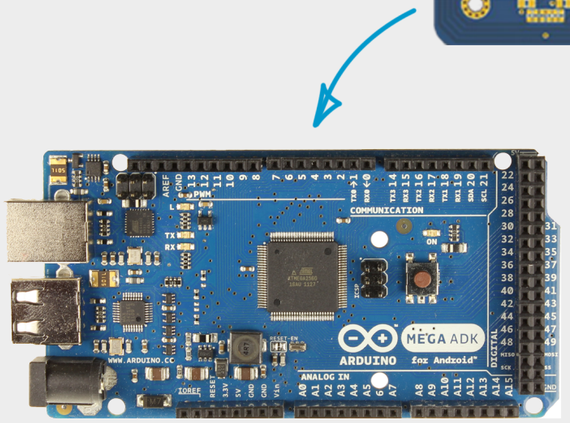
Data in the card is sent to the reader...



2

The data is read by the reader and sent to Arduino...





3

Arduino receives the data sent by the reader and detects if the data belonging to the driver is known or not. If known then it lets the driver drive the vehicle and sends the driver's NAME and his/her ID to the LCD screen in front of the car.. If unknown then the driver can't drive.

4

As the final step the LCD screen displays the driver's NAME and his/her ID.

DISCUSSION

POSIBLE IMPROVEMENTS

This project might be improved in several ways by adding some other modules and/or parts.

GPS MODULE

We might add a GPS module to track the location, speed, and journey of the vehicle.

RF TRANSMITTER

We might also use an RF Transmitter to remotely read data, such as the vehicle's speed, its location, the driver's name and his/her ID from the vehicle. We might read some other data too..

Although this does not include these functions they might be added later if wanted.

CONCLUSION

During the times we spent for doing this project we learn some new stuff too, we learnt how the RFID system worked and the method for using readers to get the information put inside the RFID cards..

Although our project is enough for the system planned, we may add some extra features too. The functions that we might add include Wireless Communication for reading data remotely, a GPS module for tracking the car's location and it's speed. And maybe some other small functions such as Blacklisting for drivers, License filtering (e.g. C class driver not able to drive a B class car) etc..

ACKNOWLEDGMENTS

We thank our instructor Sabahudin Husic mostly because of giving lessons to us on electronics. We also thank him for his help in choosing the most suitable parts/modules for our project, and for his help in understanding the commands for our RFID reader module, and for his help in every problem we faces during the development of our project.

We thank Metin Isik for his support and his financial help. We also thank him for all his effort on making the RFID reader work. We thank him for his ideas. We should also mention that he gave the main idea of this project.

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INSTRUCTORS

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