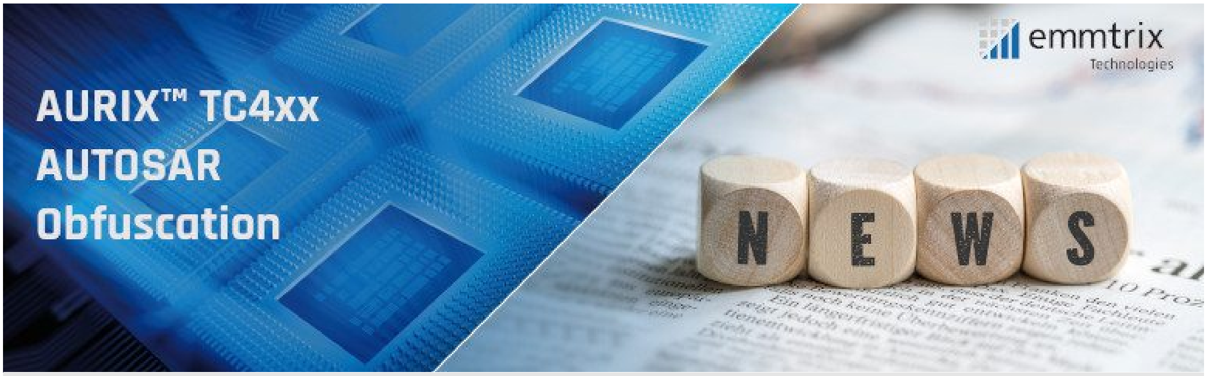


emmtrix newsletter, July 2021

Dear Mr. Doe,

After a long year of starts and stops business is back and we are happy to note that our core topic of making multicore programming accessible is becoming ever more relevant.

In this newsletter we are focusing on automotive topics such as the AURIX™ in its 3rd generation (watch this spot, more to come in our next issues) and AUTOSAR. We have also got a short piece on code obfuscation, a nifty little tool our development has come up with recently.

As our highlight this time let us tell you about our plans for supporting vector accelerators. This is a very promising development with significant acceleration potential and we are planning to offer a casual, welcome-back-to-work Q&A session in the early autumn where we will outline the topic in some 20 minutes and then discuss with you its relevance and your requirements.

Automated Support for AURIX™ TC4xx PPU

emmtrix Technologies has been working on a solution that targets upcoming vector processing units that are optimized to greatly improve performance of data-parallel workloads by working on many data elements simultaneously.

Our solution identifies the algorithms and data types used in, for example, a Simulink model and provides a hardware-optimized implementation that considers the vector width, instructions, and memory layout. This is coupled with an automated optimization process and a continuous performance analysis feedback loop, with the user able to specify transformations to explore the best speed-up.

The results rival the performance of hand-written implementations and are available much faster and free from errors.

The solution should be available this autumn for evaluation.

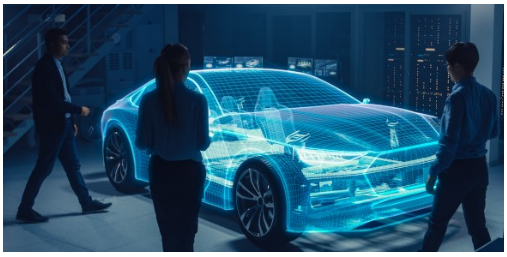
I want to know more

We are planning to host a one-off short 20-minute presentation with Q&A session in early autumn, with a full webinar to follow suit.

Let us know if this is of interest to you by completing a very short survey.

Go to survey

emmtrix goes AUTOSAR - finally



emmtrix Technologies is in the process of putting in place support for projects based on AUTOSAR.

Initially we will focus on providing an analysis and software distribution solution for projects based on the AUTOSAR Classic Platform. Our tool will help system architects, software architects and software engineers to understand the runtime behavior of software components and runnables and provide help with the distribution of software parts across multiple cores of an ECU. All this will strictly adhere to the AUTOSAR specification, which in turn will ensure interoperability of our solution portfolio with tools and software stacks across all vendors within the AUTOSAR ecosystem.

This is a mid-term project with completion currently predicted in the first half of 2022.

I want to know more

Code Obfuscation

A new feature of ePS is a transformation that performs code obfuscation.

When applied, all variables, function names and types are renamed based on an SHA-1 hashing algorithm. This irreversible process ensures that the source code only contains the same level of information as a disassembled binary. As the structure of the program is not affected by the obfuscation, the code can safely be shared with third parties for (static) code analysis, performance estimation or other purposes.

The example below shows parts of a Sobel filter application before and after the code obfuscation.

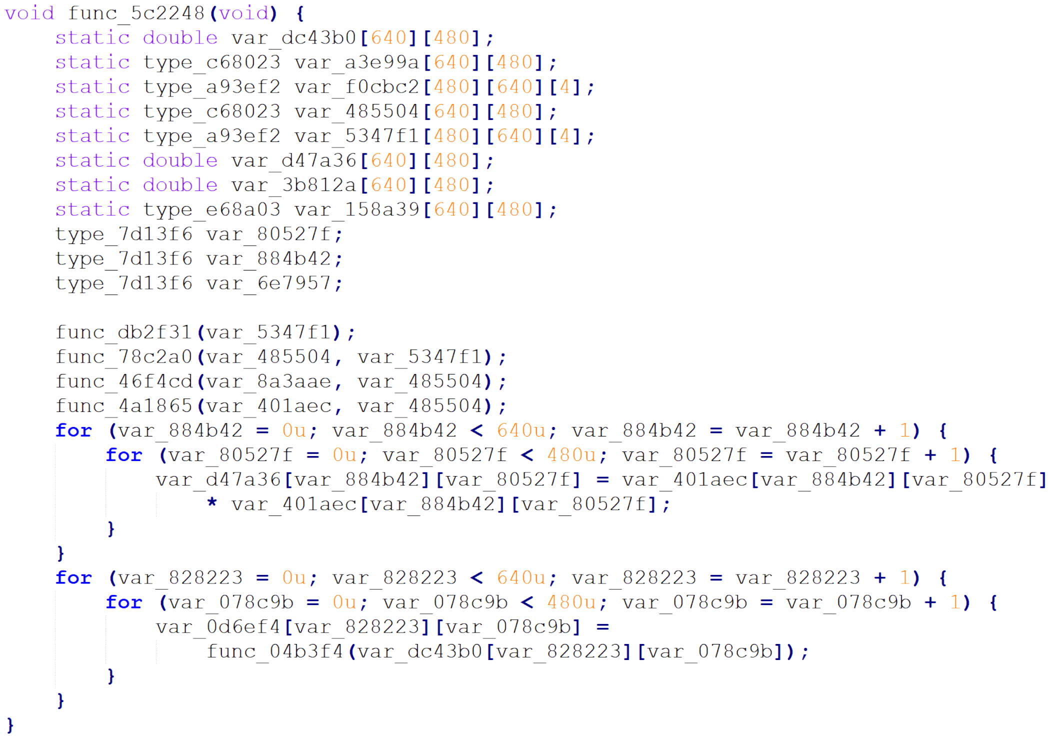
Original Code:

```
void edge_sobel_step(void) {
    static double Add_out0_data[640][480];
    static int32_t Gain1_out0_data[640][480];
    static uint8_t MATLAB_Function_out0_data[480][640][4];
    static int32_t MATLAB_Function1_out0_data[640][480];
    static uint8_t MATLAB_Function2_out0_data[480][640][4];
    static double Product_out0_data[640][480];
    static double Product1_out0_data[640][480];
    static bool Relational_Operator_out0_data[640][480];
    size_t i1;
    size_t i2;
    size_t i3;

    interface_indata(MATLAB_Function2_out0_data);
    MATLAB_Function1_step(MATLAB_Function1_out0_data,
        MATLAB_Function2_out0_data);
    conv2_1(conv2Hor_out0_data, MATLAB_Function1_out0_data);
    conv2_2(conv2Ver_out0_data, MATLAB_Function1_out0_data);

    for (i2 = 0u; i2 < 640u; i2 = i2 + 1) {
        for (i1 = 0u; i1 < 480u; i1 = i1 + 1) {
            Product_out0_data[i2][i1] = conv2Ver_out0_data[i2][i1]
                * conv2Ver_out0_data[i2][i1];
        }
    }
    for (i8 = 0u; i8 < 640u; i8 = i8 + 1) {
        for (i7 = 0u; i7 < 480u; i7 = i7 + 1) {
            Signed_Sqrt_out0_data[i8][i7] = sqrt(Add_out0_data[i8][i7]);
        }
    }
}
```

Obfuscated Code:



```
void func_5c2248(void) {
    static double var_dc43b0[640][480];
    static type_c68023 var_a3e99a[640][480];
    static type_a93ef2 var_f0cbc2[480][640][4];
    static type_c68023 var_485504[640][480];
    static type_a93ef2 var_5347f1[480][640][4];
    static double var_d47a36[640][480];
    static double var_3b812a[640][480];
    static type_e68a03 var_158a39[640][480];
    type_7d13f6 var_80527f;
    type_7d13f6 var_884b42;
    type_7d13f6 var_6e7957;

    func_db2f31(var_5347f1);
    func_78c2a0(var_485504, var_5347f1);
    func_46f4cd(var_8a3aae, var_485504);
    func_4a1865(var_401aec, var_485504);
    for (var_884b42 = 0u; var_884b42 < 640u; var_884b42 = var_884b42 + 1) {
        for (var_80527f = 0u; var_80527f < 480u; var_80527f = var_80527f + 1) {
            var_d47a36[var_884b42][var_80527f] = var_401aec[var_884b42][var_80527f]
                * var_401aec[var_884b42][var_80527f];
        }
    }
    for (var_828223 = 0u; var_828223 < 640u; var_828223 = var_828223 + 1) {
        for (var_078c9b = 0u; var_078c9b < 480u; var_078c9b = var_078c9b + 1) {
            var_0d6ef4[var_828223][var_078c9b] =
                func_04b3f4(var_dc43b0[var_828223][var_078c9b]);
        }
    }
}
```

I want to know more

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Impressum:
emmtrix Technologies GmbH
Haid-und-Neu-Straße 7
76131 Karlsruhe
www.emmtrix.com
Newsletter abbestellen