CODESYS

Features and Improvements

CODESYS V3.5 SP14
AGENDA

1. Engineering
2. Runtime
3. Visualization
4. Motion + CNC
5. Fieldbus
6. Safety
Overview

- Improvements of the intelligent input assistance
- Watchlist
- New data type
- Multicore devices
- Extensive improvements of the ST editor
- CFC
- General improvements
Improvements of the intelligent input assistance

- Preselection for component access
- Categories
  - Open with Ctrl+Space
  - Switch pages with arrow left / right
Improvements of the intelligent input assistance

- Filters
  - Independent of character position in the search item
  - Character highlighting
Watchlist

- Type cast for pointers in the watchlist
- Monitoring of instance via interface, also in case of dynamically created objects
- Monitoring of the instance when reference is made via pointer
New data type

- New data type: __VECTOR[3] of LREAL or REAL
  Syntax:
  `<variable name> : __ VECTOR[ <vector size> ] OF <element type> ( :=initialization> )? ;`
  
  `<vector size> : 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8`
  `<element type>: REAL | LREAL`

- Support of operators for parallel processing, e.g. __VCADD, __VCMUL, __VCDOT
Multicore devices

- Atomic operators for task synchronization
- Online view for core deployment
Extensive improvements of the ST editor

- **Highlighting of identical symbols**
  - When the cursor is on a symbol name, all occurrence locations of the symbol within the editor are highlighted.

```c
10 Timer(IN:= TRUE, PT:= TextTimer);
11 str_Text:=StrArray[index];
12 BildIndex:=BildArray[index];
13 IndustriesTitle:=IndustriesArray[index,0];
14 IndustriesSubText:=IndustriesArray[index,1];
15 IndustriesSubText2:=IndustriesArray[index,2];
16 IF [Timer.Q THEN
   index:=index+1;
   IF index=iMaxIndex+1 THEN
      index:=0;
   END_IF
17 END_IF
18 Timer(IN:= FALSE);
19 END_IF
```
Extensive improvements of the ST editor

- Incremental search for strings
  - Open input field at bottom edge by Ctrl+Shift+i
  - Set cursor at search location by pressing the arrow buttons or Alt+Page Up / Down
Extensive improvements of the ST editor

- Comment multiple selected lines at once
  - Via context menu
  - Via shortcut: Ctrl+O / Ctrl+I
Extensive improvements of the ST editor

- Themes for optical display
  - Stored at C:\Program Files (x86)\CODESYS 3.5.14.0\CODESYS\Themes
Extensive improvements of the ST editor

- **Editing columns via keyboard operation**
  - **Shift+Alt+ →**: The selected area is extended one position to the right
  - **Shift+Alt+ ←**: The selected area is extended one position to the left
  - **Shift+Alt+ ↑**: The selected area is extended one position up
  - **Shift+Alt+ ↓**: The selected area is extended one position down

```plaintext
20  iLocal_1 := aiCardGame[1, 3, 5]; // Assignment of 10
21  iLocal_2 := aiCardGame[2, 3, 5]; // Assignment of 20
22  iLocal_3 := aiCardGame[1, 4, 5]; // Assignment of 30
23  iLocal_4 := aiCardGame[2, 4, 5]; // Assignment of 40
24  iLocal_5 := aiCardGame[1, 3, 6]; // Assignment of 50
25  iLocal_6 := aiCardGame[2, 3, 6]; // Assignment of 60
26  iLocal_7 := aiCardGame[1, 4, 6]; // Assignment of 70
27  iLocal_8 := aiCardGame[2, 4, 6]; // Assignment of 80
```
Extensive improvements of the ST editor

- **Auto declare via “Smart Tags”:** Suggestion of appropriate commands directly at the programming element
  - To open the auto declare dialog:
    - Ctrl+.  
    - ↓  
    - Enter
CFC

- Accelerated multiple insertion of an element from the ToolBox in the CFC editor
  - Select the element in the ToolBox view
  - Press the Ctrl key and left-click in the editor
  - An element is inserted on each click
General improvements

- Display of access modifiers („PROTECTED“, „PRIVATE“, „INTERNAL“) in the device tree
General improvements

- Global and persistent bookmarks in the source code
General improvements

- Improved scaling with high DPI monitors (as of Windows 10)
  → No blurring

CODESYS V3.5 SP13 Patch 2 and descending

![CODESYS V3.5 SP13 Patch 2 and descending](image)

CODESYS V3.5 SP14

![CODESYS V3.5 SP14](image)
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Overview

- PLC Handler
- OPC UA
- Security
- MemPoolManager
- ARM devices
- Raspberry Pi
PLC Handler

- 64-bit version for Windows and Linux
- Encrypted communication
- Standard monitoring for embedded controllers
OPC UA

- Access to complex data types via single query
Security

- Encrypted communication configurable as user option
- User administration configurable as optional or obligatory
MemPoolManager

- Reduced locking:
  Reduced interference from tasks running in parallel
  → Reduced jitter
ARM devices

- 64-bit runtime system for ARM devices
Raspberry Pi

- **Option:** Multicore for Raspberry Pi (starting with Pi2 model B)

<table>
<thead>
<tr>
<th></th>
<th>Pi Zero</th>
<th>Pi Zero W / WH</th>
<th>Pi 1 Mod. A</th>
<th>Pi 1 Mod. A+</th>
<th>Pi 1 Mod. B</th>
<th>Pi 1 Mod. B+</th>
<th>Pi 2 Mod. B</th>
<th>Pi 2 Mod. B v1.2</th>
<th>Pi 3 Mod. B</th>
<th>Pi 3 Mod. B+</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU</strong></td>
<td></td>
<td></td>
<td>ARM1176</td>
<td></td>
<td></td>
<td></td>
<td>Cortex A7</td>
<td></td>
<td>Cortex A53</td>
<td></td>
</tr>
<tr>
<td><strong>ARM Core</strong></td>
<td></td>
<td></td>
<td>ARMv6</td>
<td></td>
<td></td>
<td></td>
<td>ARMv7</td>
<td></td>
<td>ARMv8</td>
<td></td>
</tr>
<tr>
<td><strong>Cores</strong></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Pi 0/1 = Singlecore  
Pi 2/3 = Multicore
Raspberry Pi

- Option: Multicore for Raspberry Pi (starting with Pi2 model B)

<table>
<thead>
<tr>
<th>Name</th>
<th>Vendor</th>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CODESYS Control for BeagleboneBlack SL</td>
<td>3S - Smart Software Solutions GmbH</td>
<td>3.5.13.20</td>
<td>CODESYS Control from 3S</td>
</tr>
<tr>
<td>CODESYS Control for emPC-A-MX6 SL</td>
<td>3S - Smart Software Solutions GmbH</td>
<td>3.5.13.20</td>
<td>CODESYS Control from 3S</td>
</tr>
<tr>
<td>CODESYS Control for Linux SL</td>
<td>3S - Smart Software Solutions GmbH</td>
<td>3.5.14.0</td>
<td>CODESYS Control from 3S</td>
</tr>
<tr>
<td>CODESYS Control for Raspberry Pi 32 with Linux</td>
<td>3S - Smart Software Solutions GmbH</td>
<td>3.5.14.0</td>
<td>CODESYS Control for Raspberry Pi 32 with Linux</td>
</tr>
<tr>
<td>CODESYS Control for Raspberry Pi MC SL</td>
<td>3S - Smart Software Solutions GmbH</td>
<td>3.5.14.0</td>
<td>CODESYS Control for Raspberry Pi MC. Supports Raspberry Pi 2 and above and MultiCore capabilities.</td>
</tr>
<tr>
<td>CODESYS SoftMotion RTE V3</td>
<td>3S - Smart Software Solutions GmbH</td>
<td>3.5.14.0</td>
<td>A CODESYS 3.x SoftMotion Soft PLC with hard realtime for Win32</td>
</tr>
<tr>
<td>CODESYS SoftMotion RTE V4</td>
<td>3S - Smart Software Solutions GmbH</td>
<td>3.5.14.0</td>
<td>A CODESYS 3.x Soft PLC for Win4</td>
</tr>
</tbody>
</table>

Group by category: Display all versions (for experts only): Display outdated versions
1. Engineering
2. Runtime
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Overview

- Improvements in trend and standard elements
- General improvements
- CODESYS HMI SL
Improvements in trend and standard elements

- **Trends:**
  - Graphs with filling colors
Improvements in trend and standard elements

- Configurable radii for rectangles:
  From style, relative to the element size, explicit

- Combo boxes:
  Dynamically adaptable value ranges
Improvements in trend and standard elements

- Frame shifting (previous / next)
General improvements

- Alarms:
  Alarm storage includes time zone information
  → Stored times remain stable when changing between summer and winter time.
CODESYS HMI SL

- CODESYS HMI SL:
  Dynamic communication settings in data sources
  → IP addresses can be set via variable, e.g. visualization or configuration dialog
AGENDA

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Overview

- Robotics
Robotics

- Improvements in quality:
  Smoother movements, improved blending and many bug fixes

- Improvements in reproducibility:
  Identical speed profile when moving along the same trajectory multiple times

- Improvements in performance:
  Increased performance on ARM PLCs
AGENDA

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Overview

- Device descriptions
- CAN
- EtherCAT
- EtherNet/IP
- KNX
- PROFINET
Device descriptions

- Device descriptions can be post-installed in the scan dialog

  ➔ No need to close the scan dialog
CAN

- IXXAT CAN minidriver implemented:
  Support of the USB adapter from IXXAT (Gateway and CODESYS Control Win V3)

- EL6751:
  Support 29 bit CAN frames
  → J1939 possible with the EtherCAT CAN Gateway
EtherCAT

- Support of redundant networks in CODESYS: Joint PLC redundancy and cable redundancy
- Support of new devices for Fast Hot Connect: Physicstype H supported in ESI files
- Option to split EtherCAT frames: Separation of process data and asynchronous data into two separate frames → reduced jitter
EtherNet/IP

- Improved EDS Interpretation:
  - Support for connection path parameters
  - Support for enumeration bit strings
  - Support for parameters with scaling
  - Improved EDS validation

- Support of “Change of State Connections” for scanner and adapter
KNX package as add-on:
Configurator for I/O channels, KNXnet/IP protocol stack, data exchange function with ETS5, plug-in for ETS5
→ Updates independent of the overall system
KNX

- KNX Editor:
  Possibility of direct editing within the table
- Additional output channel for control of status byte
- Trigger output action:
  Separation into two bits for sending or disabling of cyclic transmission
- Download of the CODESYS plug-in for ETS5 directly at KNX
PROFINET

- Pass the latest PNO conformance test (automated)
- PROFINET device:
  - Function blocks for adding/removing module diagnosis
- Support of reconfiguration for controller (CIFX) and device (IEC)
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- CODESYS PROFIsafe F-Device
CODESYS PROFIsafe F-Device

- New add-on product: CODESYS PROFIsafe F-Device V2.6
  - Slave part of the PROFIsafe protocol
  - Product for manufacturers of Safety devices
  - Completely integrated extension in the runtime system and programming system
  - Ready-to-use adaptation for CODESYS PROFINET Device, further PN Device solutions possible
CODESYS PROFIsafe F-Device
Thank you for your attention.

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