

Embedded Programming with Ada

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Ada and SPARK

- Designed for Safety and Security
- Powerful means of specification
- Strong type checking
- Object Oriented Programming
- Concurrent programming features, including support for multicore
- Generic templates
- Encapsulation
- Hierarchical program composition / programming-in-the-large

Specifications

```
type Power is range 0 .. 100;

procedure Set_Motor_Power (P : Power);
--  Set desired power for the motor
```

Resources and Performances

Comparable to C/C++ for the same level of features:

- Do you need exceptions?
- Do you need Object Oriented Programming?
- Do you need an RTOS?
- Do you need run-time checks?

Supported Platforms

- ARM Cortex-A
- ARM Cortex-R
- ARM Cortex-M
- PowerPC 32 and 64
- x86 and x86-64
- SPARC
- RISC-V
- and more...

Ravenscar Tasking

A.K.A There's a mini-RTOS in my language¹

- Tasks (threads)
- Time handling
 - Clock
 - Delays
- Protected Objects:
 - Mutual exclusion
 - Synchronization between tasks
 - Interrupt handling

¹blog.adacore.com/theres-a-mini-rtos-in-my-language

Hardware mapping

```
-- High level view of the type
type Power is range 0 .. 100

-- Hardware representation of the type
with Size      => 8,
     Alignment => 16;
```

Interfacing with C / Assembly

```
with Interfaces.C; use Interfaces.C;

[...]

function My_C_Function (A : int) return int;
pragma Import (C, My_C_Function, "my_c_function");

function My_Ada_Function (A : int) return int;
pragma Export (C, My_Ada_Function, "my_ada_function");
```

Getting started demo

Download and install the tools: adacore.com/community

Download GNAT Community Edition

For free software developers, hobbyists, and students.

x86-64 GNU Linux (64 bits)

GNAT GPL Ada

[gnat-gpl-2017-x86_64-linux-bin.tar.gz](#)
SHA-1: 9682e2a1f2f232ce03fe21d77b14c37a0de5649b

496.34 MB May 17 2017

SPARK Discovery

[spark-discovery-gpl-2017-x86_64-linux-bin.tar.gz](#)
SHA-1: a70d75c71508ed3ab0ecb4a34fcc1dff9a9d9089

104.06 MB May 29 2017

ARM ELF (hosted on linux)



GNAT GPL Ada

[gnat-gpl-2017-arm-elf-linux-bin.tar.gz](#)
SHA-1: 71b5830d0242dfeb294d8895960f969bbc5c2417

548.9 MB May 17 2017

Download Ada Drivers Library

This screenshot shows the GitHub repository page for AdaCore / Ada_Drivers_Library. The page displays various statistics and a list of recent commits. A prominent red arrow points from the bottom left towards the 'Clone with HTTPS' button.

Ada source code and complete sample GNAT projects for selected bare-board platforms supported by GNAT.

1,179	commits	22	branches	0	releases	15	contributors	BSD-3-Clause
Branch: master				New pull request	Create new file	Upload files	Find file	Clone or download
Clone with HTTPS ⓘ Use SSH Use Git or checkout with SVN using the web URL. https://github.com/AdaCore/Ada_Drivers_Library								
Download ZIP								

Recent commits:

- pat-rogers Merge pull request #200 from AdaCore/add_gpio_drive ...
- arch add convenience routine to conditionally enable a pin
- boards robust, safer version of GPIO_Port_Setup_Interrupt_Threshold
- components SGTL5000: Fix some typos
- docs docs/filesystem.md: Add documentation for directory handling
- examples Examples: Bring back the blinky and serial examples for the STM32F4 d...
- hal HAL_SDMMC: Add single and multiple block write cmd definition
- middleware File_IO: Improve error handling
- scripts Examples: Bring back the blinky and serial examples for the STM32F4 d...
- testsuite Monitor_Block_Drivers: Show data size
- .gitignore Use new GPRbuild attribute: Create_Missing_Dirs

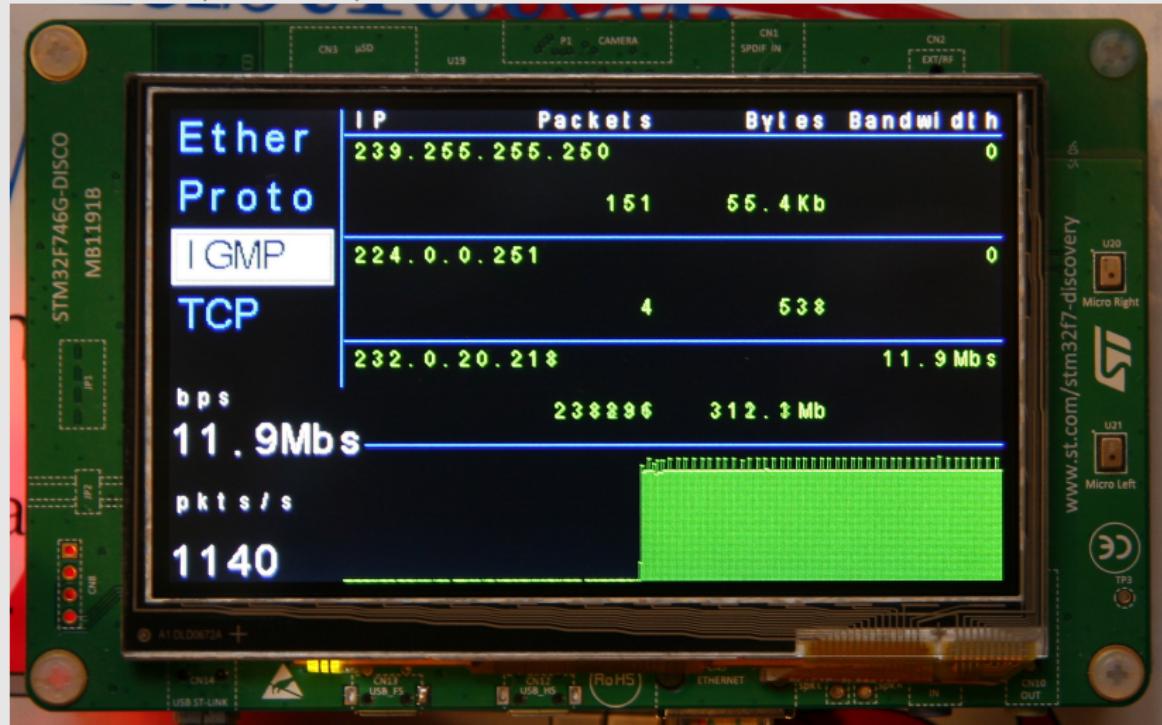
The Make with Ada Competition

- Embedded software project competition
- Open to everyone
- ~8000 euros in prize
- makewithada.org (Twitter @adaprogrammers)



2016 Winner project (Stephane Carrez)

github.com/stcarrez/etherscope



2017 Winner project (Jonas Attertun)

blog.adacore.com/make-with-ada-2017-brushless-dc-motor-controller

