

# mbed HDK from prototype to production

**ARM**

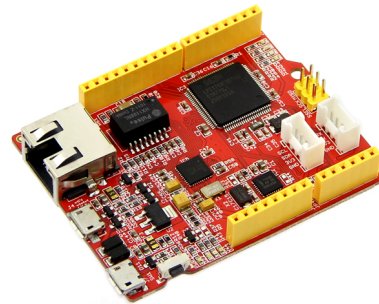
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Staff Application Engineer / ARM

ARM mbed Connect / Shenzhen, China  
December 5th, 2016

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# mbed HDK – Origin and heritage

- The origins of mbed are in rapid prototyping and productivity
  - Creating abstractions
  - Choosing defaults that suit the common case
  - Pulling tricks/stunts to make things JustWork™
  - Pushing complexity away from the consumer to the creators (80/20 rule)
- The HDK was originally a set of schematics for the LPC1114 DAPLink and the first supported MCU's. It was a recipe for dev boards... It worked!



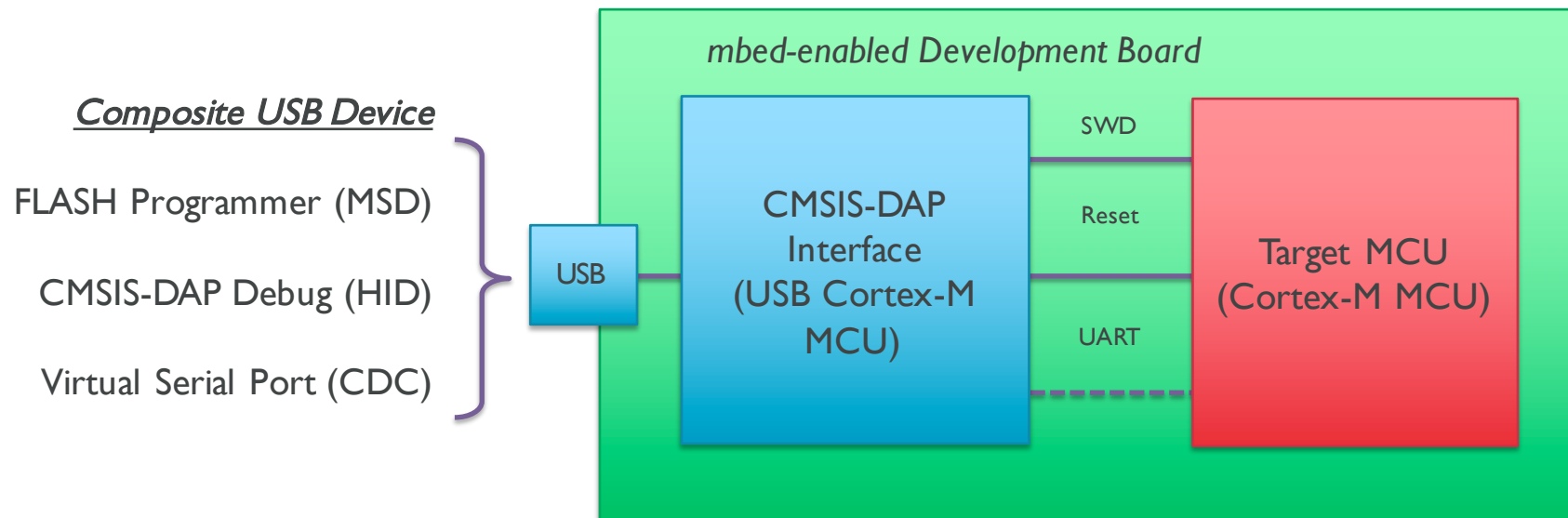
# mbed HDK – Who and what it's for

- The first revision of the mbed HDK aimed to provide a solution to inter-linked problems
  - Recreating LPC1768 (and other) designs, that were compatible with the mbed SDK, and included debug interface (circuit and firmware)
- Released under permissive proprietary license, compatible with Apache 2.0
- No clear audience, other than those who wanted to reuse what we'd built.
- A zipfile included schematics, libraries, and some binaries for the DAPLink
- The philosophy remains the same, but the scope has widened
  - We learned from what we did right and wrong!



# DAPLink – mbed interface firmware

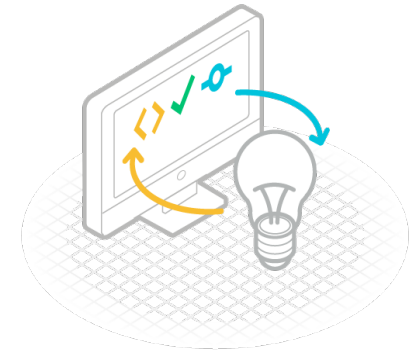
- An open source project that implements the embedded firmware required for a Cortex-M debug probe
- <https://github.com/mbedmicro/daplink>



# What's new! (and still in progress)

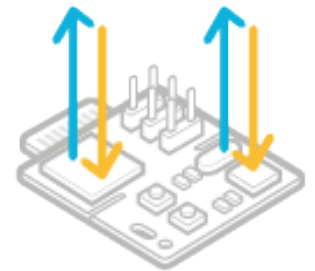
- ***Reference Libraries – Convenient resources for the Pros***

- Eagle Component Libraries; The components our “reference designs” are built from
- Eagle Schematic libraries; Schematic chunks that can be re-used



- ***Reference designs – Complete designs, laid out, ready to fabricate***

- Built from the Reference Component and Schematic Libraries,
- Can be manufactured, most likely to be tweaked and extended
- Bits of kit that we built for our own needs, but others might need them too!
- Linked to and supported by software projects



# What's new! (and still in progress)



- **Version control!**

- <https://github.com/ARMmbed/mbed-HDK>

- The hardware guys finally listened to the software guys!
  - Hosted in GitHub, complete with releases to avoid Zip Archive Hell!
  - We accept Pull Requests!

*Look out for Acceptance Criteria, Coming Soon!*

# What's new!

- **OSH Park PCB, eBOM**

- PCBs available in OSH Park, ready to be ordered
- Eagle component libraries being linked against Octopart eBOM feature
- Generates purchasable BOMs across major the distributors (Farnell, Mouser, Digikey)

Branch: master - mbed-HDK / Production Design Projects / CI Test Shield /

BlackstoneEngineering added readme with links to software, ebom, and pcb Latest commit 4392116 25 days ago

- v1.0.1 Added CI Test Shield Production Design a month ago
- CI Test Shield.brd removed obsolete silkscreen on hidden layers that showed up on OSHPar... 26 days ago
- CI Test Shield.sch Added CI Test Shield Production Design a month ago
- readme.md added readme with links to software, ebom, and pcb 25 days ago

readme.md

### CI Test Shield

The CI Test Shield has two parts

1. Hardware - physical board with sensors and wiring to hook pins together. The hardware design files can be found in
2. Software - tests that use the hardware. The software can be found in the [CI Test Shield github repository](http://

### How to get hardware

1. Buy pre-assembled board from vendor (todo)
2. Do it yourself, order PCB from OSHPark and parts from the BOM. You can either use the BOM in this folder or order from an eBOM on Octopart.

### How to use the software

For full instructions on how to use the software see the github page.

## OSH Park

### CI Test Shield v1.0.1

by [mbedAustin](#).

**2 layer board of 2.10x2.15 inches (53.37x54.64 mm).**  
**Shared on September 27th, 2016 20:05.**

mbed CI Test Shield v1.0.1

[Order board](#), [Download](#), [Permalink](#), [Embed order link](#).

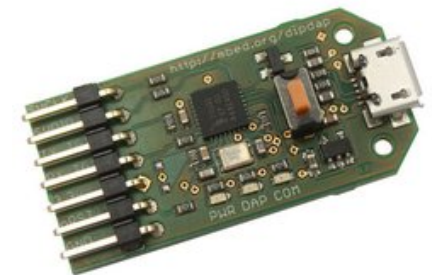
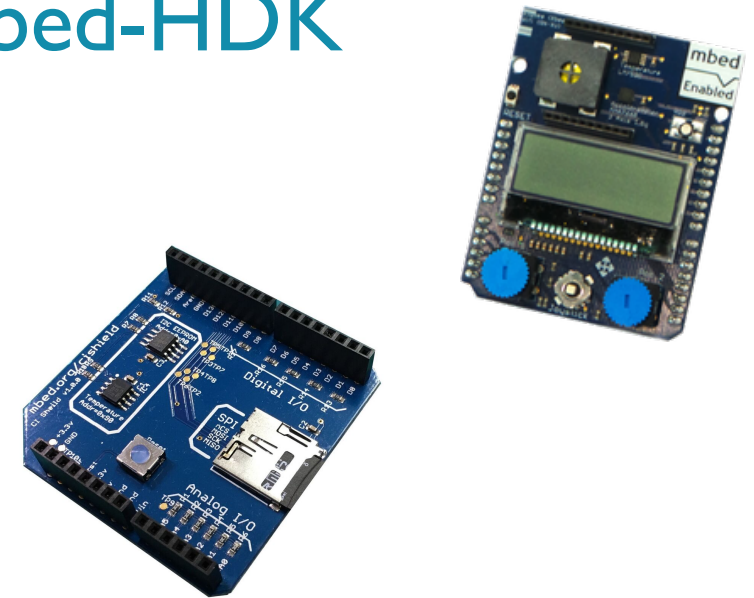
Designed and developed by [Rabid](#).

Batch size: 1 USD 7.92 each USD 7.92 total 100% BOM coverage

Parts	Line Item Details	Internal Part Number	Description	Preferred Distributors				
3	667-ERJ-3EKF1002V	6	Panasonic ERJ-3EKF1002V	<table border="1"> <tr> <th>Digi-Key</th> <th>Mouser</th> </tr> <tr> <td>USD 0.10000 Stock: 3,021,239 Cut Tape</td> <td>USD 0.10000 Stock: 1,333</td> </tr> </table>	Digi-Key	Mouser	USD 0.10000 Stock: 3,021,239 Cut Tape	USD 0.10000 Stock: 1,333
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6	523-101-00660-68-4	1	Amphenol 12300660686	<table border="1"> <tr> <th>Digi-Key</th> <th>Mouser</th> </tr> <tr> <td>USD 1.80000 Stock: 19,946 Cut Tape</td> <td>USD 1.80000 Stock: 6,617</td> </tr> </table>	Digi-Key	Mouser	USD 1.80000 Stock: 19,946 Cut Tape	USD 1.80000 Stock: 6,617
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7	771-UM75BD.112	1	NXP Semiconductors LM75BD.112	<table border="1"> <tr> <th>Digi-Key</th> <th>Mouser</th> </tr> <tr> <td>USD 0.56000 Stock: 5,192 Tube</td> <td>USD 0.58000 Stock: 772</td> </tr> </table>	Digi-Key	Mouser	USD 0.56000 Stock: 5,192 Tube	USD 0.58000 Stock: 772
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USD 0.56000 Stock: 5,192 Tube	USD 0.58000 Stock: 772							

# Production Design Projects in mbed-HDK

- mbed Application Shield
- CI Test Shield
- DAPLink
  - DIPDAP
  - SWDAP
- mbed 6LoWPAN Border Router HAT

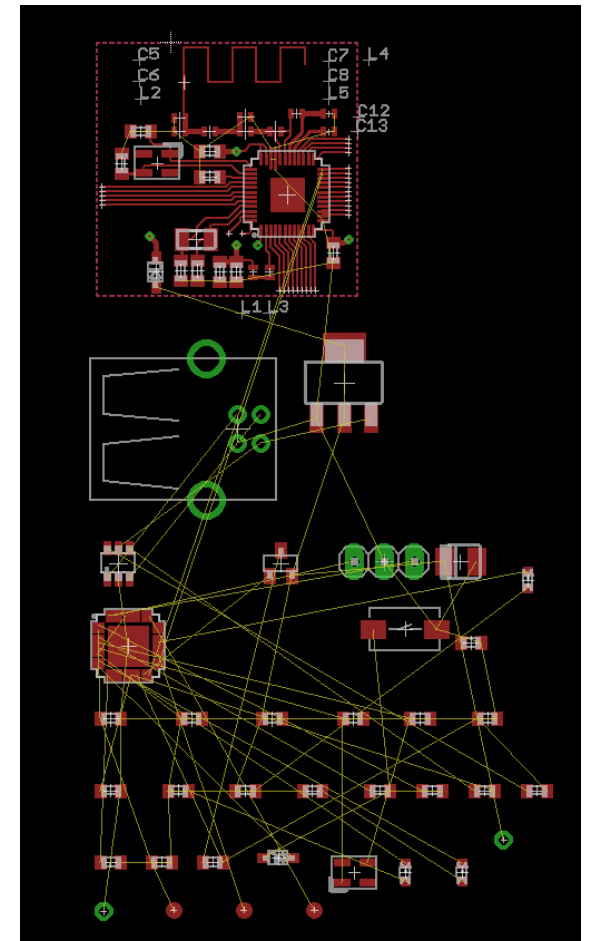
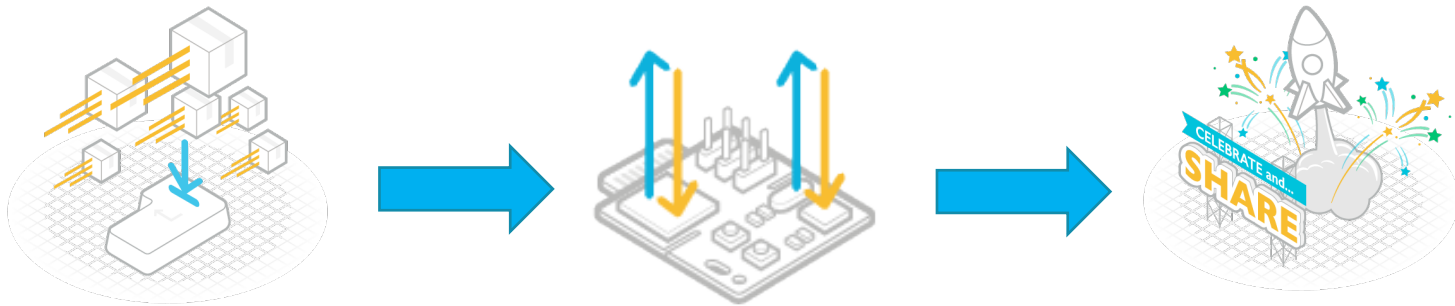




# Example – Composability

Let's make a nRF51822 dev board, with an LPC1114 Interface

1. Import MCU subsystem
2. Import DAPLink subsystem from the reference library
3. Add special sauce as required
4. Manufacture -> Ship -> Profit!



# Get involved!

- We're happy to take contributions..
  - **Libraries**  
*MCU, Radio, Modules, components*
  - **Subsystem**  
*Prebuilt schematic blocks that are logically correct*
  - **Full examples**  
*RF examples in particular add a lot of value*
- Help us build the go-to place for developers who want full stack solutions
  - Hardware, device software (OS, Stack, Client), cloud connectivity

***support@mbed.org***

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