



tosqa

machine control, reloaded

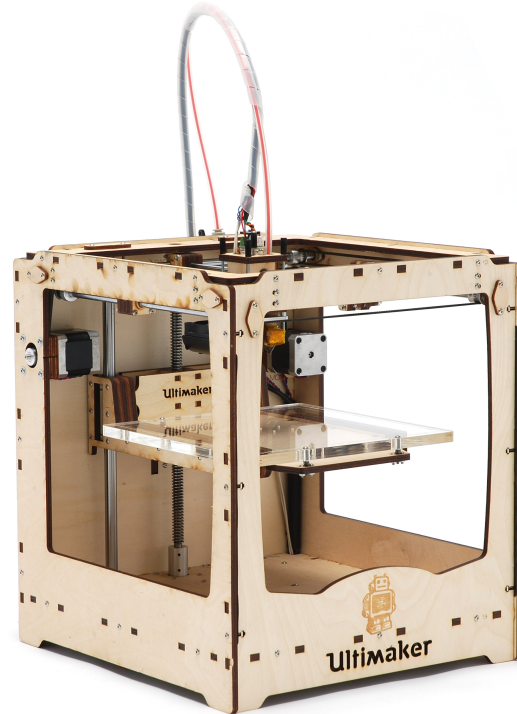


tosqa.com

laser



3d-printer



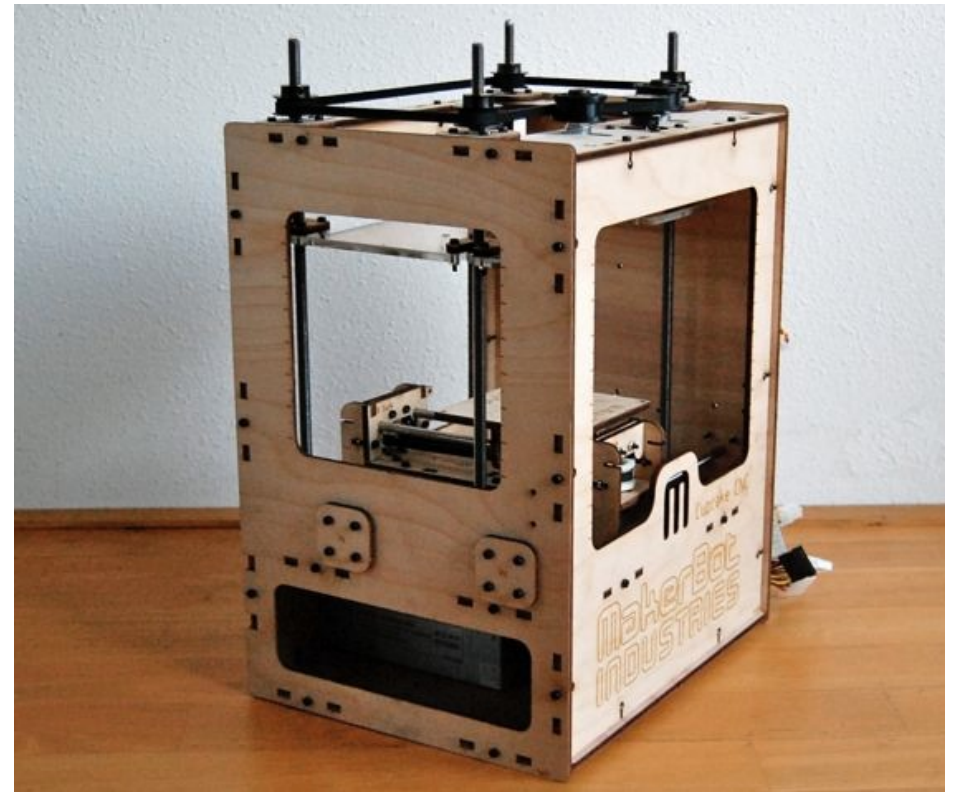
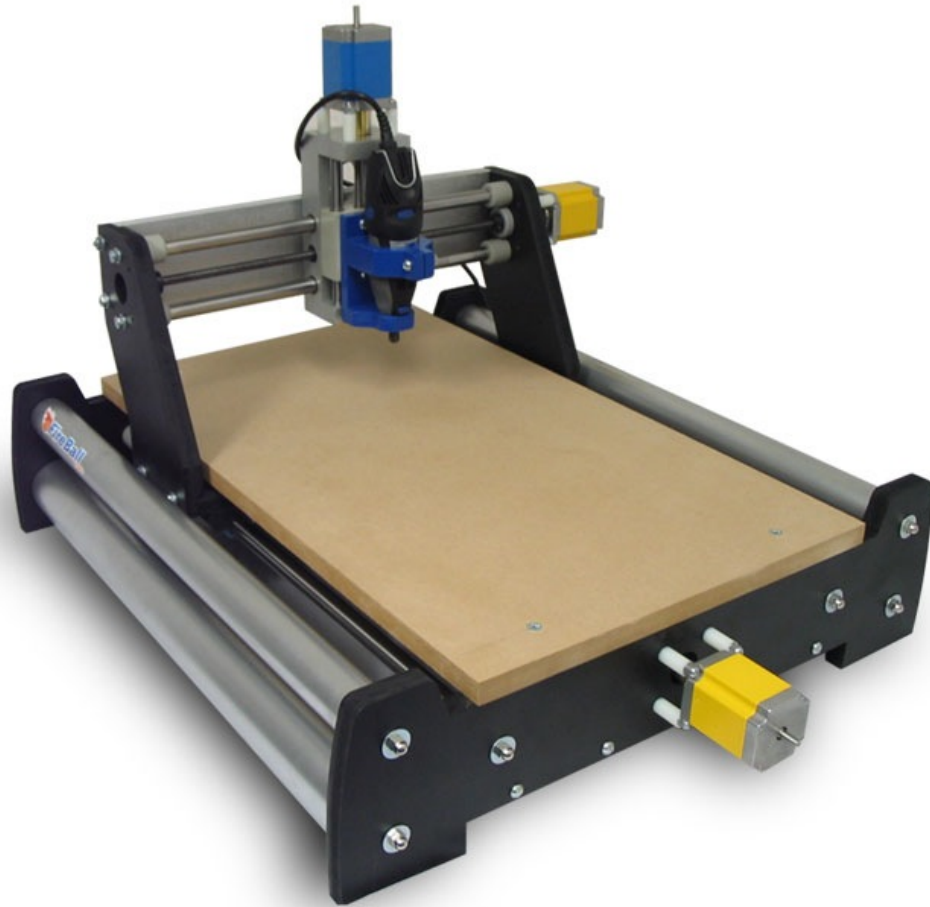
free



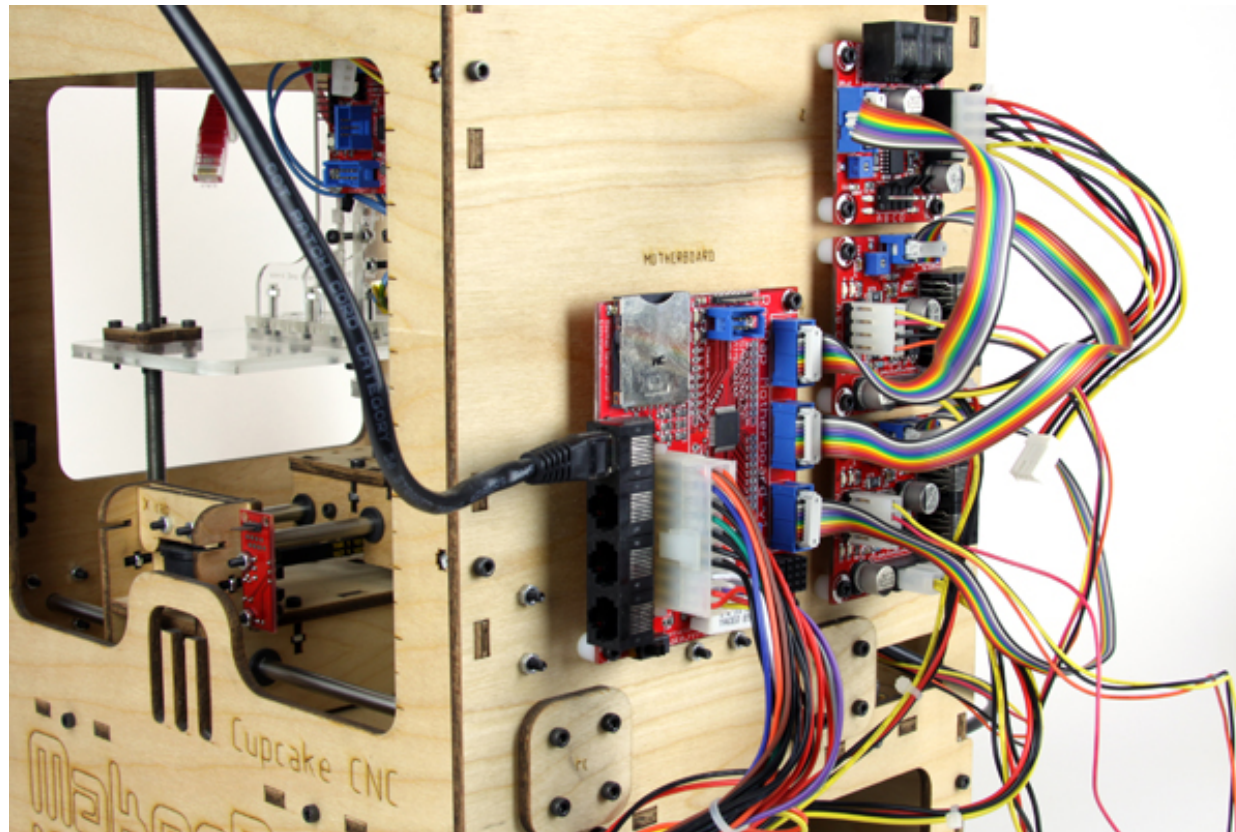
machine control, 'CNC'



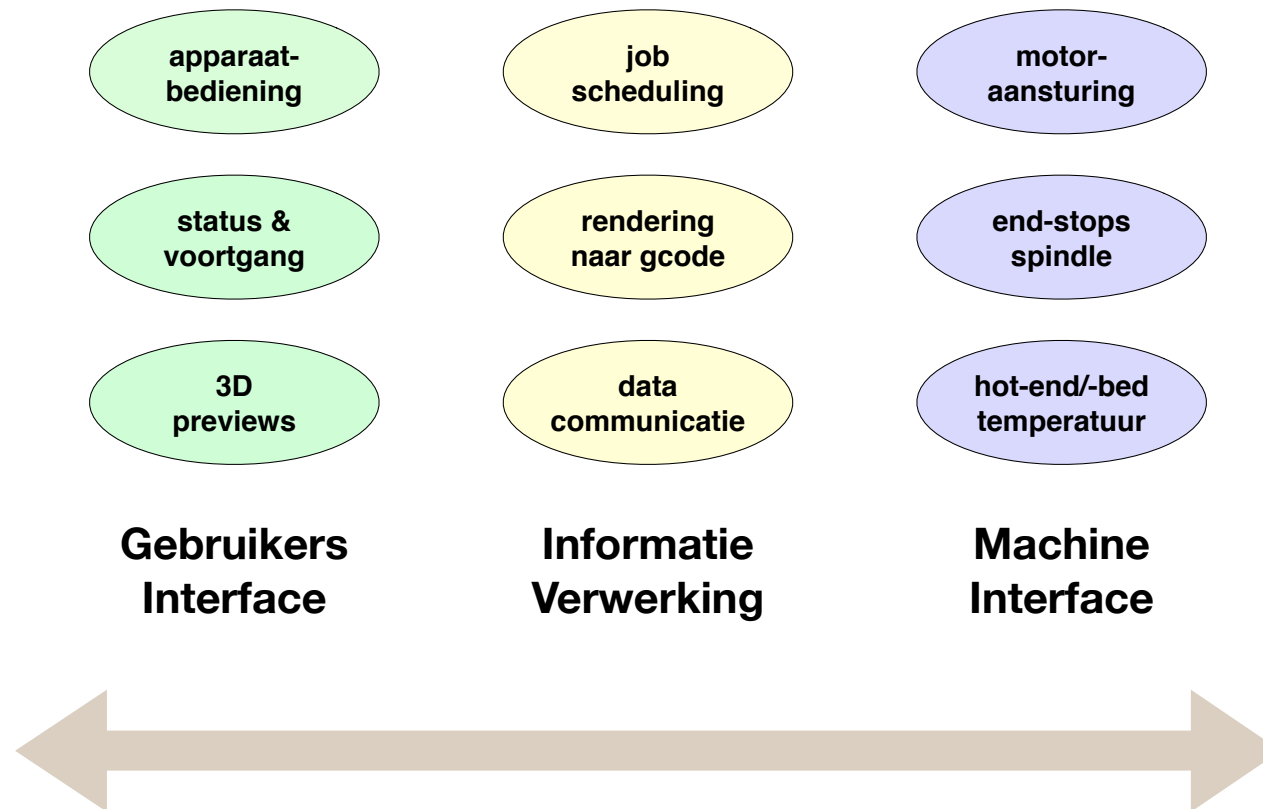
Beauty ...



... and the beast



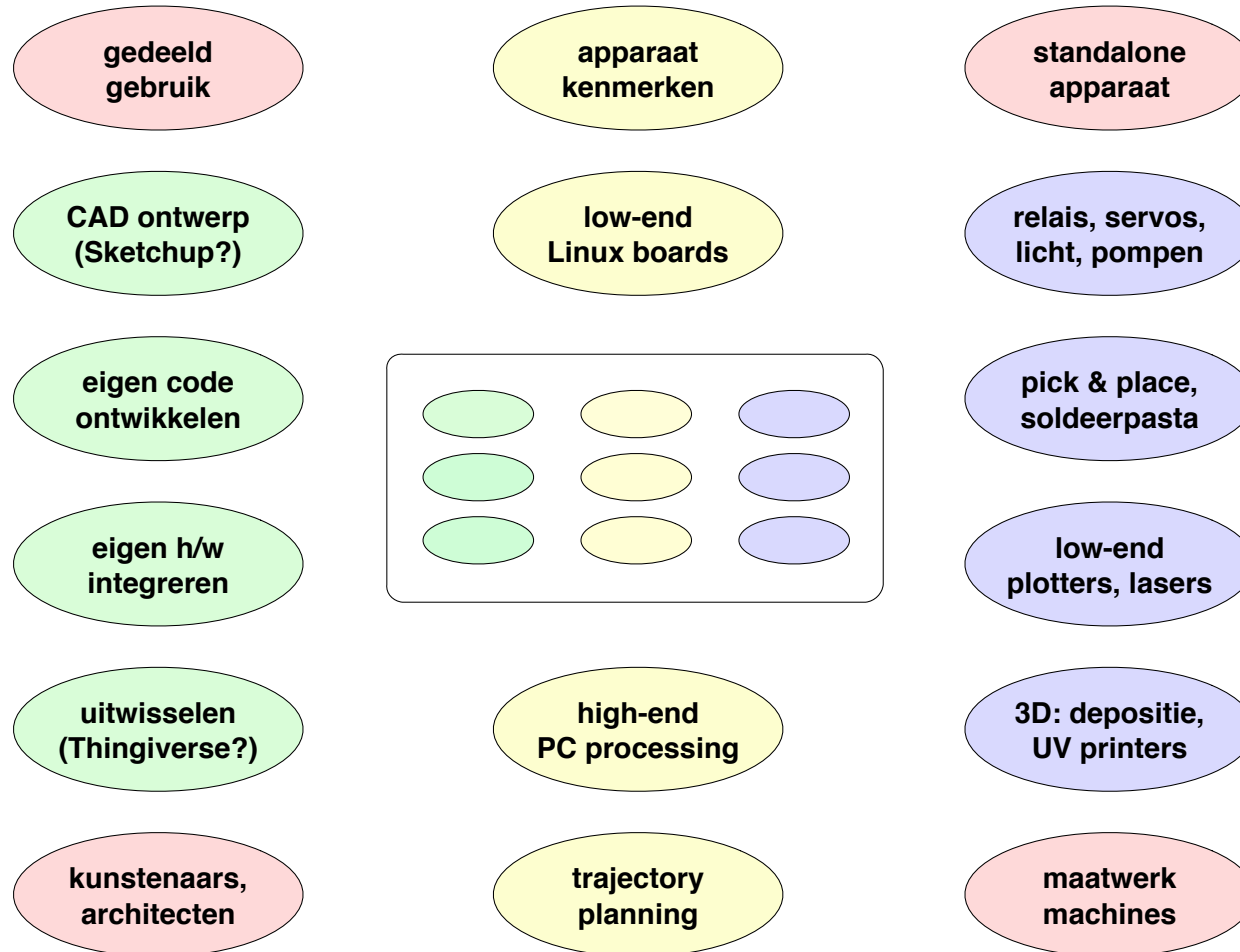
Doe-het-zelf CNC nú



Alles in één: MakerBot, UltiMaker, ...



Het hele plaatje



Modulaire keuzes

alles in de browser
ontwerp-proces +
bediening / status

alles \geq Linux
multi-platform
multi-language

alles via de CAN bus
host: direct of via
network / serial bridge

JavaScript, HTML5
AngularJS, D3 (SVG)
WebSockets
real-time, responsive

host engine in Go
LevelDB, MQTT
dataflow architectuur
hardware discovery

ARM μ C met CAN
ChibiOS RTOS
CAN firmware upload
RJ12 klik-systeem

**Gebruikers
Interface**

**Informatie
Verwerking**

**Machine
Interface**

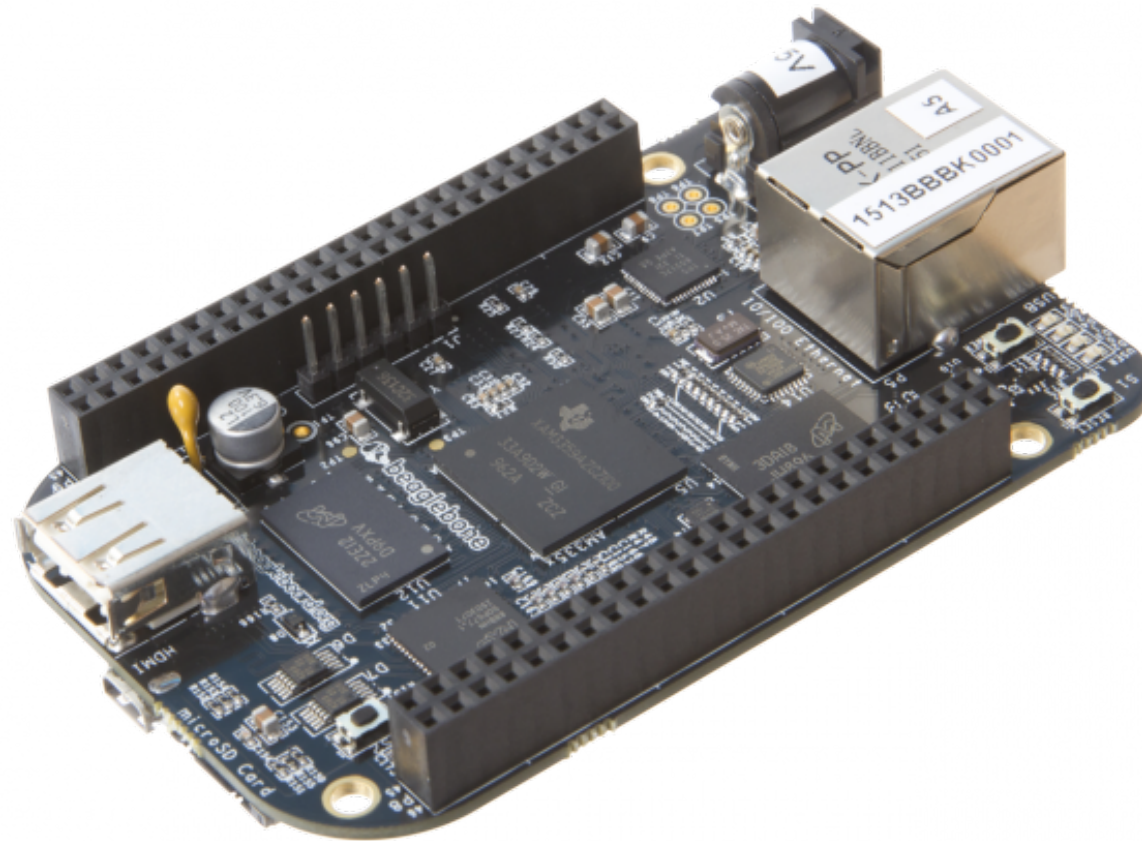
Google Chrome
Safari (FireFox)

BeagleBone Black
(RasPi, Odroid)

LPC11C24
"SSB" & "IOU"



BeagleBone Black



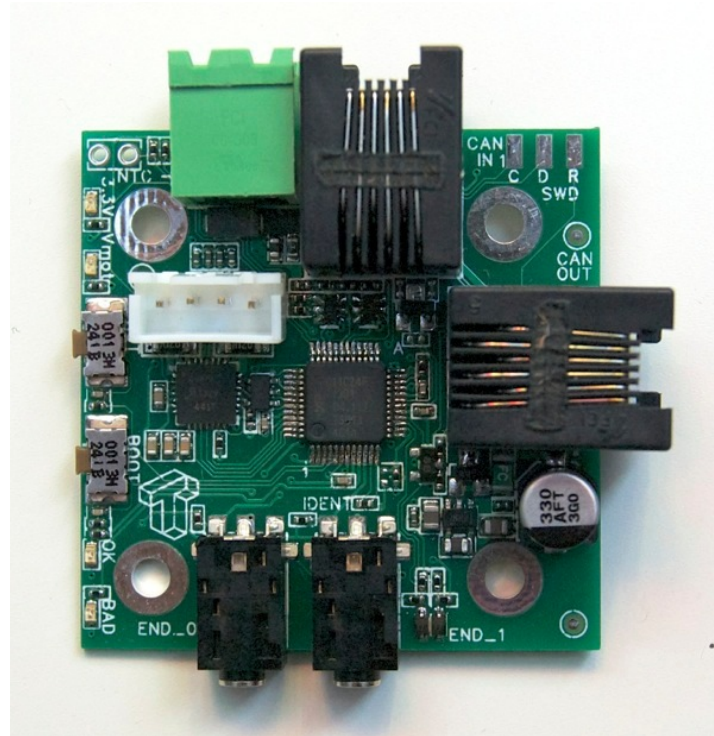
of een Raspberry Pi of andere willekeurige Linux-computer



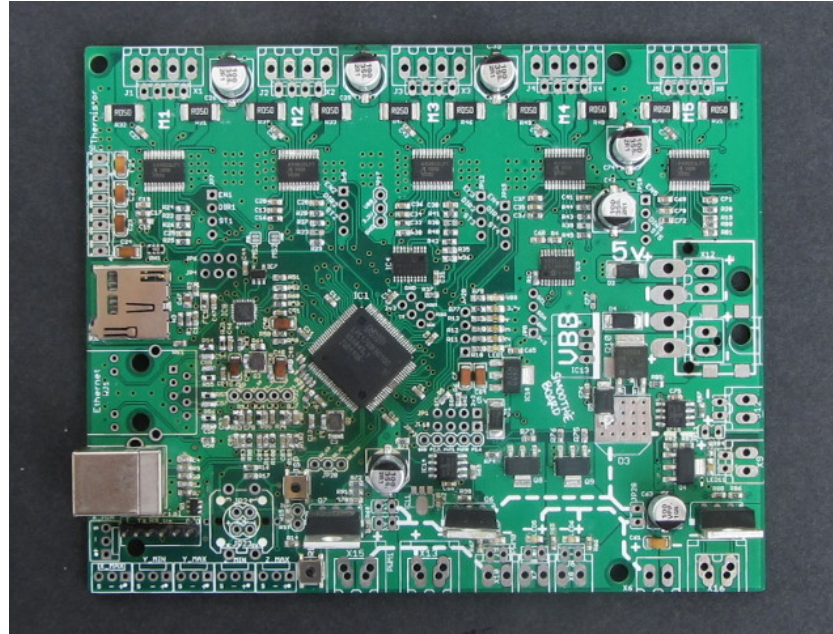
CAN-bus



single stepper board



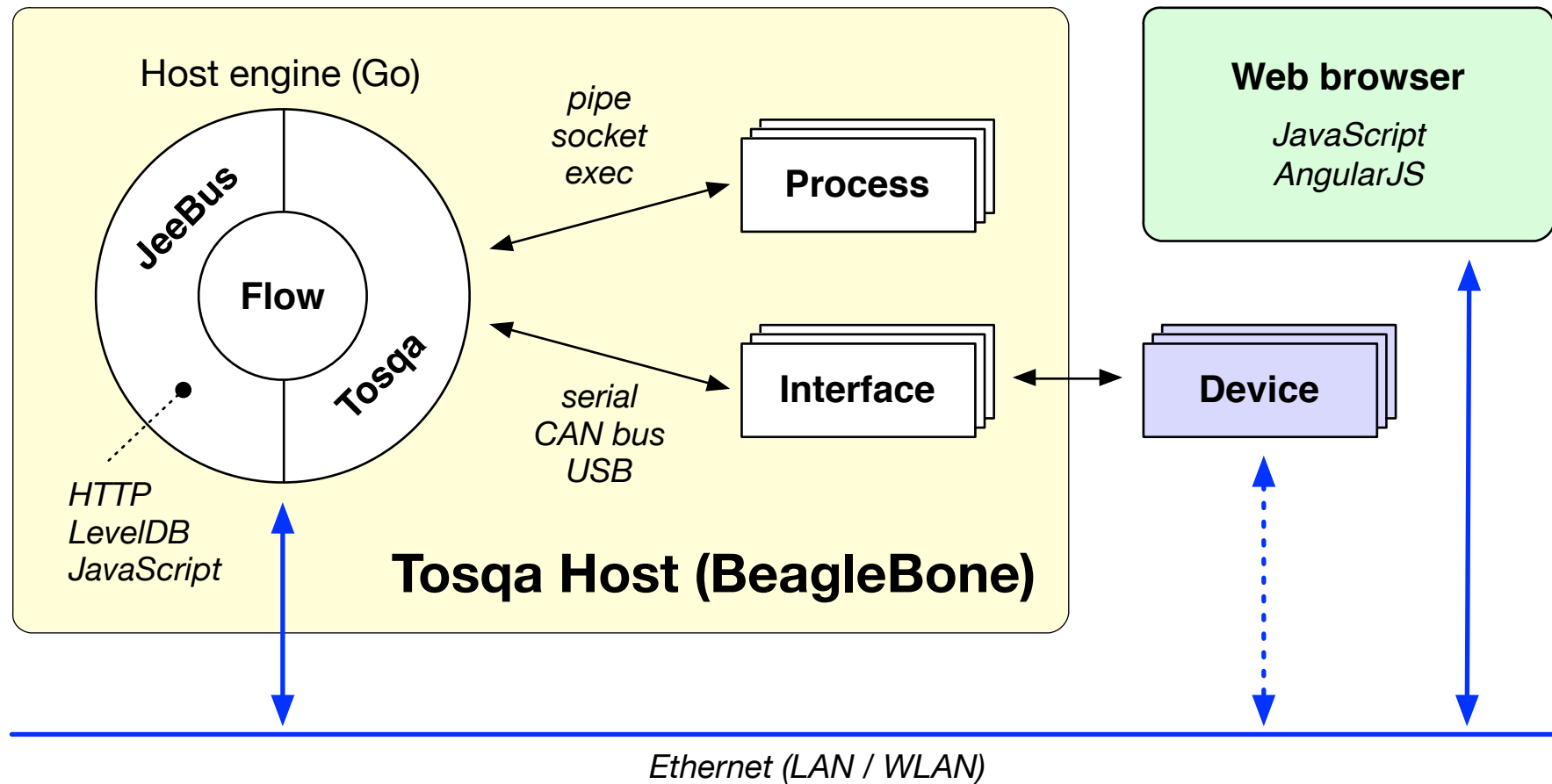
SmoothieBoard, met 1x LPC1769 en o.a. 5 stepper drivers



5x Tosqa's Single Stepper Board - elk met een LPC11C24



Tosqa





- “HTML enhanced” - declaratief, attributes + {{...}}
- SPA: Single Page Application (de URL is N E P)
- static pages + JS, alles gebeurt in de browser
- bi-directionele data binding, geen DOM manipulatie:

```
<script src="angular.min.js"></script>
<body ng-app>
  Name: <input type="text" ng-model="yourName">
  <hr>
  <h1>Hallo {{yourName}}!</h1>
</body>
```

Name: <input type="text" value="Tosqa"/>
Hallo Tosqa!



Dataflow

- denk aan Unix pipes, maar dan overal binnen één proces
- visueel ontwerp == later nog zien (snappen!) hoe het zat
- iedereen “doet het” nu: FBP, Scratch, NoFlo, Node-Red
- ook: Grasshopper, Quartz Composer, Pure Data, Max/MSP
- perfecte match voor Go’s CSP: channels en goroutines
- terminologie in Tosqa: gadgets, pins, wires, circuits, feeds



Alles is een Gadget

```
$ tosqahost info
Registered gadgets and circuits:
```

```
AddTag Attach CanBridge CanSerial Clock CmdLine Concat3 Counter DataSub Delay
Dispatcher EnvVar FanOut FbpParser Forever GcodeInterp GcodeParser
GcodeScanner HTTPServer JavaScript LevelDB MQTTPub MQTTServer MQTTSub Pipe
Printer ReadFileJSON ReadFileText Repeater RpcHandler SerialPort
SinglePlanner Sink SketchType SocketCan StepGen TimeStamp Timer WSLiveReload
Waiter WebSocket-default WebSocket-jeebus circuitFill dbdump dbexport dbget
dbimport dbkeys dbput demo help info init main mqttpub mqttsub tableFill try1
```

```
type Counter struct {
    flow.Gadget
    In flow.Input
    Out flow.Output
    count int
}

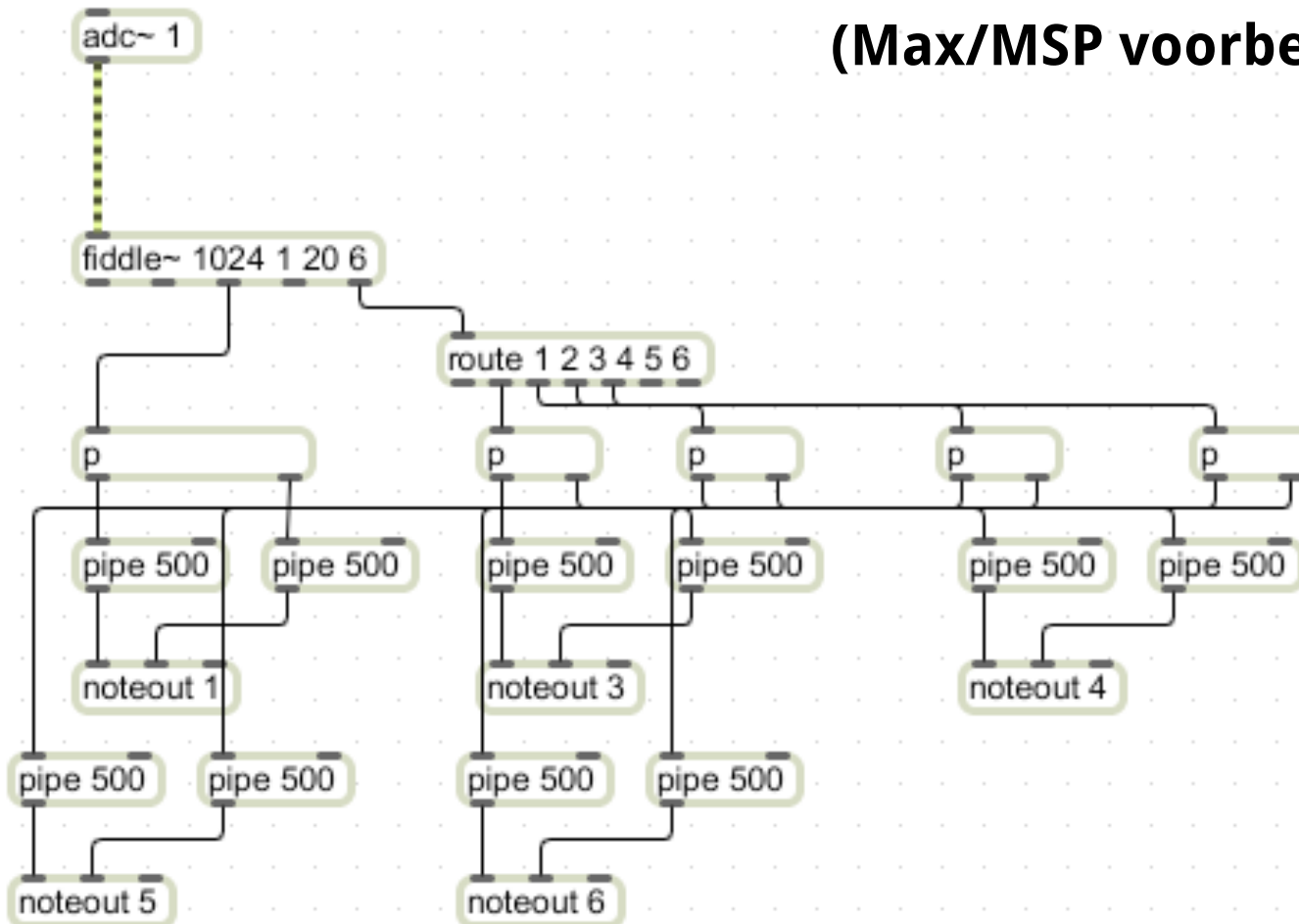
func (w *Counter) Run() {
    for _ := range w.In {
        w.count++
    }
    w.Out.Send(w.count)
}
```

```
flow.Registry["Counter"] = func() flow.Circuitry { return new(Counter) }
```

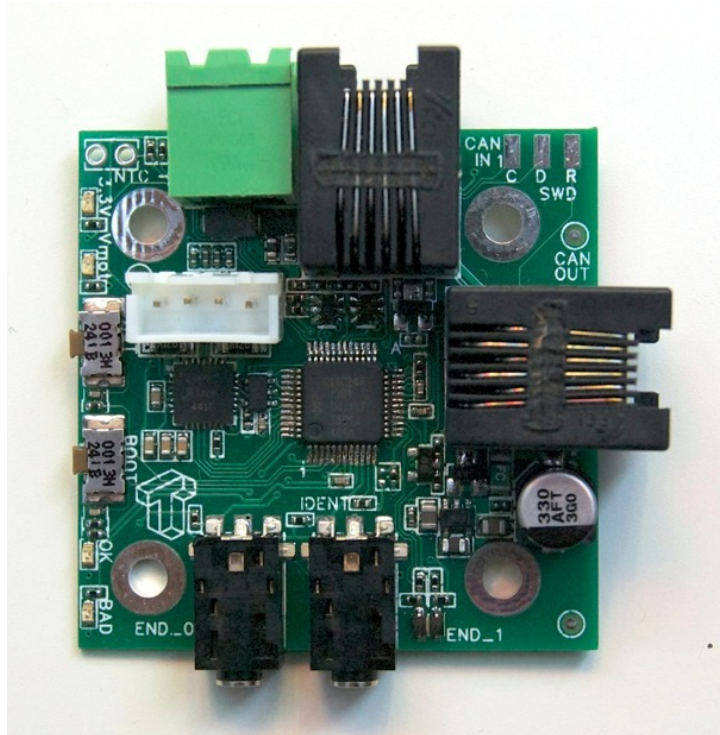


Visuele Circuit Editor

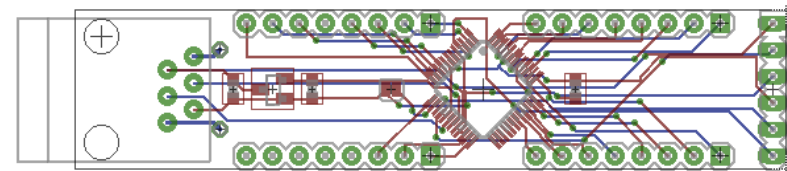
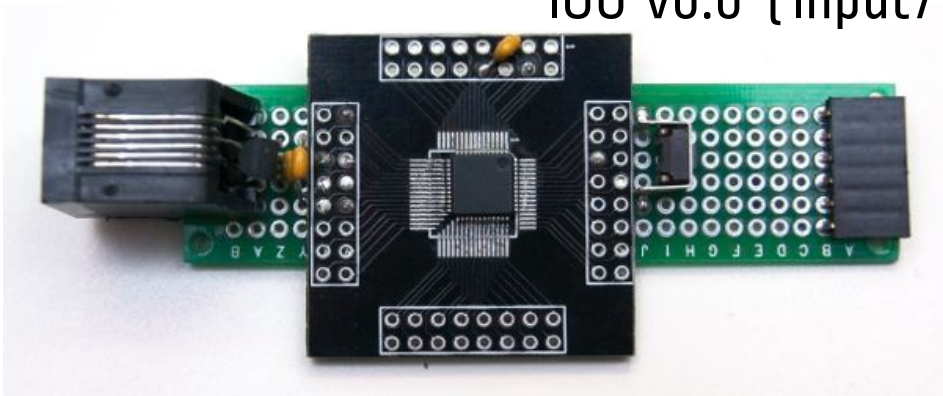
(Max/MSP voorbeeld)



SSB v1.2 (Single Stepper Board)

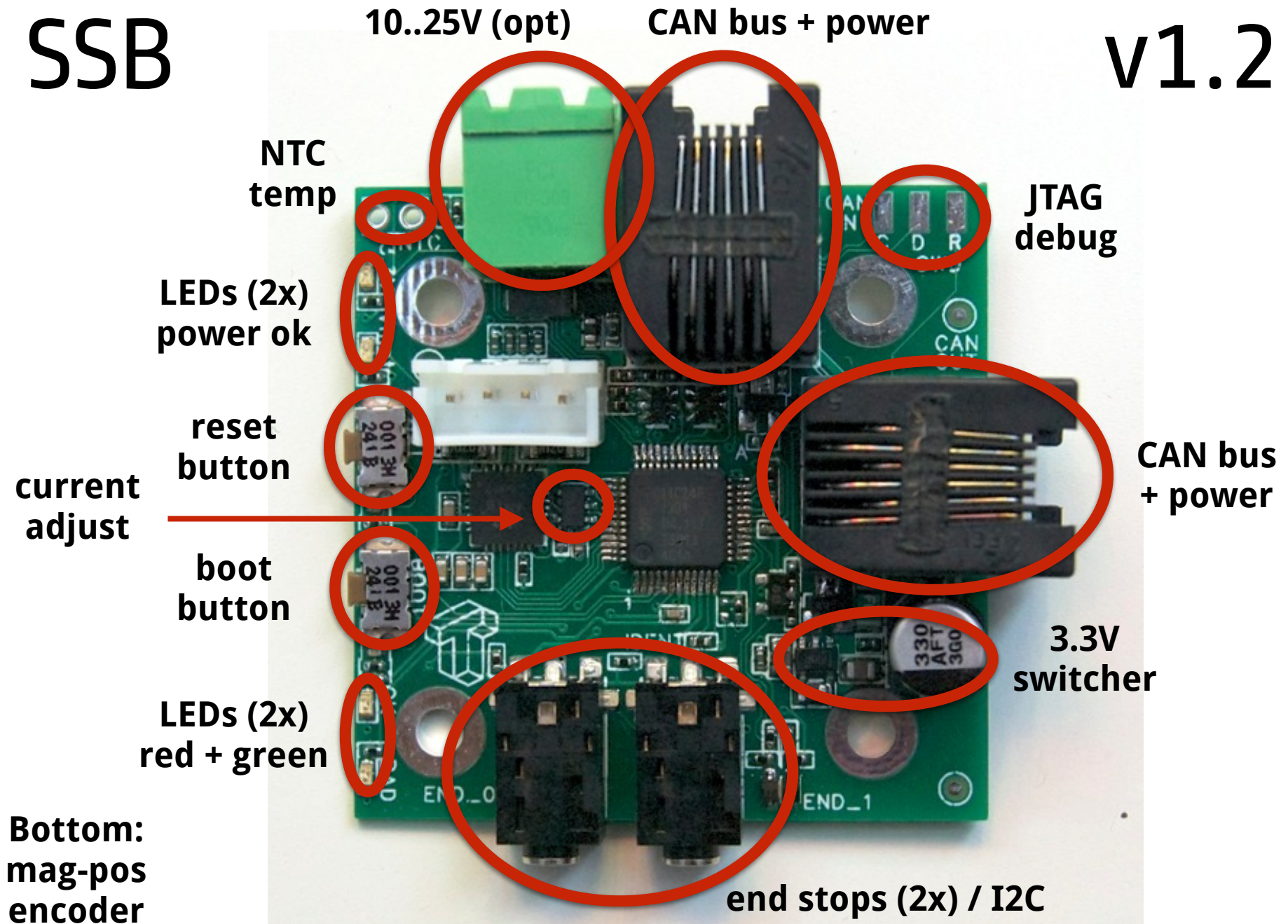


IOU v0.0 (Input/Output Unit)

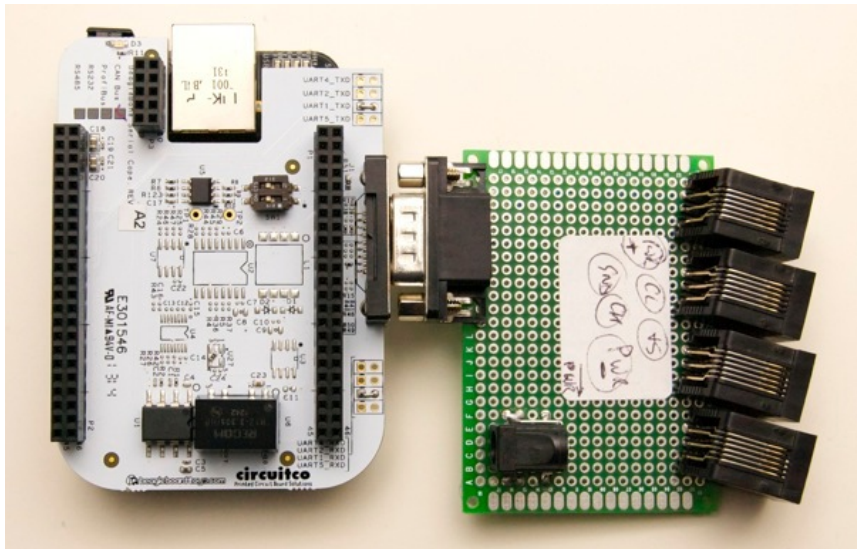


SSB

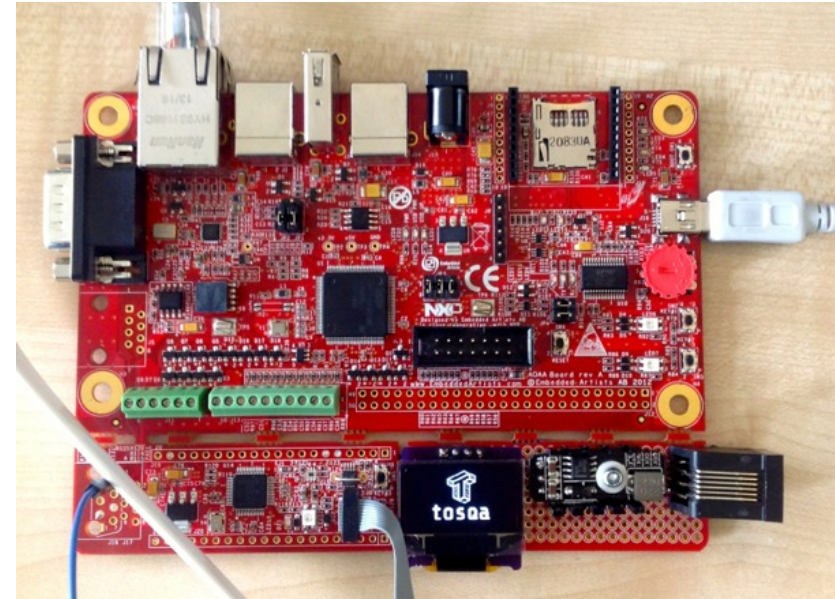
v1.2



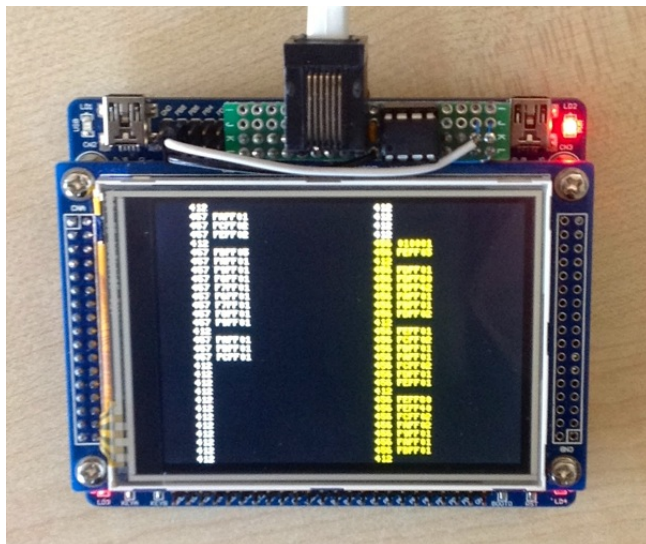
BeagleBone + CAN "cape"



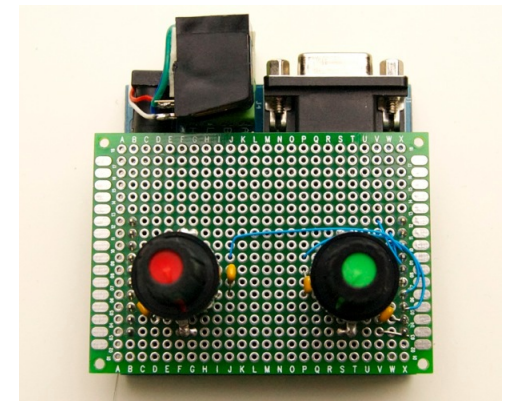
LPC1769 + LPC11C24
[12V loodaccu eronder]



STM32 ARM + LCD [eBay]



LPC11 ARM
bordje +
2x rotary
encoders



The ~~End~~ Beginning!

- **Website** ➤ <http://tosqa.com/> (en GitHub)
- **Code + PCBs** ➤ 100% Open Source (MIT/BSD)
- **Tosqa team** ➤

Peter Brier, Tim Castelijm, David Menting, Emile Nijssen, Peter Uithoven, Jean-Claude Wippler

- **Veel uitdagingen** ➤ Doe je mee?

