a Low-level hardware control

Microcontroller (*e.g.* Arduino)

Pump controller

Pin1 — EN
Pin2 — STEP
Pin3 — MS1
Pin4 — MS2
Pin5 — MS3
Pin6 — DIR
GND — GND
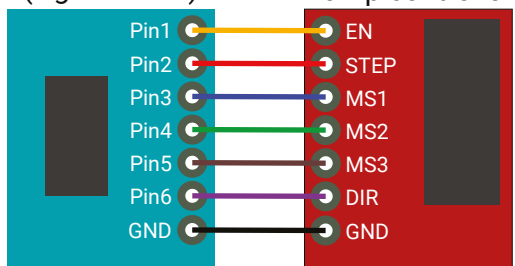
ControlPump.ino

```
(...)

void loop() {

  //Pulse with a 4s period
  //by toggling STEP input

  digitalWrite(Pin2, HIGH);
  delay(2000);
  digitalWrite(Pin2, LOW);
  delay(2000);
}
```

b Hybrid control

TTL Source

Pump controller

TTL — IO
GND — GND

Configuration

Events
- Step state
- Direction state
- Switch forward state
- Switch reverse state
- Input state
- Protocol state

Protocol
Protocol direction
Reverse ▼
Protocol type
Step ▼
Number of steps
15
Step period [ms]
10

Input/Ouput
Digital input
Use as a pure digital input ▼
Digital output 0
Digital output controlled by software ▼
Digital output 1
Digital output controlled by software ▼

Other
Motor microstep
Full step ▼

c Software control

bonsai
VISUAL REACTIVE PROGRAMMING

Pump Command — Pump

Timer — Boolean — SyringePump. EnableProtocol — Pump Command