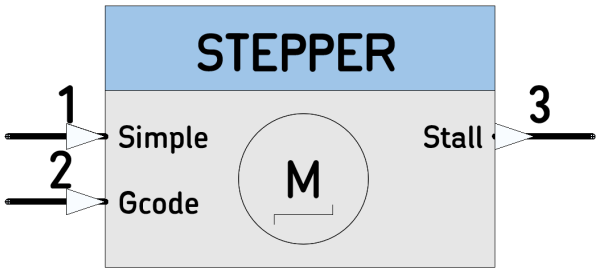
# STEPPER

Node for simple Stepping Motor Control.




Will work with: SilentStepstick, StepStick, or a any Step/Dir driven Step Motor driver

> - Category: Motor
> - HAL: mbed
> - Tested: with LPC1768 and TMC2130 Silentstepstick
> - Author: N. Chalikias

# Implementation Details

`EndSwitch` Input stops the movement automatically and captures/outputs the `endSwitchPosition` as a number of executed steps.
If TMC2130 driver is used, then Stall Detection and `StallPosition` reporting is supported by connecting TMC2130 DIAG1 pin to `EndSwitch` Input.

## Simple commands

For simple use-cases, 4 commands are implemented as in the Input section below for input1 (Schematic pin 1). The same commands are implemented in the DC-Motor control Node L298, so a use-case scenario can be implemented with DC or stepping motor, just changing the motor Node in the Design. Example:

```
[Ticker]-->[Counter]-->[SilentSTEPPER] for stepping-motor
[Ticker]-->[Counter]-->[L298]          for DC-Motor
```

## Gcode commands

For more complex use-cases, Gcodes G0 and G1 are implemeted for input 2 (Schematic pin 2).

## Stall Detection

By configuring registers `TCOOLTHRS` and `GCONF`, the TMC2130 DIAG1 pin is set to signal the Stall condition. The microprocessor pin connected to TMC2130 STALL pin is configured to create an interrupt.
A Timer is set to the desired stepping frequency. A Timer ISR is attached to the Timer. The Timer_ISR pulses the STEP-Pin and increments a SteppingCounter. The DIAG1 Interrupt ISR Stops the Timer (this stops the movement) and Captures the SteppingCounter value to a StallPosition parameter.
The next endFrame, outputs the StallPosition to the Node output creating a stall event.

## Accessing TMC2130 Registers

Registers are accesed with 40bit SPI transactions, sending a 40 bit command and getting back 40 bit status.

# Input Connections

```
  * (Schematic pin 1) integer: Value
     * 0 or 0x30 STOP
     * 1 or 0x31 RIGHT  STATE MACHINE: ACTIVATED ONLY IF IN STOP
     * 2 or 0x32 LEFT   STATE MACHINE: ACTIVATED ONLY IF MOVING RIGHT
     * 3 or 0x33 BRAKE
* (Schematic pin 2) * string: Gcode string
```

# Output Connections

```
*  (Schematic pin 2)
   * int: `StallPossition` or `EndSwitchPosition`
```

# Node Parameters

```
*  PinName:  pinMOSI
*  PinName:  pinMISO
*  PinName:  pinSCK
*  PinName:  pinSS
*  PinName:  pinSTEP
*  PinName:  pinDIR
*  PinName:  pinENABLE
*  PinName:  pinEndStop Connect to a microswitch or TMC2130 DIAG1 pin
*  uint32_t: speedDefault
*  uint32_t: AccelerationDefault
*  char8_t:  Axis the Node executes Gcode for (X,Y,Z,E,A,B,C,D)
*  bool:     MC2130
```

# Usage Example

```
[Ticker]-->[Counter]-->(1)[SilentSTEPPER]
```