3DTouch Auto Leveling Sensor

User Manual

1. Introduction

3DTouch is an auto leveling sensor for 3D Printers that can precisely measure the tilt of your print surface. It can greatly improve the printing precision of your 3D Printer.

3DTouch features simple, smart and precise. It could work with nearly any kind of bed materials, such as glasses, woods, metals and so on.

The main functions and controls of 3DTouch are the same as most auto bed leveling sensors, which consists of a RC servo and a micro switch, thus, 3DTouch can be used on almost every 3D printer control board.

By using progressively designed solenoid and hall sensor, 3DTouch can integrate high precision in such a simple structure. To make it more user-friendly and to bring you more enjoyable printing experience we add many smart functions such as self-test, false alarm, alarm release and test mode for M119.

Features:

1 Simple

3DTouch can be easily applied, since it has a small and simple structure. Gathering information & firmware setting will be an easy task, because 3DTouch works as usual auto bed leveling sensor.

2 Smart
Self-test: The push pin is operated three times to test when the power is on
Alarm: The LED light blinks if a problem found on a self-test or on an operation

3 High-precision
3DTouch's Standard Deviation in repeatability is around 0.005mm, at that precise.
If you choose 3DTouch, your 3D printer will be high-class masterpiece, giving you an enjoyable experience.

4. Innovative Solenoid: Ultra Power Saving
On idle state, while the push-pin is whether pulled out or retracted, there are not any electric current flowing on solenoid, and standby electric current in the whole device is below 15mA on average, whereas on working state, while the pin is moving in sudden about 100ms, under 300mA flows in the device.
Low power consumption even further drops joule heating, preventing from heat problem.

5 Technologies
3DTouch consists of Atmel ATtiny13A, solenoid, and a push pin.

6 wide Selection of Bed
3DTouch does not uses either optical, nor proximity (inductive/capacitive) sensor.
3DTouch is controlled by Hall Effect, providing high precision. Thus the bed material can be selected freely.

7 Optimized structure: Larger Build Size
3DTouch is a small and technology-intensive one. Build size can be set larger than other existing auto bed leveling sensor.
3DTouch uses existing RC Servo motor signal intactly, so just plug 3DTouch on the same pins after removing servo motor.

Specifications:
Voltage: 5V
Current: 15mA
Max. Current: 300mA
Cable length: 150mm
Net Weight: 10g
Shipping weight: 25g

Wiring

3-pin: Brown (-, GND), Red (+5V), Orange (control signal)

2-pin: Black (-, GND), White (Z min)

2. How to use it

2.1 mount the 3DTouch sensor

So far we have successfully tested our 3DTouch sensor on Geeetech Prusa I3 pro B, Pro C and Pro X.

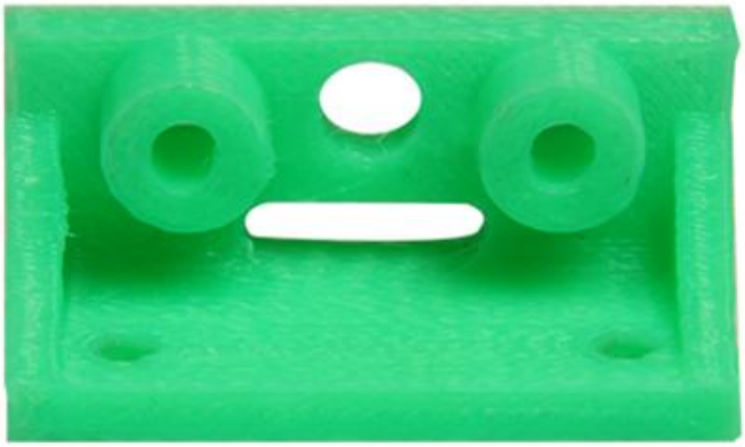
Here is a detailed instructions on how to use the 3DTouch sensor to your geeetech pro B. For pro C and pro X, the steps are the same.

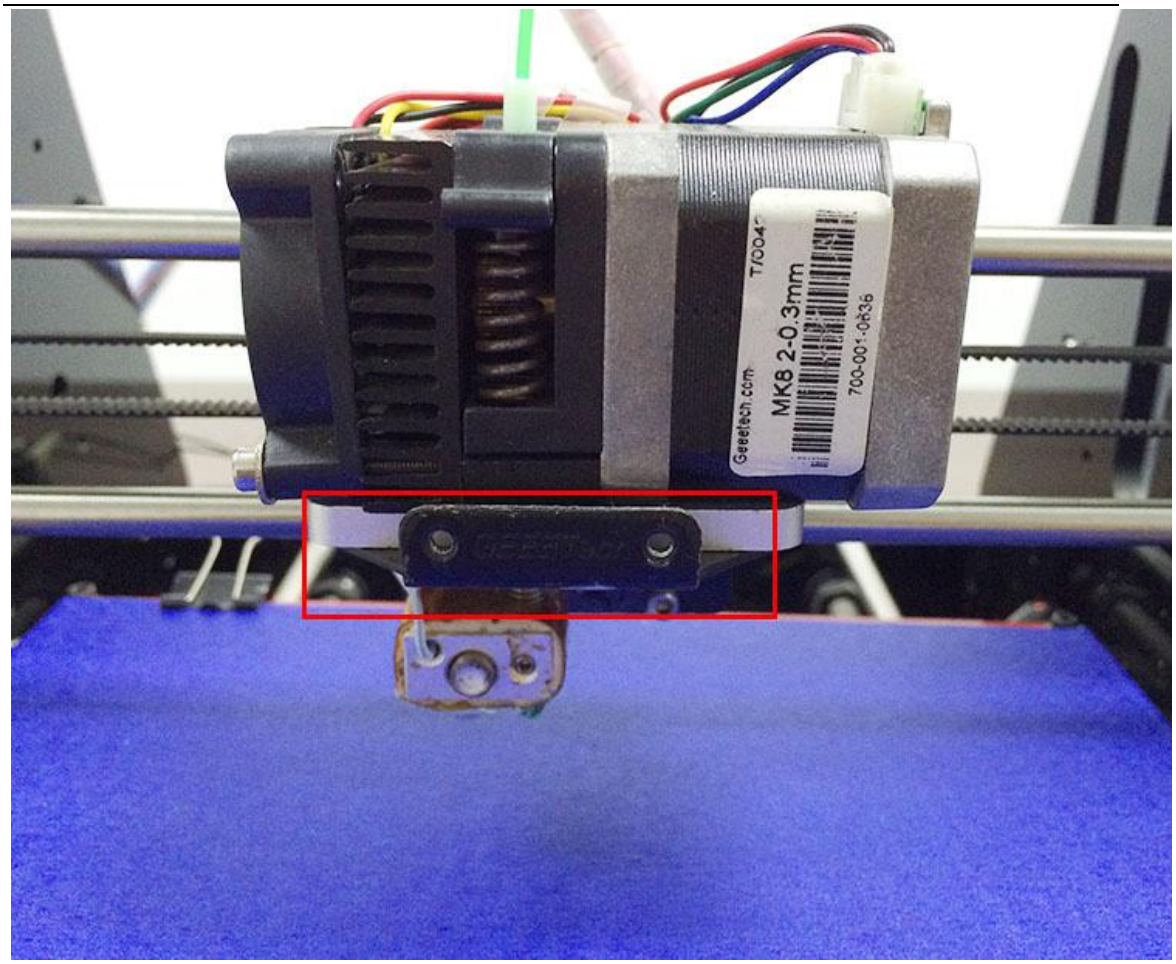
You will need a suitable mount to attach the 3DTouch sensor to your printer.Here is a 3DTouch sensor mount:

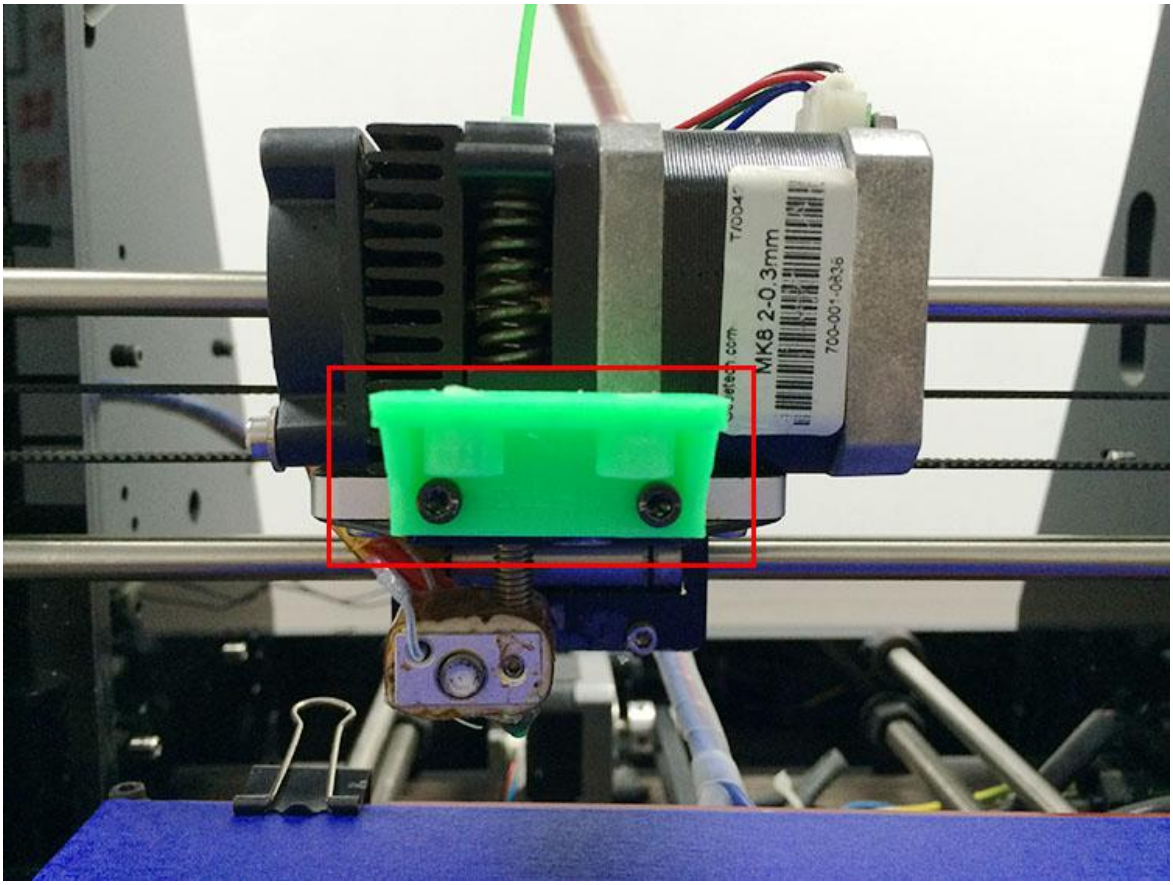
Mount for Geeetech Prusa I3 pro B

1. Download the .stl file for the mount of pro B here and print one.

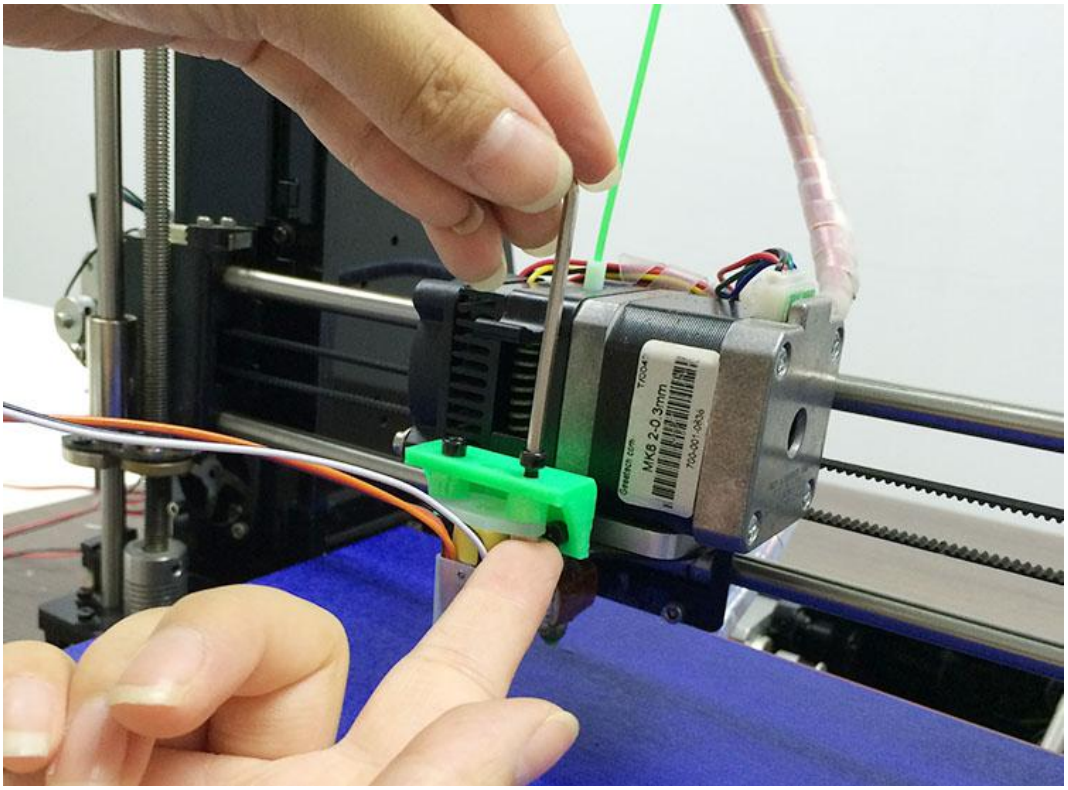
2. Fix the mount on the Extruder holder with 2 M3*6mm screw.

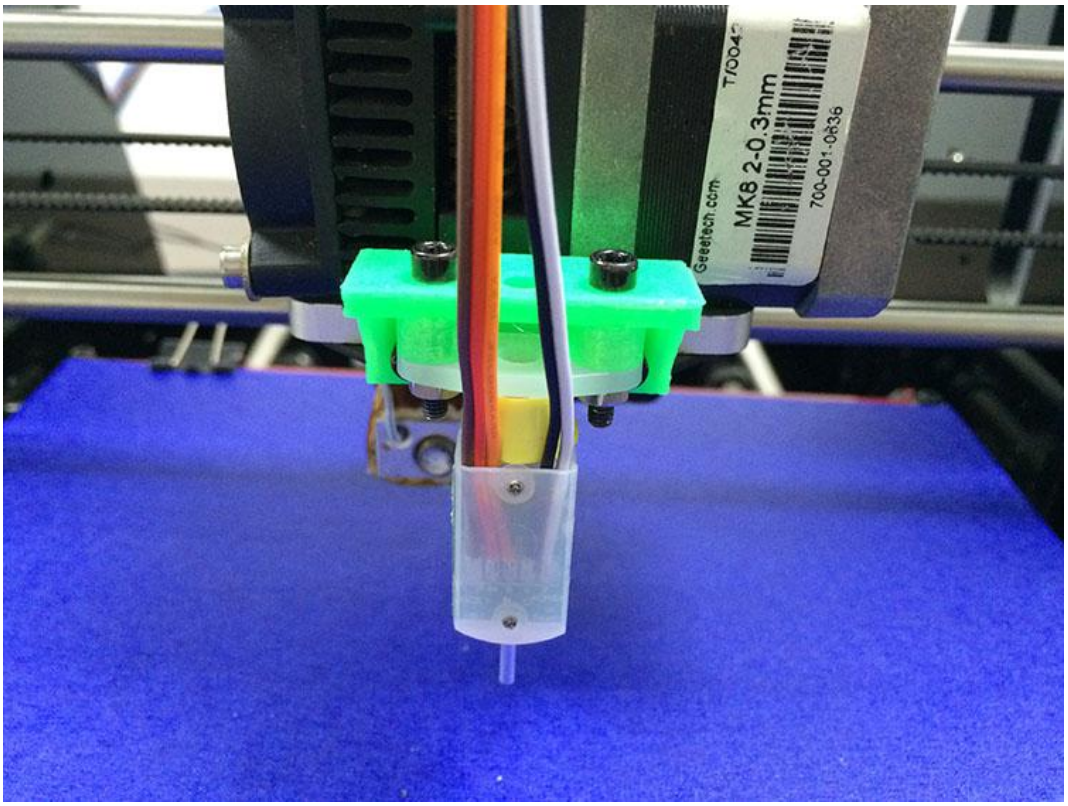



MK8 2-0.3mm
Geeetech.com



3. Fix the 3DTouch sensor on the sensor mount with 2 M3*16mm screws and 2 M3 nuts.

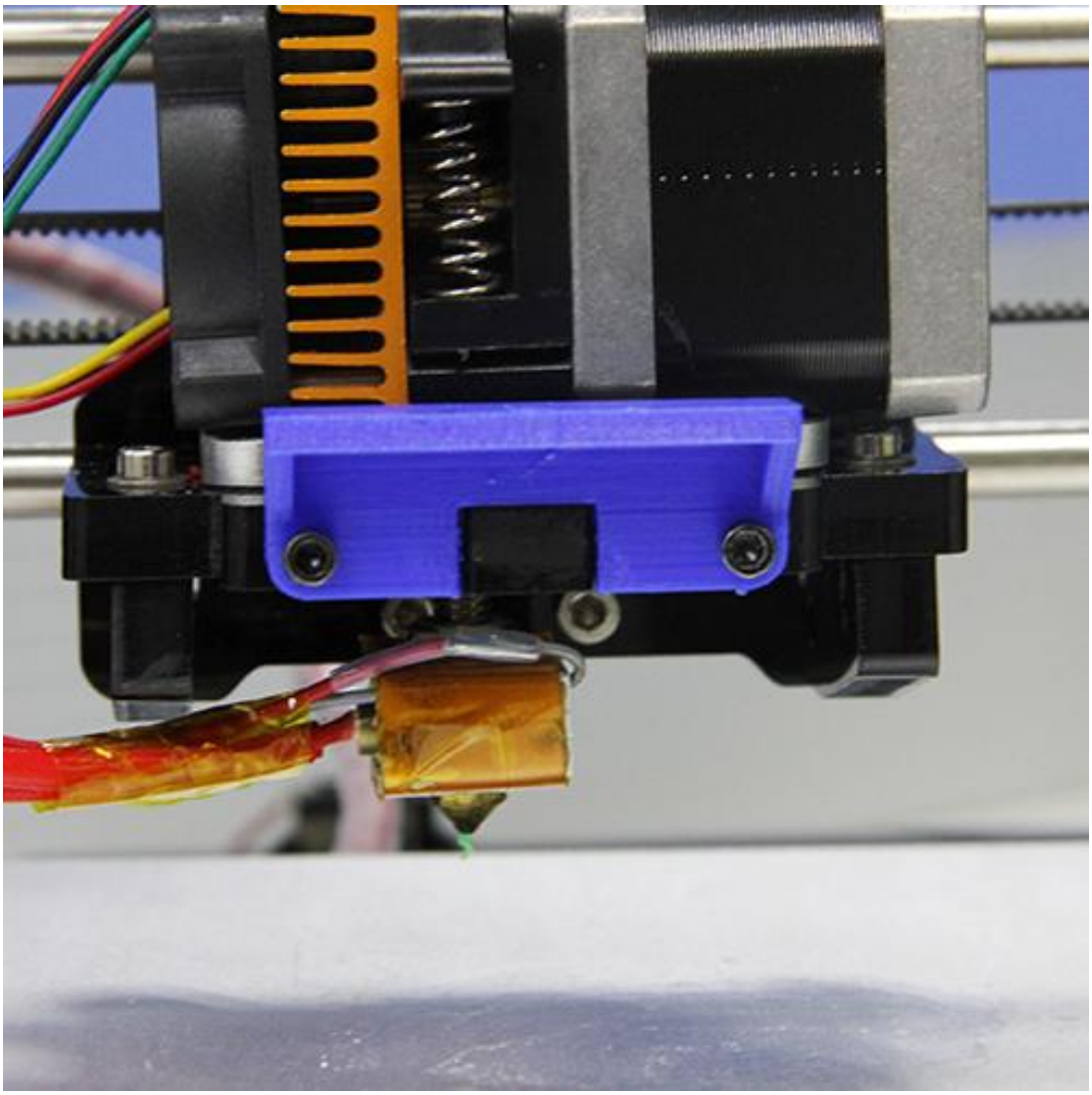

MK8 2-0.3mm


MK8 2-0.3mm
Geeetech.com

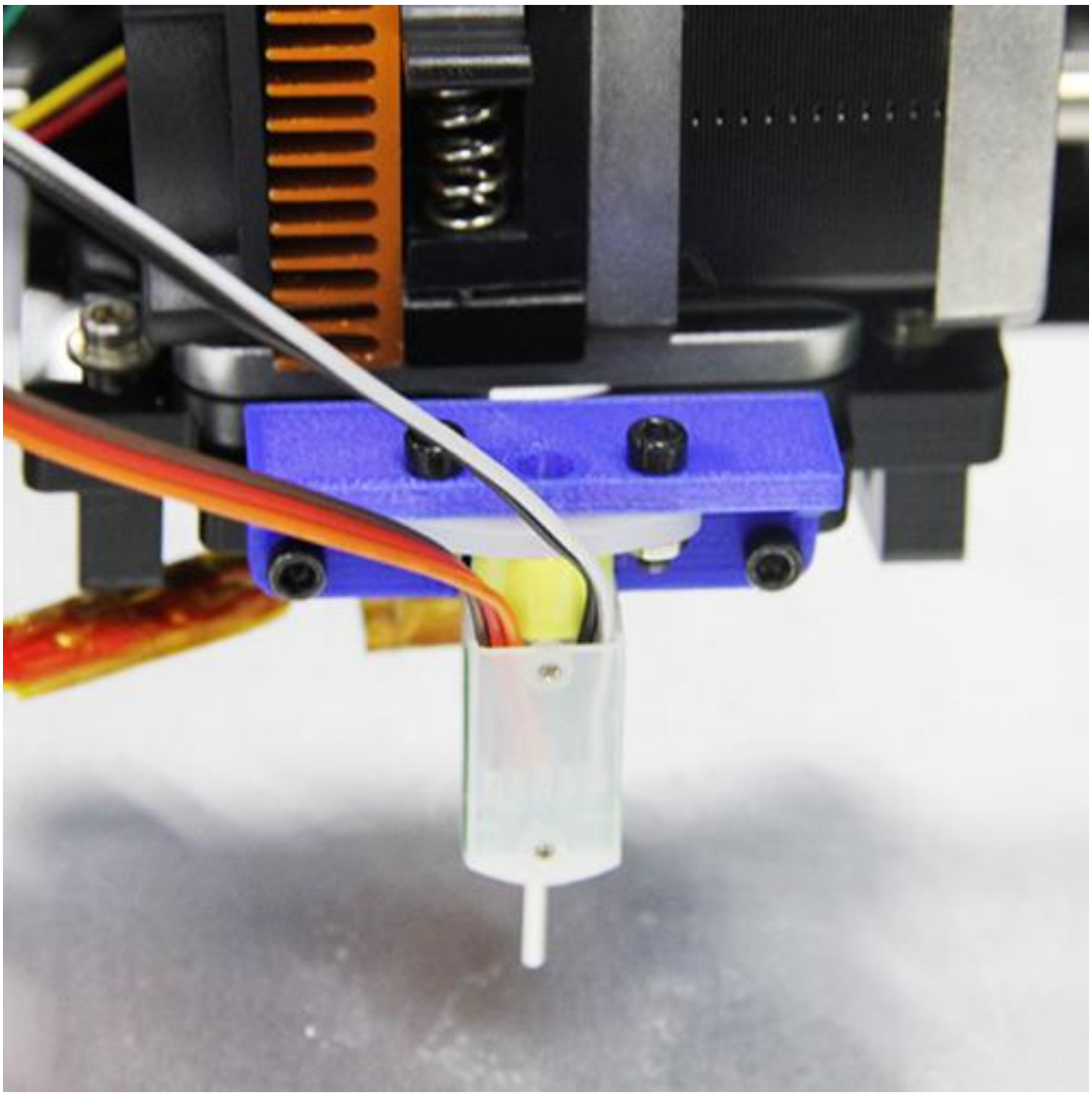
Mount for Geeetech Prusa I3 pro X

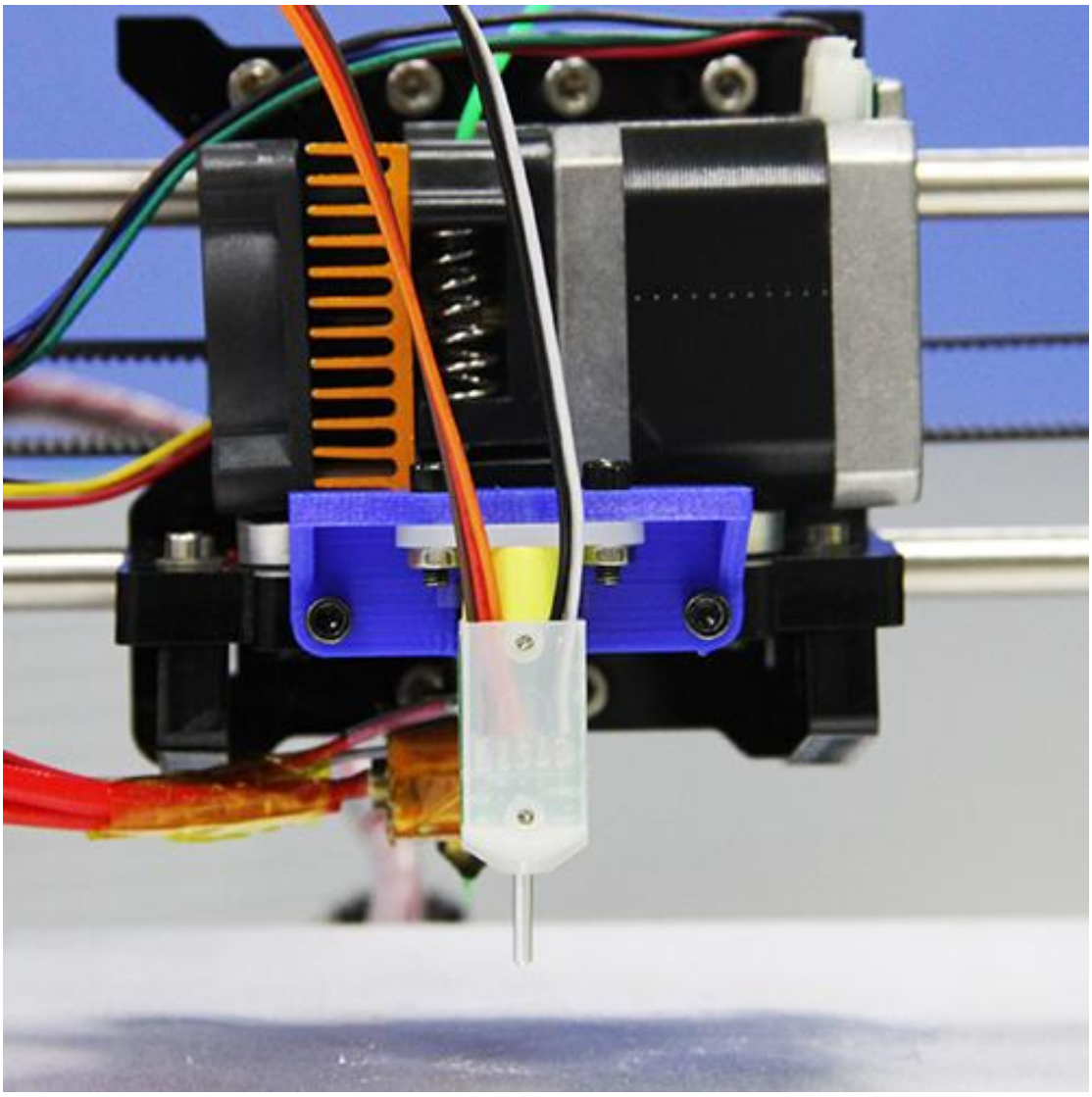
1. Download the .stl file for the mount of pro X here and print one.

2. Fix the mount on the Extruder holder with 2 M3*16mm screw and M3 square nut.(square nut are also ok)



3. Fix the 3DTouch sensor on the sensor mount with 2 M3*16mm screws and 2 M3 nuts.





2.2 Wiring

The 3DTouch Auto Leveling sensor has 5 wires, 3 for the first servo connection and 5v and 2 for the Z min end stop, negative and signal pins.

3DTouch can be operated in the following condition.

One I/O for control (PWM or Software PWM)

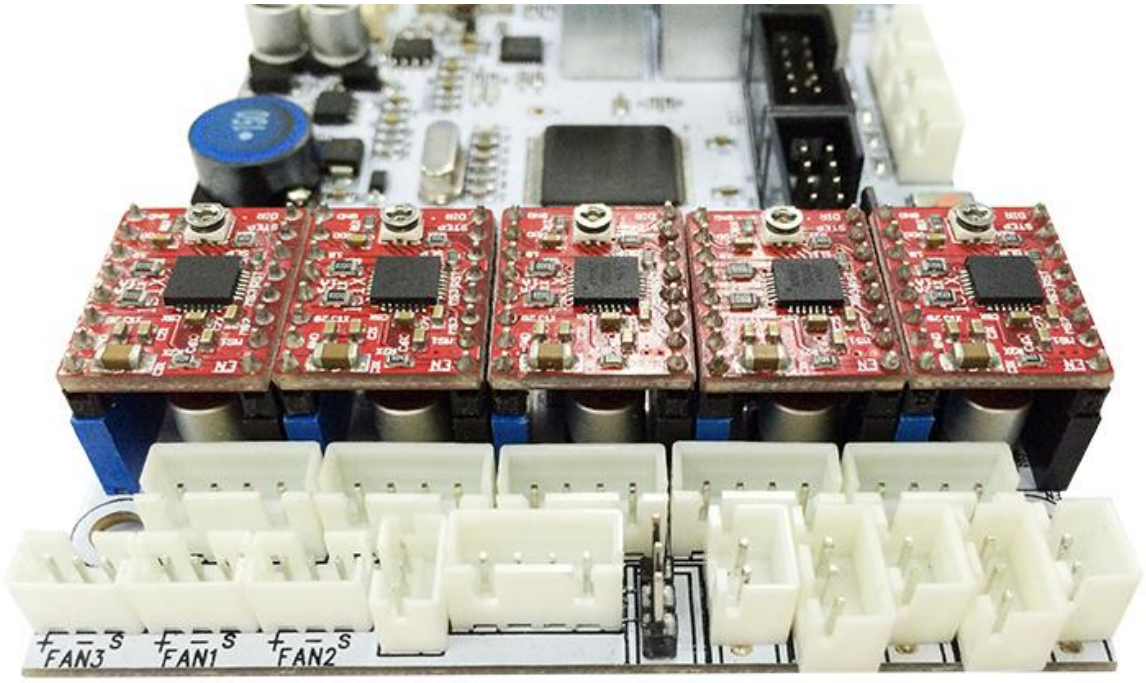
One I/O for Z min (Z Probe)

GND and +5V power

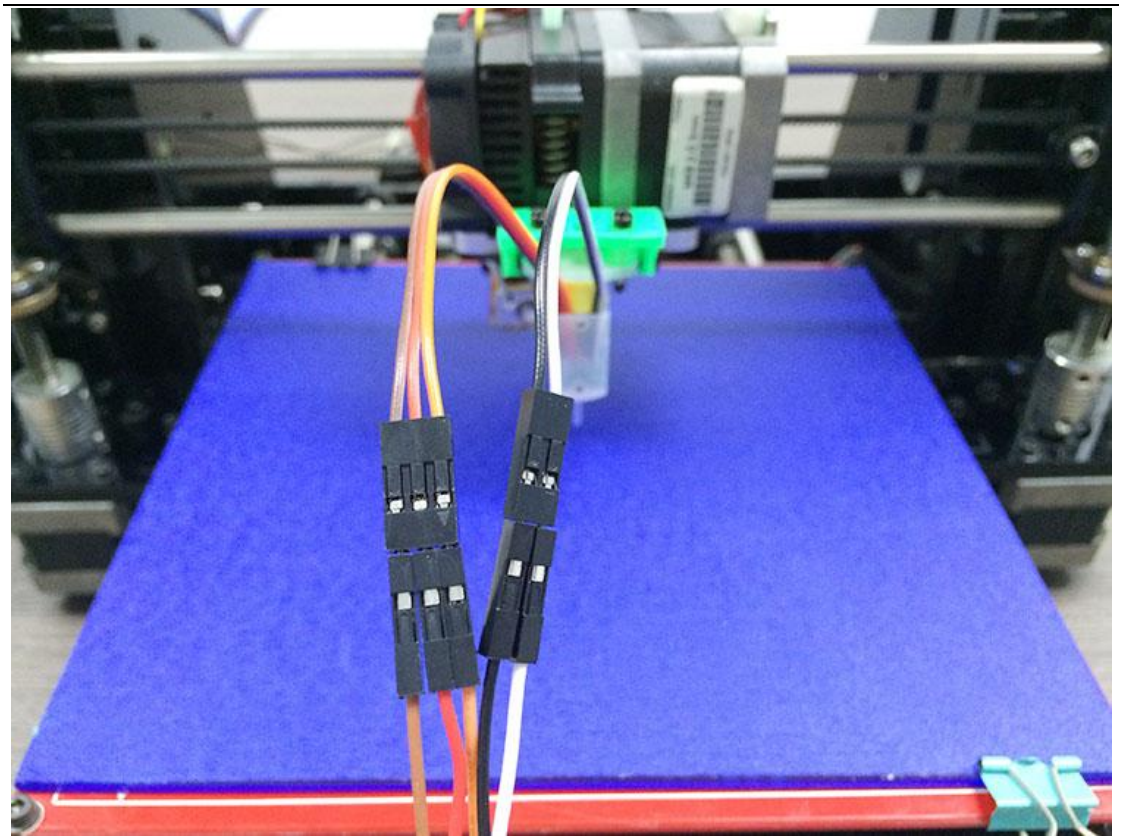
Let’s take our GT2560 3D Printer control board as an example.

There are several ways to connect the 3DTouch Auto Leveling sensor to GT2560, here is the easiest way.

Step1. Remove the Z max connector from the board and replace it with a 3Pin Straight Pin. You need to use soldering iron here.



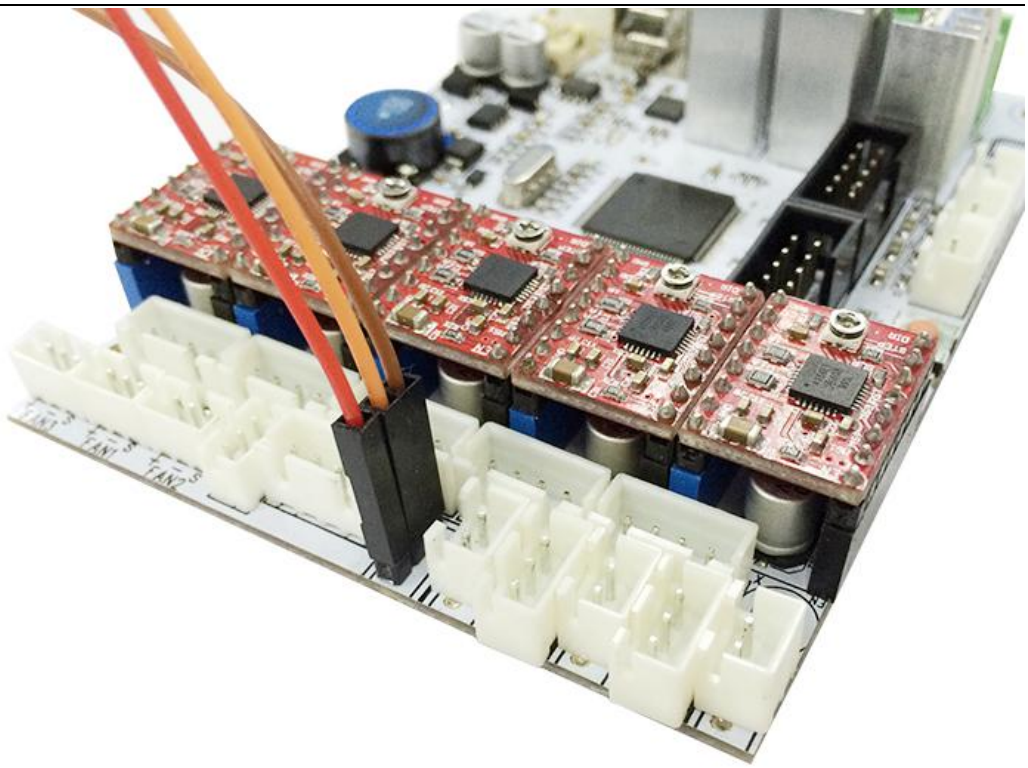
Step2. Use DuPont wire to extend the wires of 3DTouch. It doesn't matter if you cannot find the wires with the same color, but do not mix the wires up.



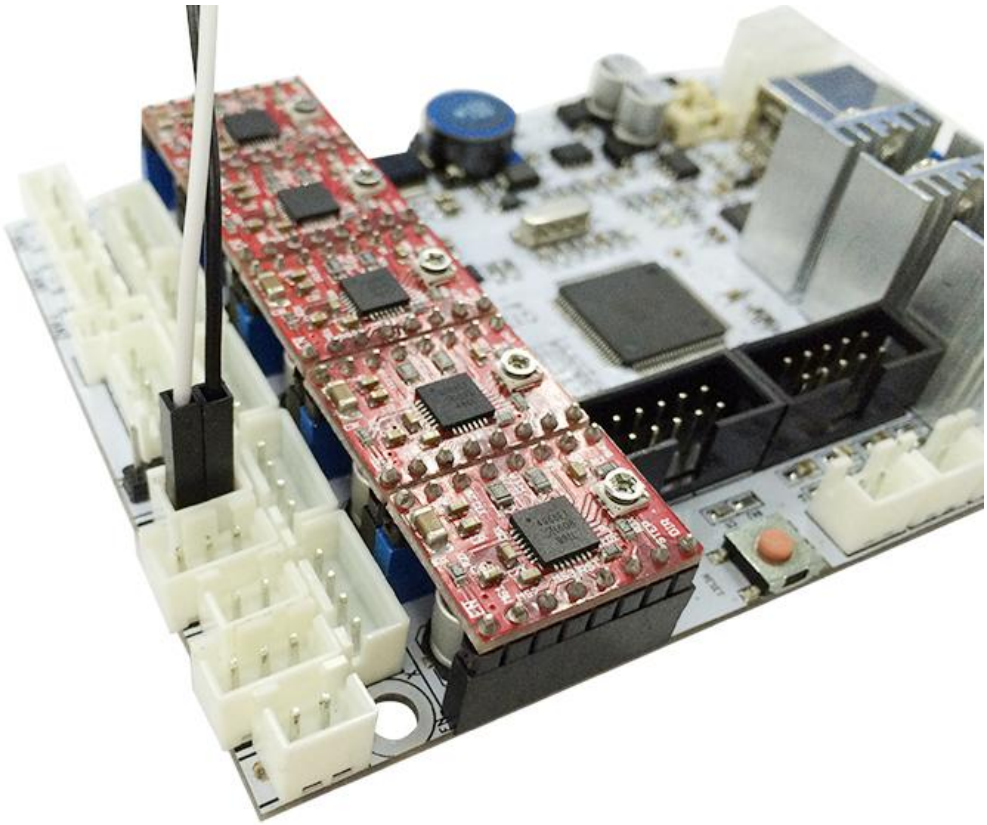
Step3. Connect the extended wire to the GT2560 control board.

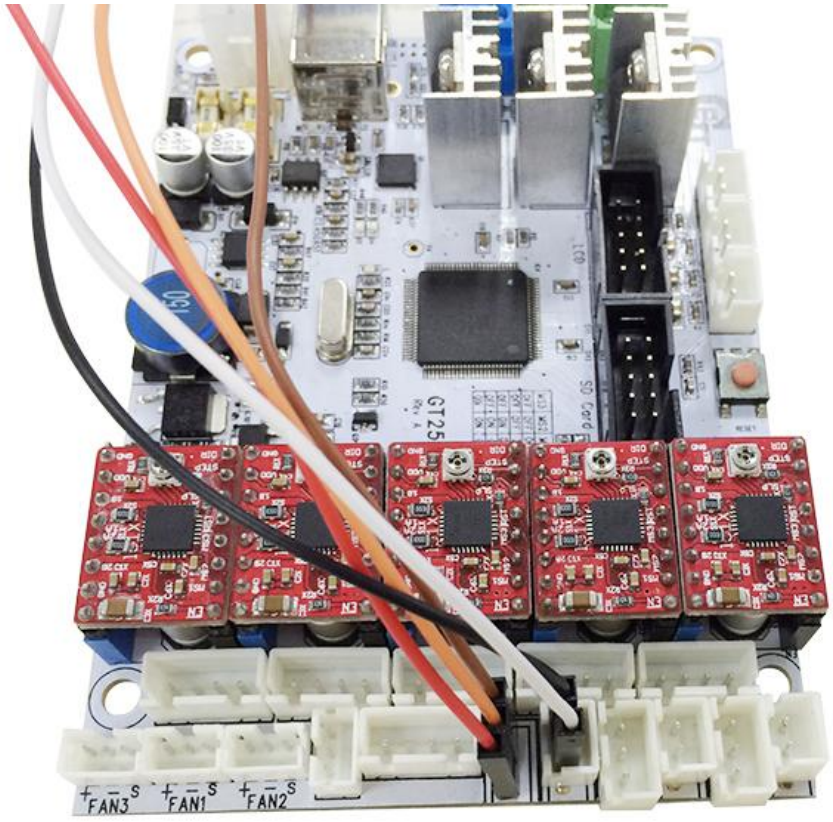
Connect the 3 pin wire to the Z max pin.

3-pin: Brown (-, GND) Red (+5V) Orange (control signal)



Connect the 2 pin wire to the Z min pin.





Note the wire order.

- When using 3DTouch Auto Leveling sensor, you do not need to connect the original Z min end stop wires.

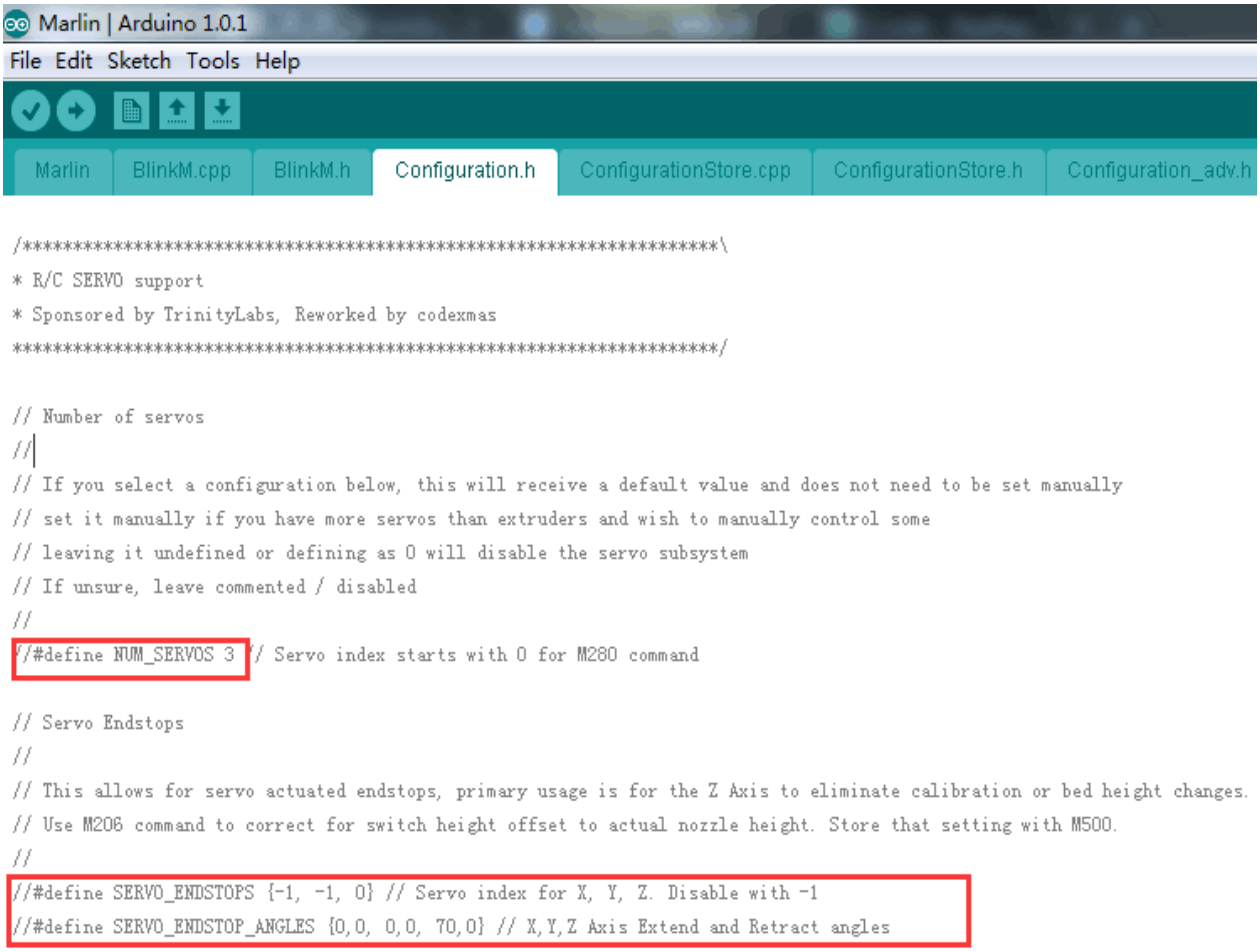
That's all for the wiring of the 3DTouch Auto Leveling sensor and GT2560.

2.3. Firmware setting

Changes need to be made for the configuration file in the Marlin source code for 3DTouch. The required changes are similar to how you would setup a mechanical servo sensor.

The firmware setting for the Prusa I3 pro B, pro C and pro X are most the same. To download the firmware, please visit here.

Step1. Open the firmware in Arduino IDE, find the following code in *Configuration.h*:

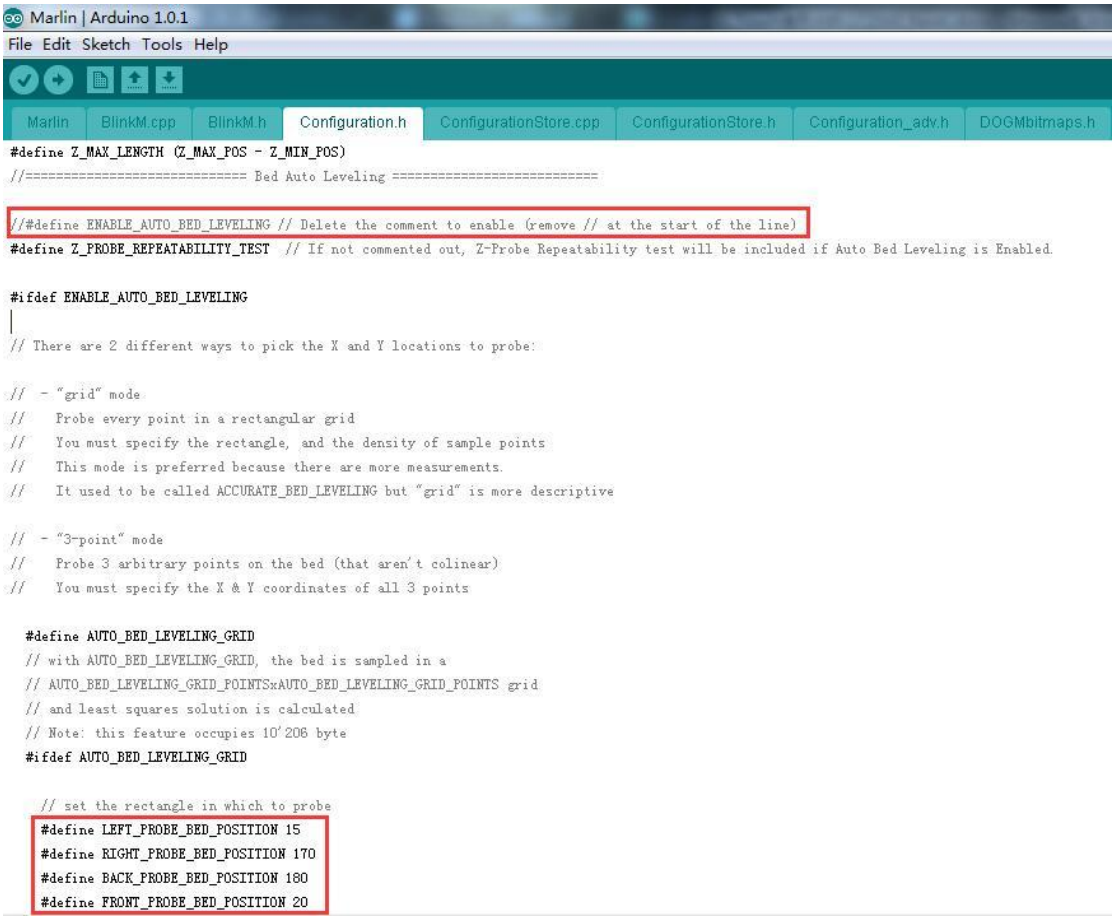


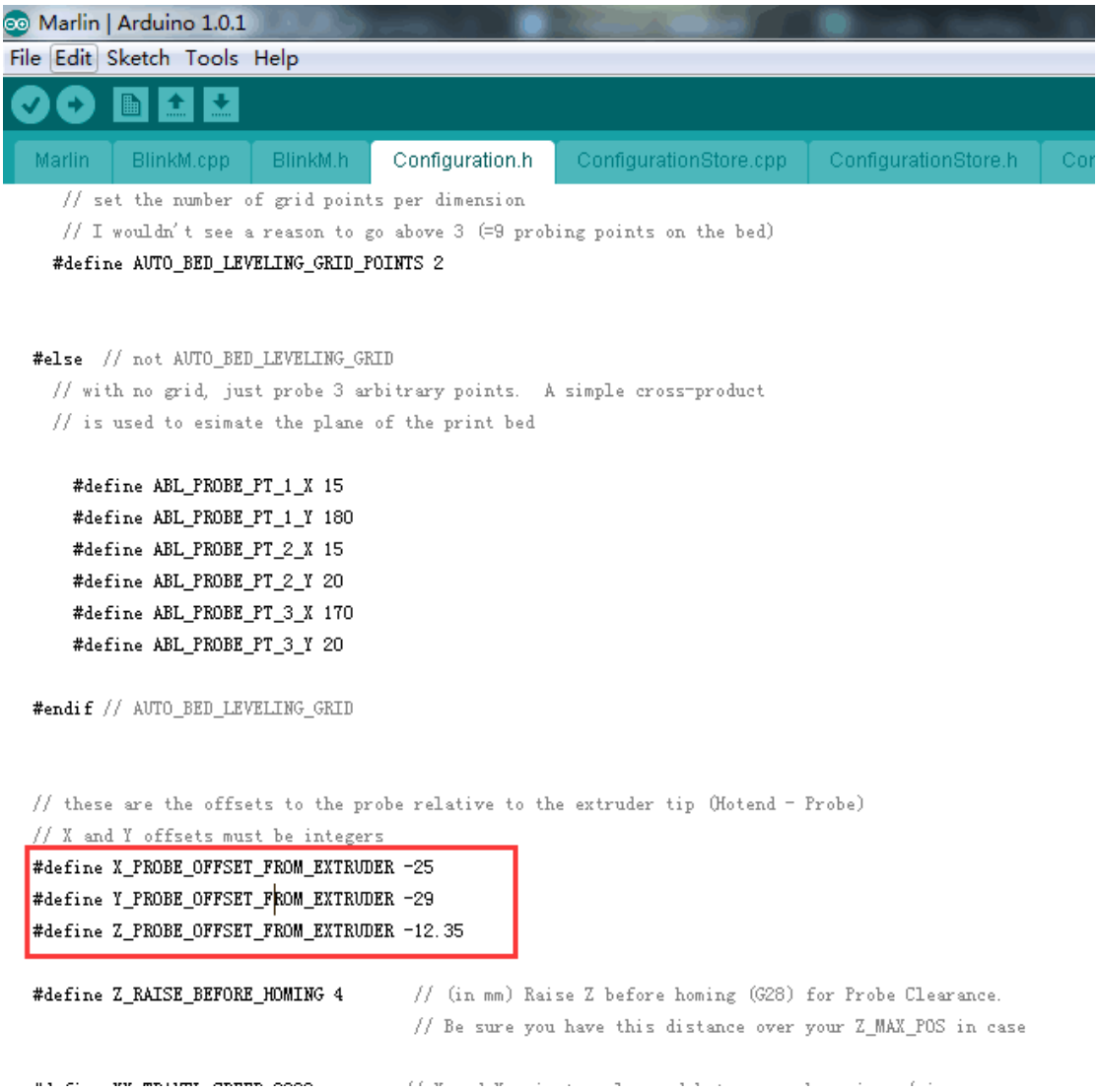
Modify the code in the red box into:

// Number of servos
//
// If you select a configuration below, this will receive a default value and does not need to be set manually
// set it manually if you have more servos than extruders and wish to manually control some
// leaving it undefined or defining as 0 will disable the servo subsystem
// If unsure, leave commented / disabled
//
#define NUM_SERVOS 1 // Servo index starts with 0 for M280 command

// Servo Endstops
//
// This allows for servo actuated endstops, primary usage is for the Z Axis to eliminate calibration or bed height changes.
// Use M206 command to correct for switch height offset to actual nozzle height. Store that setting with M500.
//
#define SERVO_ENDSTOPS {-1, -1, 0} // Servo index for X, Y, Z. Disable with -1
#define SERVO_ENDSTOP_ANGLES {0,0, 0,0, 10,90} // X,Y,Z Axis Extend and Retract angles

Step2. Find the codes regarding to Bed Auto Leveling in *Configuration.h.*





//==========Bed Auto Leveling==========

#define ENABLE_AUTO_BED_LEVELING // Delete the comment to enable (remove // at the start of the line)

#define Z_PROBE_REPEATABILITY_TEST // If not commented out, Z-Probe Repeatability test will be included if Auto Bed Leveling is Enabled.

#ifdef ENABLE_AUTO_BED_LEVELING

…

#define AUTO_BED_LEVELING_GRID

…

#ifdef AUTO_BED_LEVELING_GRID

```
// set the rectangle in which to probe
#define LEFT_PROBE_BED_POSITION 30
#define RIGHT_PROBE_BED_POSITION 200
#define BACK_PROBE_BED_POSITION 147
#define FRONT_PROBE_BED_POSITION 20
```

Step3: scroll down to find the codes to Define the probe offset


```
#else  // not AUTO_BED_LEVELING_GRID
  // with no grid, just probe 3 arbitrary points.  A simple cross-product
  // is used to esimate the plane of the print bed

    #define ABL_PROBE_PT_1_X 15
    #define ABL_PROBE_PT_1_Y 180
    #define ABL_PROBE_PT_2_X 15
    #define ABL_PROBE_PT_2_Y 20
    #define ABL_PROBE_PT_3_X 170
    #define ABL_PROBE_PT_3_Y 20

#endif // AUTO_BED_LEVELING_GRID


// these are the offsets to the probe relative to the extruder tip (Hotend - Probe)
// X and Y offsets must be integers
#define X_PROBE_OFFSET_FROM_EXTRUDER -25
#define Y_PROBE_OFFSET_FROM_EXTRUDER -29
#define Z_PROBE_OFFSET_FROM_EXTRUDER -12.35

#define Z_RAISE_BEFORE_HOMING 4       // (in mm) Raise Z before homing (G28) for Probe Cle
                                      // Be sure you have this distance over your Z_MAX_PO

#define XY_TRAVEL_SPEED 8000         // X and Y axis travel speed between probes, in mm/mi

#define Z_RAISE_BEFORE_PROBING 15    //How much the extruder will be raised before traveli
#define Z_RAISE_BETWEEN_PROBINGS 5 //How much the extruder will be raised when traveling

//#define Z_PROBE_SLED // turn on if you have a z-probe mounted on a sled like those desig
//#define SLED_DOCKING_OFFSET 5 // the extra distance the X axis must travel to pickup the
```

#define AUTO_BED_LEVELING_GRID_POINTS 2
#else // not AUTO_BED_LEVELING_GRID
…
#define X_PROBE_OFFSET_FROM_EXTRUDER 4
#define Y_PROBE_OFFSET_FROM_EXTRUDER -43
#define Z_PROBE_OFFSET_FROM_EXTRUDER -1.4

#define Z_RAISE_BETWEEN_PROBINGS 10

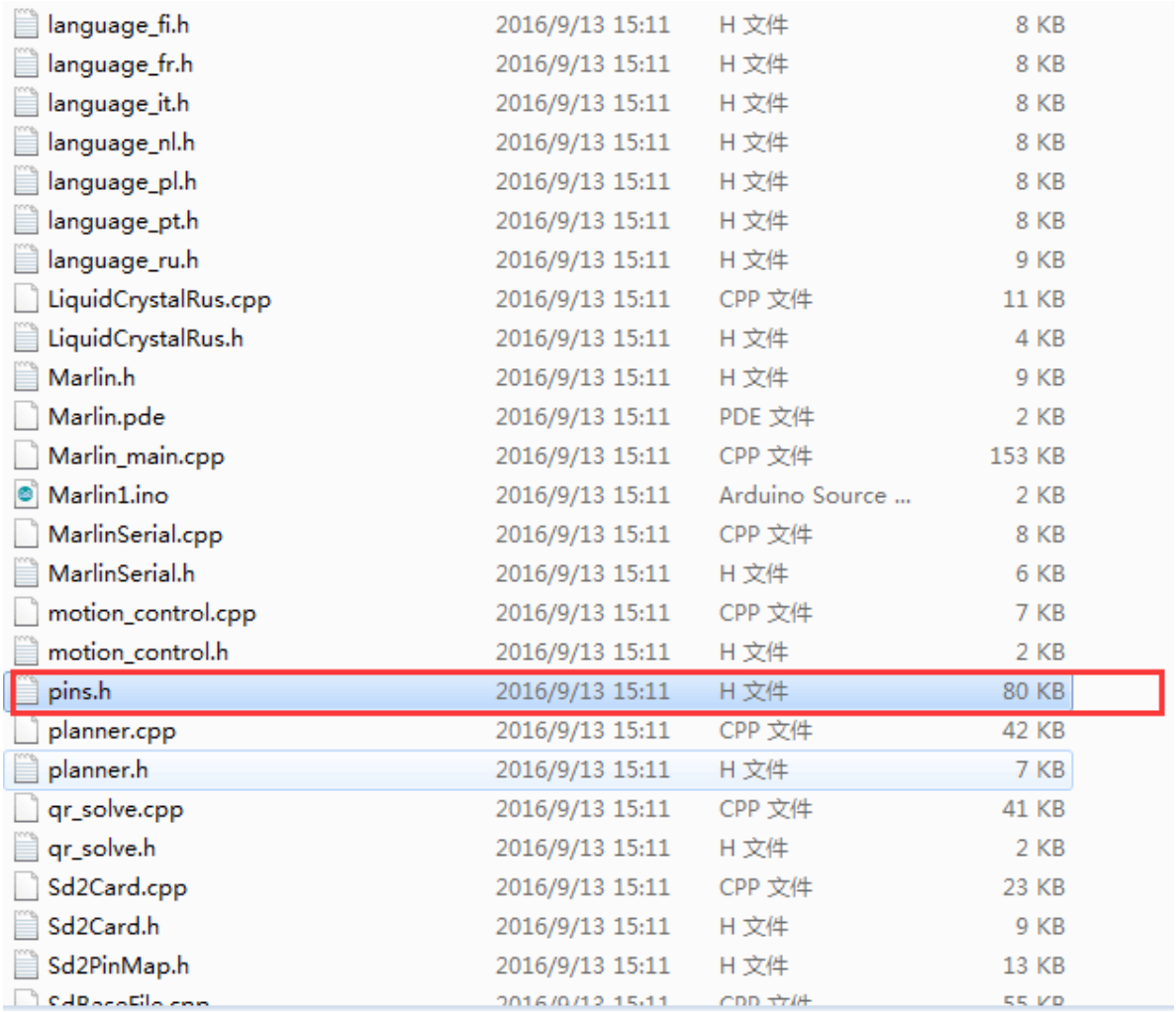
Note, please if your printer is pro X, you need put different numbers as shown below:

#define LEFT_PROBE_BED_POSITION 20
#define RIGHT_PROBE_BED_POSITION 190
#define BACK_PROBE_BED_POSITION 165
#define FRONT_PROBE_BED_POSITION 30

#define X_PROBE_OFFSET_FROM_EXTRUDER 4
#define Y_PROBE_OFFSET_FROM_EXTRUDER -50
#define Z_PROBE_OFFSET_FROM_EXTRUDER -3.26

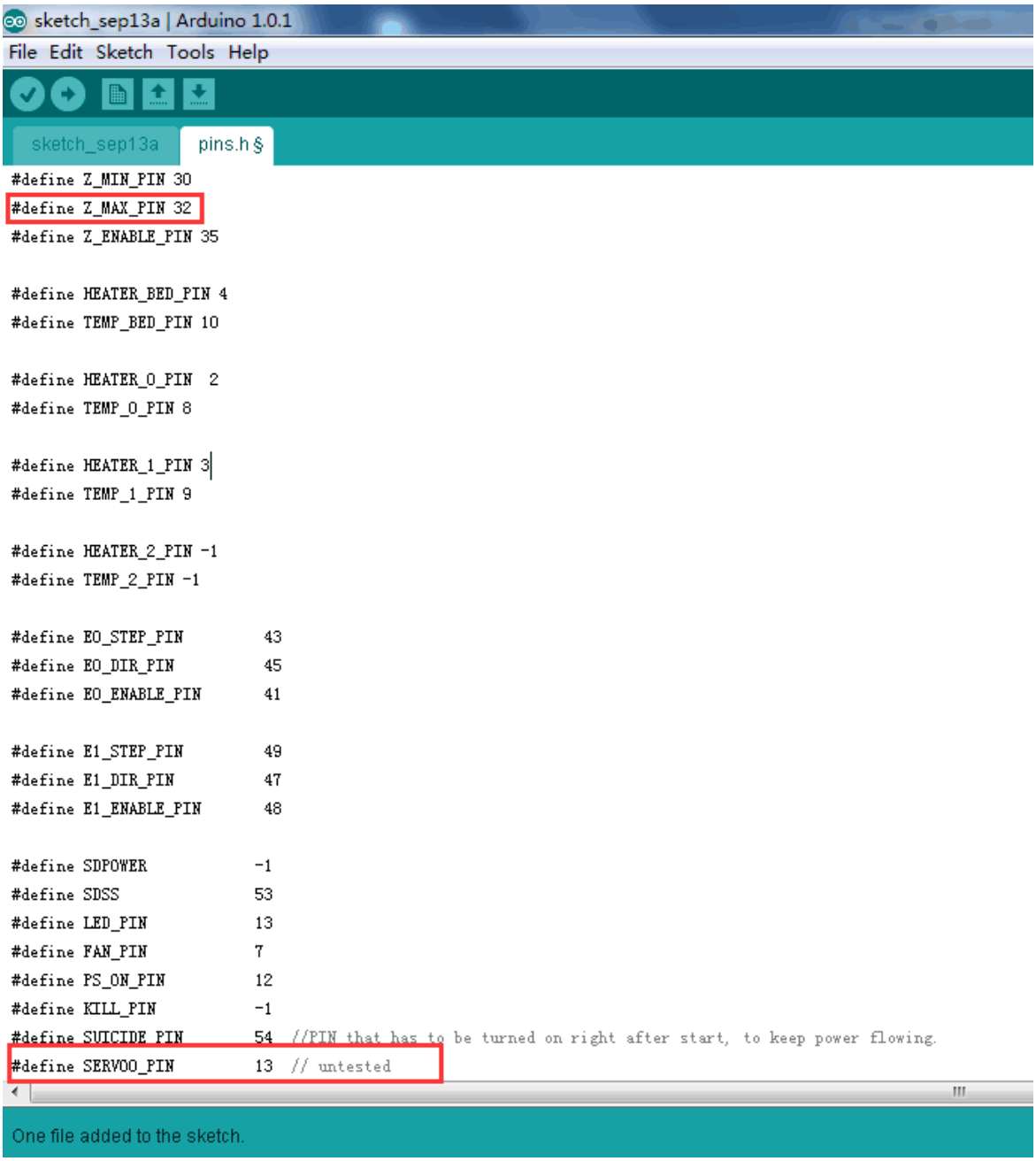
#define Z_RAISE_BETWEEN_PROBINGS 10

Step4. Find the following code in pins.h
If you do not find the *pins.h tab* on Arduino IDE, please open it separately, after the modification, please save it.



language_fi.h	2016/9/13 15:11	H 文件	8 KB
language_fr.h	2016/9/13 15:11	H 文件	8 KB
language_it.h	2016/9/13 15:11	H 文件	8 KB
language_nl.h	2016/9/13 15:11	H 文件	8 KB
language_pl.h	2016/9/13 15:11	H 文件	8 KB
language_pt.h	2016/9/13 15:11	H 文件	8 KB
language_ru.h	2016/9/13 15:11	H 文件	9 KB
LiquidCrystalRus.cpp	2016/9/13 15:11	CPP 文件	11 KB
LiquidCrystalRus.h	2016/9/13 15:11	H 文件	4 KB
Marlin.h	2016/9/13 15:11	H 文件	9 KB
Marlin.pde	2016/9/13 15:11	PDE 文件	2 KB
Marlin_main.cpp	2016/9/13 15:11	CPP 文件	153 KB
Marlin1.ino	2016/9/13 15:11	Arduino Source ...	2 KB
MarlinSerial.cpp	2016/9/13 15:11	CPP 文件	8 KB
MarlinSerial.h	2016/9/13 15:11	H 文件	6 KB
motion_control.cpp	2016/9/13 15:11	CPP 文件	7 KB
motion_control.h	2016/9/13 15:11	H 文件	2 KB
pins.h	2016/9/13 15:11	H 文件	80 KB
planner.cpp	2016/9/13 15:11	CPP 文件	42 KB
planner.h	2016/9/13 15:11	H 文件	7 KB
qr_solve.cpp	2016/9/13 15:11	CPP 文件	41 KB
qr_solve.h	2016/9/13 15:11	H 文件	2 KB
Sd2Card.cpp	2016/9/13 15:11	CPP 文件	23 KB
Sd2Card.h	2016/9/13 15:11	H 文件	9 KB
Sd2PinMap.h	2016/9/13 15:11	H 文件	13 KB

Find the following code as shown in the red box:




```
/**********************************************************************
* Ultimaker pin assignment
**********************************************************************/

#if MB(ULTIMAKER)
#define KNOWN_BOARD

…
```

```
#define Z_MAX_PIN -1//32
#define Z_ENABLE_PIN 35

…
#define SUICIDE_PIN       54 //PIN that has to be turned on right after start, to keep power flowing.
#define SERVO0_PIN         32//13 // untested
```

Now, we have finished the firmware; please upload the modified firmware to your control board.

3. Testing

When the 3DTouch is first powered up it does a self test – Starting with the pin up it them goes down/up 3 times and ends up the LED on solid. Continuous flashing means that there is an obstruction or fault.

The 3DTouch acts on the following g.code that can be used manually to diagnose faults etc but you don't need to normally worry about them.

M280 P0 S10 ; pushes the pin down

M280 P0 S90 ; pulls the pin up

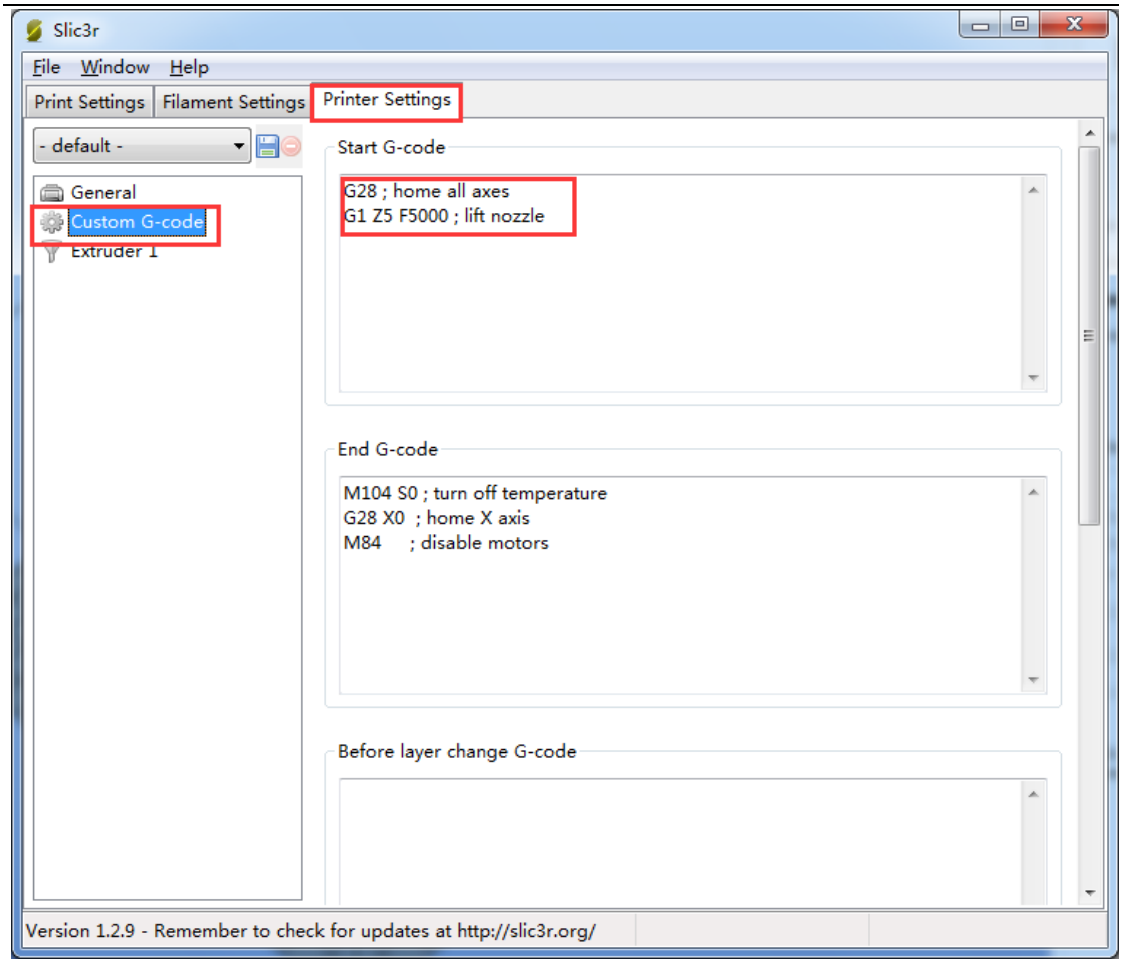
M280 P0 S120 ; Self test – keeps going until you do pin up/down or release alarm

M280 P0 S160 ; Release alarm

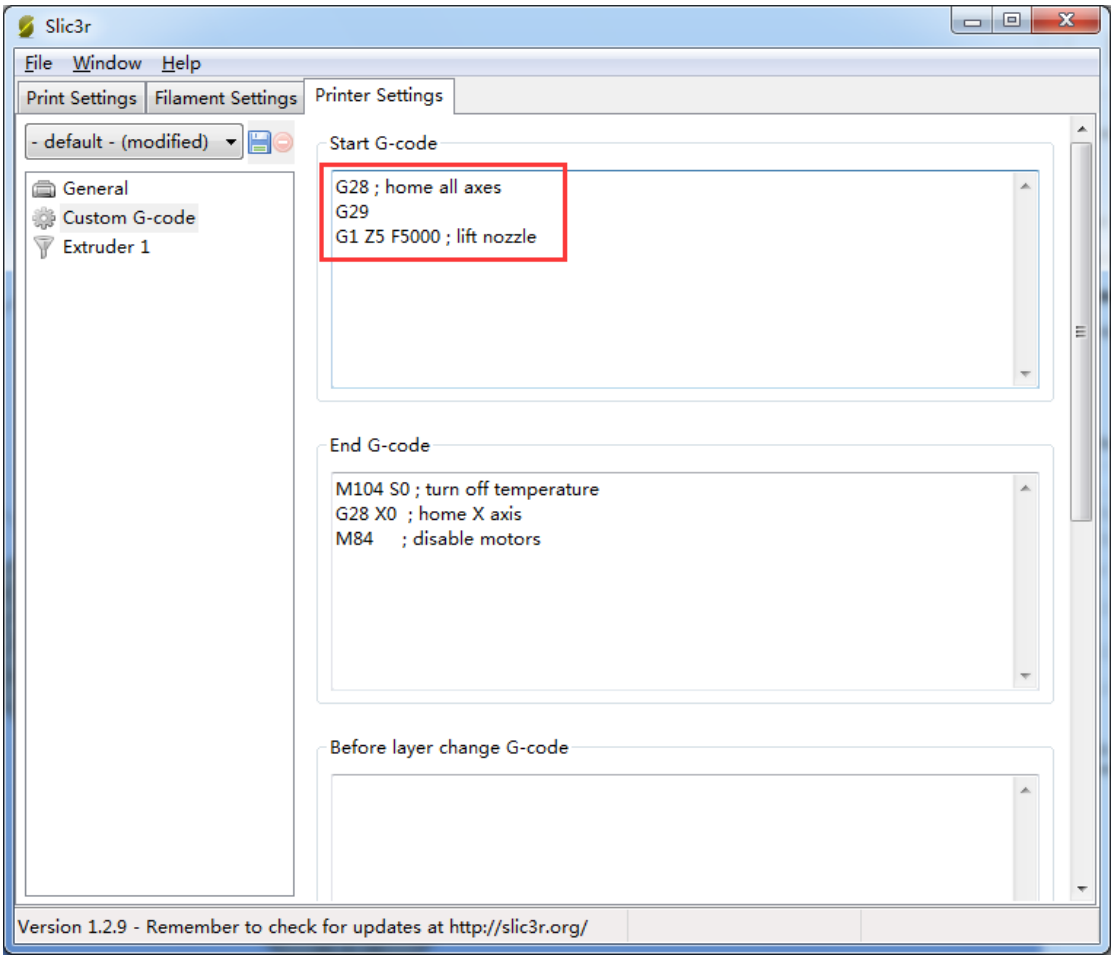
Alarm – The 3DTouch can sense when something is wrong and then goes into alarm mode which is continuous flashing. Alarm can be triggered like an obstruction that stops the pin going up and down freely, it could be dirt etc.

4. Printer setting

Providing the firmware is correctly configured, the sensor responds to the same codes as any other sensor e.g. inductive, capacitive or IR. The Start Code in you slicer should contain the sequence G28 followed by G29 to do the auto bed leveling.
Open Slicer>printer setting


Slic3r
File Window Help
Print Settings
Filament Settings
Printer Settings
- default -
General
Custom G-code
Extruder 1
Start G-code
G28 ; home all axes
G1 Z5 F5000 ; lift nozzle
End G-code
M104 S0 ; turn off temperature
G28 X0 ; home X axis
M84 ; disable motors
Before layer change G-code
Version 1.2.9 - Remember to check for updates at http://slic3r.org/

Add G29 command right after G28



*Don't put another G28 after the G29 as it will just remove the G29 results.

The G29 command should be added every time.

5. Videos

Here is a video of using the 3DTouch Auto Leveling Sensor on Geeetech Prusa I3 pro B 3d printer.

Here is a video of using the 3DTouch Auto Leveling Sensor on Geeetech Prusa I3 pro X 3d printer.