
BIGTREETECH

Smart Filament Sensor

Operating Instruction

I . Product introduction

Smart Filament Sensor is a filament detection module aiming at the defects of the broken materials detection module in the market. It was launched by the 3D printing team of ShenZhen BigTree Technology CO.,LTD .

II .Sensor features

- 1) It can detect abnormal extrusion of filament caused by nozzle plugging, filament wrapping and extruder failure.
- 2) It can detect the failure of filament to pass through the module, such as filament fracture and filament exhaustion.
- 3) It works with open source firmware marlin 2.0.x. Marlin2.0 uses powerful development tools, Visual Studio Code integrated development environment: supports online debugging, which is more helpful for product development and performance optimization. Adopts C language development, so it has low development threshold.
- 4) Support motherboard with broken filament detection interface.
- 5) Support screen 2004,12864, TFT24 (12864 mode), tft35_v3.0 (12864 mode).
- 6) The module is being optimized and will be compatible with touch screen in the future.
- 7) Support for input power 3.3v-5v.
- 8) Support long - range and short - range extrusion.
- 9) Support 1.75mm diameter filament (please install the flexible filament before installing the extruder).
- 10) Installation is optional.

III. Module parameters

Module size: 75mmX30mmX29.55mm

Fixed hole spacing: 20.35mm

Filament detection diameter: 1.75mm

Detection length: 7mm

Voltage: 3.3V~5V

Adapter firmware: marlin 2.0.X

Support extrusion: long - range extrusion, short - range extrusion

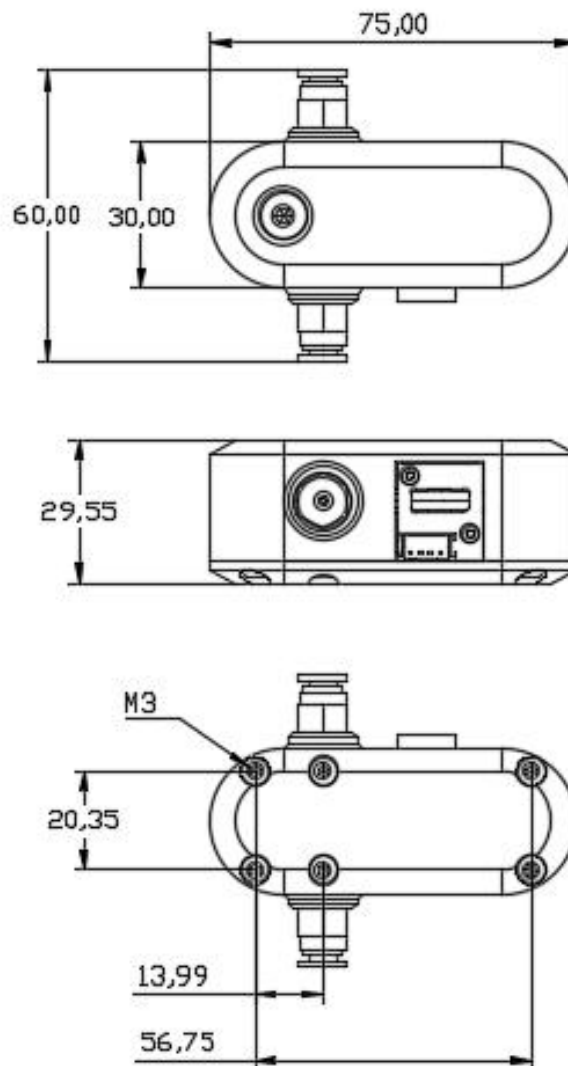


图 1

IV. Firmware modification

1) The firmware used in the product is marlin2.0.x. Use the screens 2004, 12864, TFT 24 (12864 mode), TFT35_V3.0 (12864 mode) can be used directly. According to our test, the motherboard that can use this sensor includes: SKR V1.3; SKR mini E3. SKR E3 DIP; MKS CEN L; MKS GEN V1.4. The module is being optimized and will be compatible with the touch screen later. The specific modification method is shown in figure 2

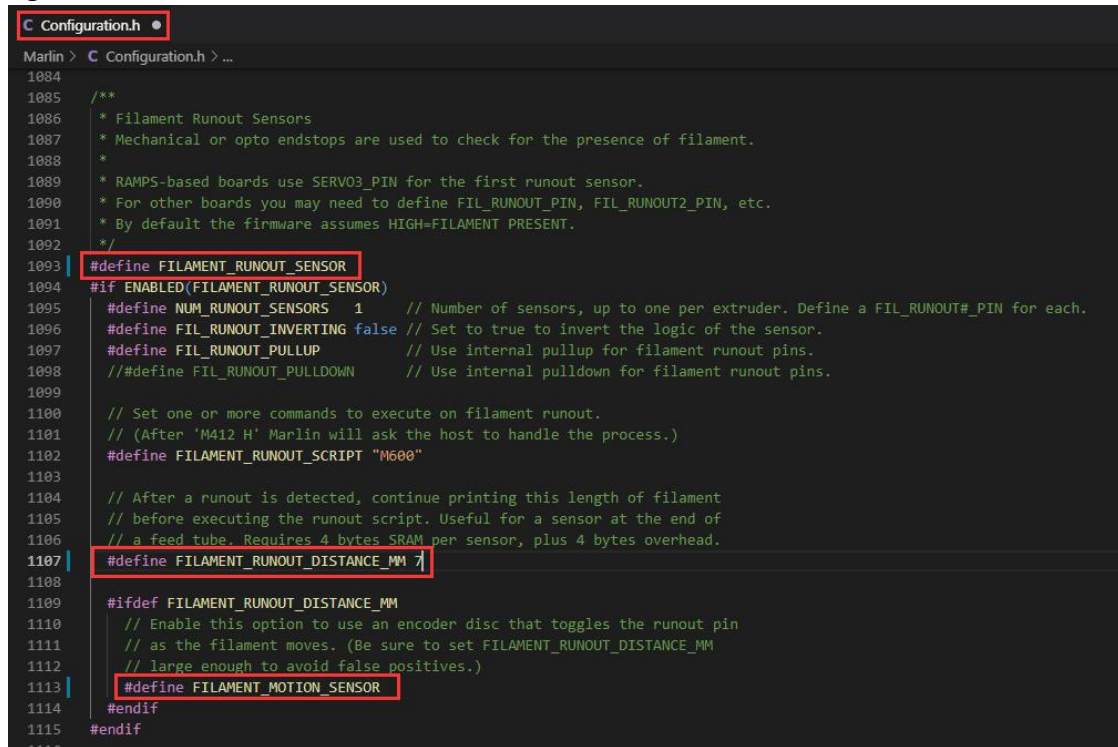


图 2

The configuration to be modified is:

uncomment #define FILAMENT_RUNOUT_SENSOR

Turn on the Smart Filament Sensor

uncomment #define FILAMENT_RUNOUT_DISTANCE_MM 7

Sets the accuracy of the sensor to 7mm

uncomment #define FILAMENT_MOTION_SENSOR

Sets the sensor to the encoder type

2) Interface modification

Modify the interface location (as shown in figure 3) to change the interface to any extended interface

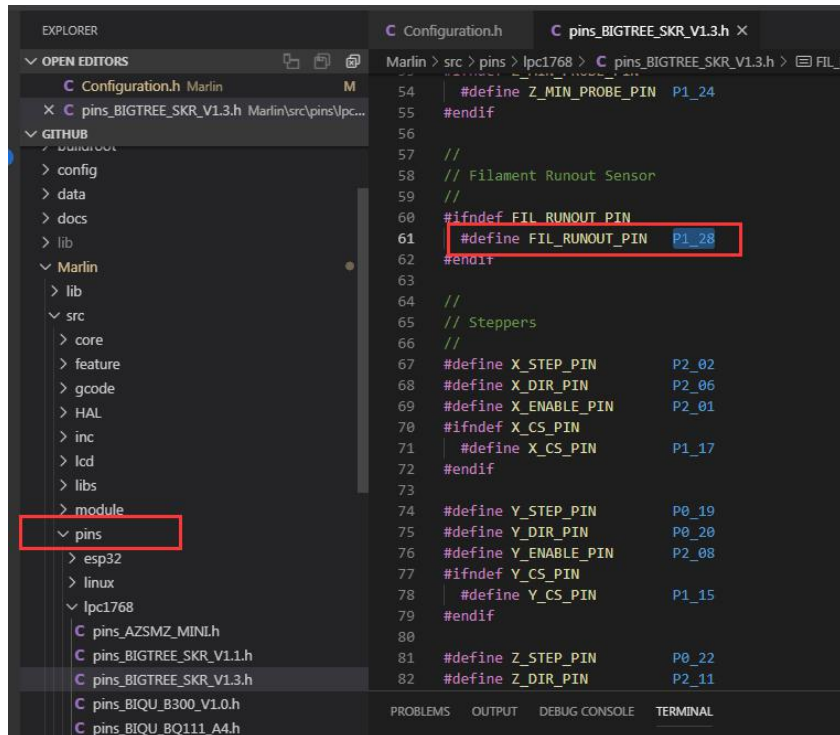


Figure 3

3) Modify relevant parameters after suspension

The modified position is shown in figure 4, and parameters such as the backpull speed and backpull distance after suspension can be controlled.

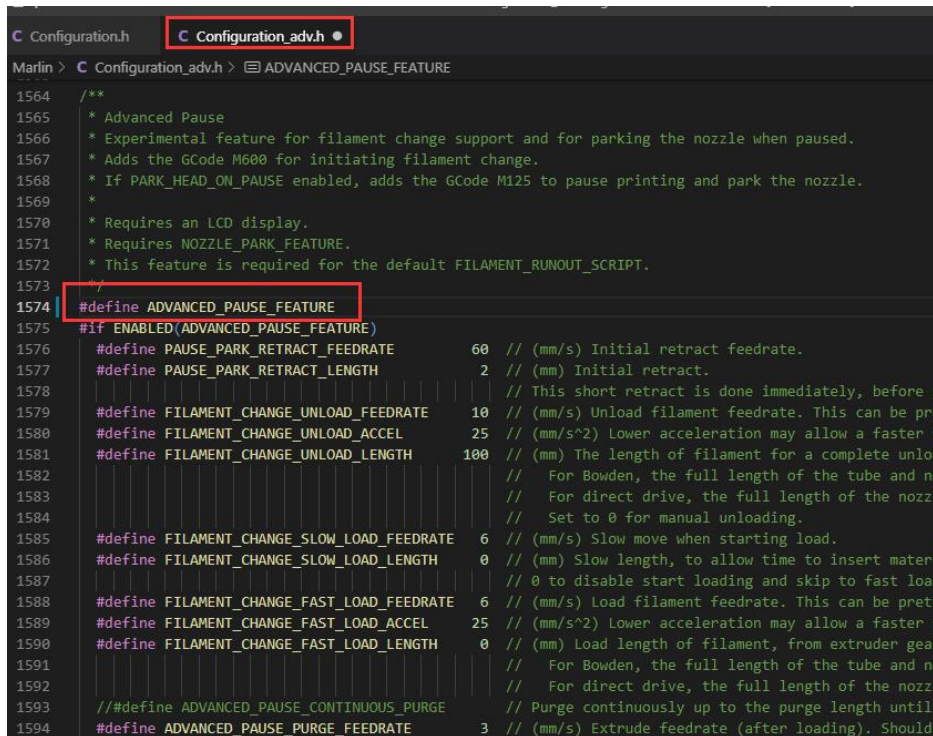
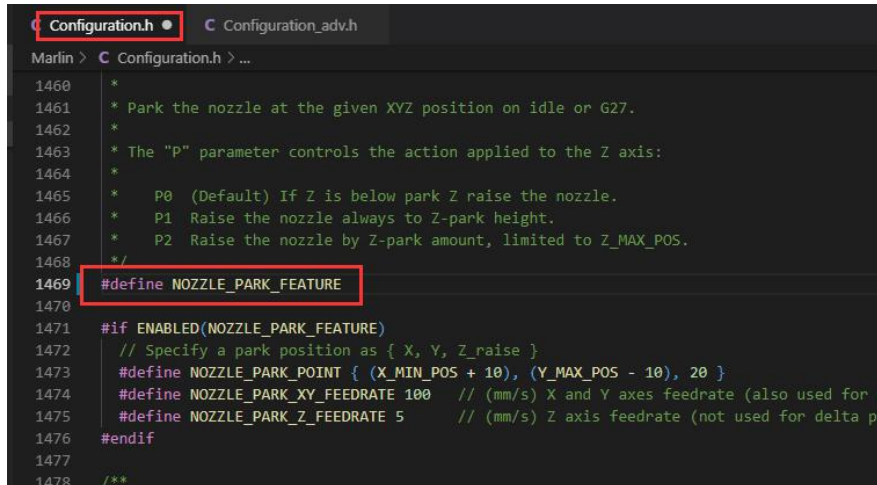


Figure 4

4) Modify pause position

The modified position is shown in figure 5. The position where the nozzle stops after suspension can be set.



```

1460 *
1461 * Park the nozzle at the given XYZ position on idle or G27.
1462 *
1463 * The "P" parameter controls the action applied to the Z axis:
1464 *
1465 *   P0 (Default) If Z is below park Z raise the nozzle.
1466 *   P1 Raise the nozzle always to Z-park height.
1467 *   P2 Raise the nozzle by Z-park amount, limited to Z_MAX_POS.
1468 */
1469 #define NOZZLE_PARK_FEATURE
1470
1471 #if ENABLED(NOZZLE_PARK_FEATURE)
1472   // Specify a park position as { X, Y, Z_raise }
1473   #define NOZZLE_PARK_POINT { (X_MIN_POS + 10), (Y_MAX_POS - 10), 20 }
1474   #define NOZZLE_PARK_XY_FEEDRATE 100 // (mm/s) X and Y axes feedrate (also used for delta)
1475   #define NOZZLE_PARK_Z_FEEDRATE 5 // (mm/s) Z axis feedrate (not used for delta)
1476 #endif
1477
1478 /**

```

Figure 5

5) Modify the screen

Modify figure 6 and figure 7 to use LCD2004. 12864, TFT24-12864 mode, TFT35-v3.0-12864 mode.

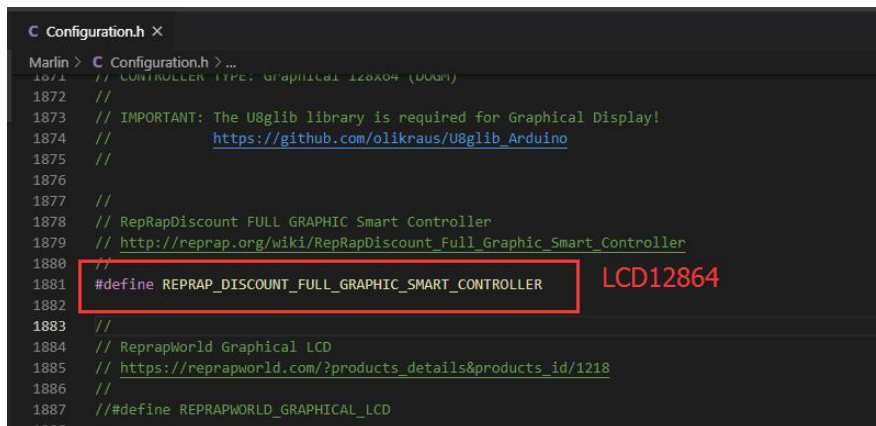


```

1732 //===== (Character-based LCDs) =====
1733 //=====
1734
1735 //
1736 // RepRapDiscount Smart Controller.
1737 // http://reprap.org/wiki/RepRapDiscount\_Smart\_Controller
1738 //
1739 // Note: Usually sold with a white PCB.
1740 //
1741 #define REPRAP_DISCOUNT_SMART_CONTROLLER LCD2004
1742
1743 //
1744 // Original RADDs LCD Display+Encoder+SDCardReader
1745 // http://doku.radds.org/dokumentation/lcd-display/
1746 //

```

Figure 6



```

1871 // CONTROLLER TYPE: Graphical 128x64 (UDWIN)
1872 //
1873 // IMPORTANT: The U8glib library is required for Graphical Display!
1874 // https://github.com/olikraus/U8glib\_Arduino
1875 //
1876 //
1877 //
1878 // RepRapDiscount FULL GRAPHIC Smart Controller
1879 // http://reprap.org/wiki/RepRapDiscount\_Full\_Graphic\_Smart\_Controller
1880 //
1881 #define REPRAP_DISCOUNT_FULL_GRAPHIC_SMART_CONTROLLER LCD12864
1882
1883 //
1884 // ReprapWorld Graphical LCD
1885 // https://reprapworld.com/?products\_details&products\_id/1218
1886 //
1887 // #define REPRAPWORLD_GRAPHICAL_LCD
1888

```

Figure 7

V. Wiring method

1) Take SKR V1.3 (figure 3) as an example

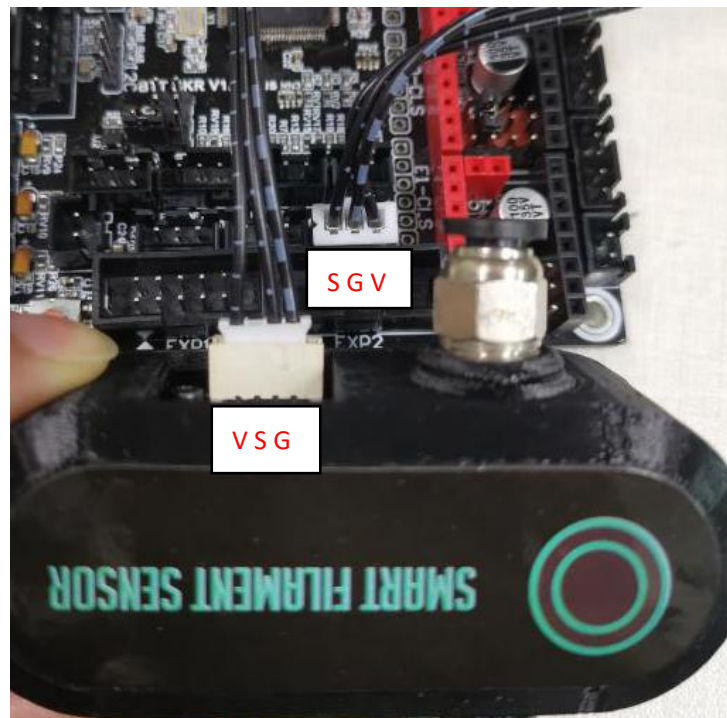


Figure 8

The smart filament detection module uses a break detection interface (such as SKR V1.3 for E0DET). **Any motherboard with a break detection interface can be used.**

S for SIN

G for GND

V for VDD

VI. Installation method

- 1) Remove the pneumatic joint between the teflon tube and the extruder (as shown in figure 9-11)

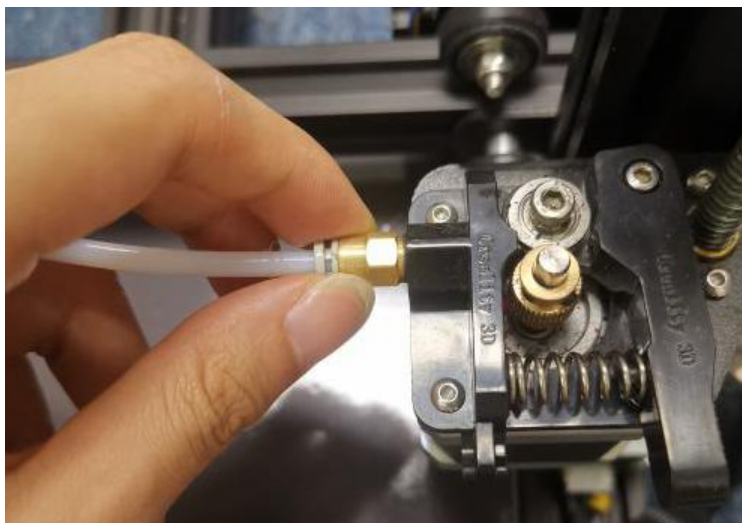


figure 9

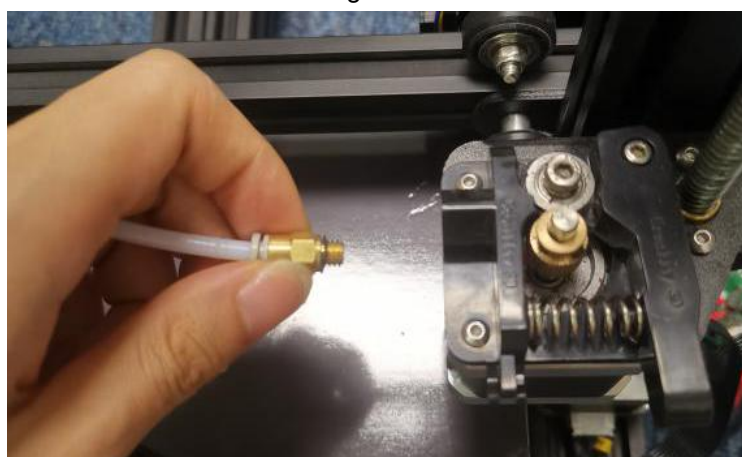


figure 10



figure 11

2) Insert the printer's teflon tube into the pneumatic joint (like Figure 12)

Note: The teflon tube needs to be fully inserted into the module in order to ensure that it will not affect the entry of filament.



figure 12

3) Screw the smart filament module connector into the extruder.(like figure 13)

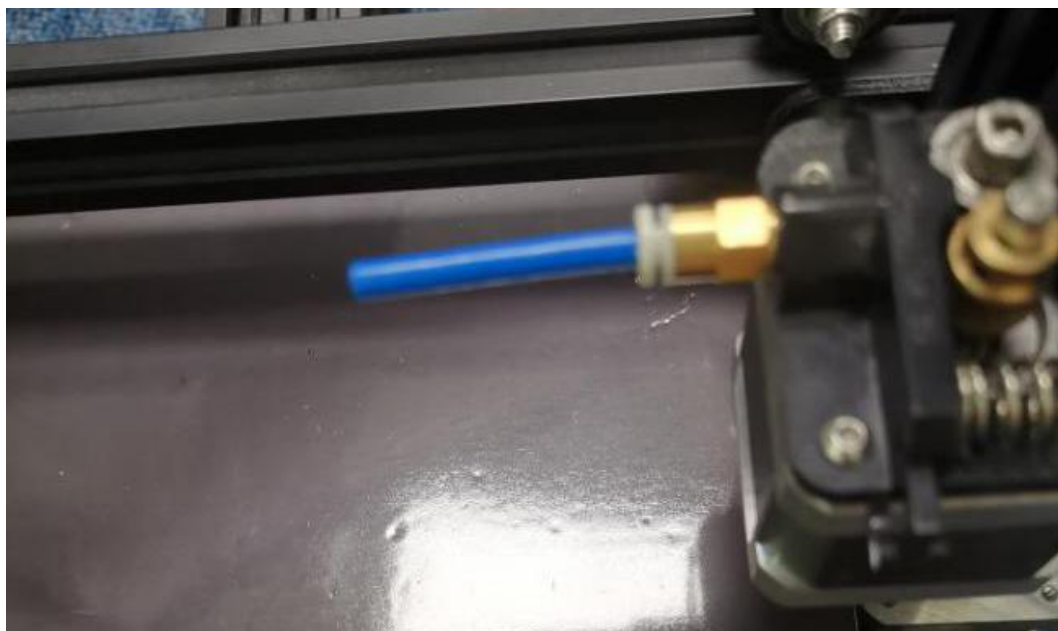


figure 13

- 4) Insert the smart filament module connector Teflon tube into the pneumatic joint (like Figure 14)

Note: Teflon tube needs to be fully inserted into the module so that it does not affect the entry of filament.



figure 14

- 5) Other fixed methods

The two screw holes shown in Figure 15 can be used for fixing, and the printed piece can be designed according to the fixed position. So this module can be applied to the proximity extruder.



figure 15

VII. Notes

- 1) This module is powered by 3.3v or 5V, so high voltage will cause damage to the module.
- 2) The current shell material is printed with PLA, so the shell will be damaged if the screws and pneumatic joints are turned frequently and wrongly many times.
- 3) Scrap and dust may cause false alarms and require removal of the sensor for cleaning.
- 4) Please consult technical support before using the motherboard with no broken filament detection module.

VIII. Item listing

1) Smart Filament Sensor:



2) Smart Filament Sensor Cable:



3) Smart Filament Sensor Connector:



4) Spare set screws:

