BIGTREETECH Smart Filament Sensor Module

Operating instruction

I . Product introduction

Smart Filament Detection Module 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.Module Features

- It can detect abnormal extrusion of filament caused by nozzle plugging, filament wrapping and extruder failure.
- 2) 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.
- 3) Support motherboard with broken filament detection interface.
- Support screen 2004,12864, TFT24 (12864 mode), tft35_v3.0 (12864 mode).
- 5) The module is being optimized and will be compatible with touch screen in the future.
- 6) Compatible touch screen TFT24, TFT35-V3.0.
- 7) Support for input power 3.3v-5v.

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- 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. Item listing

1) Smart Filament Sensor:



2) Smart Filament Detection Module Cable:



3) Smart Filament Detection Connector



4) Spare set screws:



IV.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









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V. Firmware modification

1) The firmware of this product is marlin2.0.x. Screen 2004,12864, TFT24 (12864 mode), tft35_v3.0 (12864 mode) can be used directly. The motherboard that can be used :SKR V1.3; SKR mini E3. SKR E3 DIP; MKS CEN L; MKS GEN V1.4. The modification method is shown in figure

2.

C Configuration.h •	
Marlin > C Configuration.h >	
1084	
1086 * Filament Runout Sensors	
1087 * Mechanical or opto endstops are	used to check for the presence of filament.
1089 * RAMPS-based boards use SERVO3_PI	
	define FIL_RUNOUT_PIN, FIL_RUNOUT2_PIN, etc.
	HIGH=FILAMENT PRESENT.
1092 */	
1093 #define FILAMENT_RUNOUT_SENSOR	
1094 #if ENABLED(FILAMENT_RUNOUT_SENSOR)	
1095 #define NUM_RUNOUT_SENSORS 1	// Number of sensors, up to one per extruder. Define a FIL_RUNOUT#_PIN for each.
1096 #define FIL_RUNOUT_INVERTING fals	e // Set to true to invert the logic of the sensor.
1097 #define FIL_RUNOUT_PULLUP	<pre>// Use internal pullup for filament runout pins.</pre>
1098 //#define FIL_RUNOUT_PULLDOWN	<pre>// Use internal pulldown for filament runout pins.</pre>
1099	
1100 // Set one or more commands to ex	ecute on filament runout.
1101 // (After 'M412 H' Marlin will as	k the host to handle the process.)
1102 #define FILAMENT_RUNOUT_SCRIPT "M	600"
1103	
1104 // After a runout is detected, co	ntinue printing this length of filament
1105 // before executing the runout so	ript. Useful for a sensor at the end of
1106 // a feed tube. Requires 4 bytes	SRAM per sensor, plus 4 bytes overhead.
1107 #define FILAMENT_RUNOUT_DISTANCE_	
1109 #ITUET FILAMENT_KONUUT_DISTANCE_P	n
1110 // enable this option to use an	upo to cot ETLAMENT DUNOUT DICTANCE MM
1111 // as the illament moves. (be s	positives)
1113 #define ETLAMENT MOTION SENSOR	
1114 #endif	
1115 #endif	
1116	

figure 2

The configuration to be modified is:

Uncomment #define FILAMENT_RUNOUT_SENSOR Turn on the consumables detection 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

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2) When using the serial touch screen mode, you also need to enable

"M114_DETAIL" in marlin ,as shown in Figure 3

C Config	uration_adv.h •
Marlin >	C Configuration_adv.h >
201	#define AUTOTEMP
262	#if ENABLED(AUTOTEMP)
264	#define AUTOTEMP_OLDWEIGHT 0.98
265	#endif
266	
267	// Show extra position information with 'M114 D'
268	#define M114_DETAIL
269	
270	// Show Temperature ADC value
271 272	<pre>// Enable for MI05 to include ADC values read from temperature sensors. //#define SHOW_TEMP_ADC_VALUES</pre>

Figure 3

3) Interface to modification

Modify the interface location as shown in figure 4. Change the interface

to any extended interface.

EXPLORER		C Confi	guration.h	C pins_BIGTREE_	skr_v1.3.h $ imes$	
V OPEN EDITORS	9 ø	Marlin >	src > pins > lp	oc1768 > C pins_BI	GTREE_SKR_V1.	.3.h > 🖃 FIL
C Configuration.h Marlin	М	54	#define 2	Z MIN PROBE PIN	P1 24	
× C pins_BIGTREE_SKR_V1.3.h Marlin\src\p	ins\lpc		#endif			
∨ GITHUB						
> data			// Filament	t Runout Sensor		
			// #ifndof ET			
> docs		61	#define	ETI RUNOUT PIN	P1 28	
		62	#enait			
✓ Manin						
> lib						
✓ src						
> core						
> feature			#define X_	STEP_PIN	P2_02	
> gcode			<pre>#define X_0</pre>	DIR_PIN	P2_06	
> HAL			#define X_I	ENABLE_PIN	P2_01	
> inc			#ifndet X_0	CS_PIN		
> lcd			#define /	X_C2_PIN	P1_1/	
> libs			#enuri			
> module		74	#define Y	STEP PIN	PØ 19	
✓ pins			#define Y [DIR PIN	P0 20	
> esp32			#define Y_	ENABLE_PIN	P2_08	
> linux			#ifndef Y_0	CS_PIN		
× Inc1768			#define `	Y_CS_PIN		
C pipe AZSMZ MINITh			#endif			
			-			
			#define Z_	STEP_PIN	P0_22	
C pins_BIGTREE_SKR_V1.3.h		82	#define Z_l	DIK_PIN	P2_11	
C pins_BIQU_B300_V1.0.h		PROBLEM	AS OUTPUT	DEBUG CONSOLE T	ERMINAL	
C pins_BIQU_BQ111_A4.h						

figure 4

4) Relevant parameters after modification

The modified position is shown in figure 5, and parameters such as the

backpull speed and backpull distance after suspension can be controlled.



figure 5

5) Modify the pause position

The position where the nozzle stops after suspension can be set. The

modified position is shown in figure 6.

C Confi	guration.h C Configuration_adv.h
Marlin 🗧	C Configuration.h >
1468	*/
1469	#define NOZZLE_PARK_FEATURE
1470	
	#if ENABLED(NOZZLE_PARK_FEATURE)
	// Specify a park position as { X, Y, Z_raise }
	<pre>#define NOZZLE_PARK_POINT { (X_MIN_POS + 10), (Y_MAX_POS - 10), 20 }</pre>
	#define NOZZLE_PARK_XY_FEEDRATE 100 // (mm/s) X and Y axes feedrate (also used for d
	#define NOZZLE_PARK_Z_FEEDRATE 5 // (mm/s) Z axis feedrate (not used for delta pr
	#endif
1478	

figure 6

6) Modify the screen

Modify figure 7 and figure 8 to use LCD2004. 12864, TFT24-12864 mode,

TFT35-v3.0-12864 mode.

C Config	juration.h •			
Marlin >	C Configuration.h >			
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	<pre>// http://doku.radds.org/dokumentation/lcd-display/</pre>			
1746				
	figure 7			
C Configura	ation.h ×			
Marlin > C	Configuration.h >			
	/ https://github.com/olikraus/U8glib_Arduino			
1875 /				
1877 /				
	<pre>/ http://reprap.org/wiki/RepRapDiscount_Full_Graphic_Smart_Controller</pre>			
1880 7	define REPRAP DISCOUNT FULL GRAPHIC SMART CONTROLLER LCD12864			
1882				
1883 /				
1884 /				
1885 /	/ nttps://reprapworid.com//products_details&products_id/1218			
1887 /	/#define REPRAPWORLD GRAPHICAL LCD			

figure 8

VI.Touch screen Settings

Note: at present, the touch screen only supports TFT 24 and TFT35 V3.0

produced by our company

1) Select Settings in the ready to print screen



figure 9

2) Select function settings in the Settings interface



figure 10

3) Click filament detection in the function setting interface until the smart detection is on (The default setting of filament detection function on the screen is off. Click the icon again after the filament detection function is on to open the smart filament detection mode).













$\boldsymbol{W}\!\boldsymbol{I}.$ Wiring method

1) Take SKR V1.3 (figure 14) as an example



figure 14

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

S for SIN

G for GND

V for VDD

₩.Installation method

Remove the pneumatic joint between the teflon tube and the extruder

(as shown in figure 15-17)



figure 15



figure 16





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

18)

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 18

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

figure 19)



figure 19

4) Insert the smart filament module connector Teflon tube into the

pneumatic joint (like Figure 20)

Note: Teflon tube needs to be fully inserted into the module so that it

does not affect the entry of filament.



figure 20

5) Other fixed methods

The two screw holes shown in Figure 10 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 21

$I\!X.$ Notes

1) This module is powered by 3.3v or 5V, so high voltage will cause damage to the module.

2) Frequent and wrong screwing of screws and pneumatic connectors will damage the shell.

3) Scrap and dust may cause false alarms and you need to remove the module to clean.

4) Please consult technical support before using the motherboard with no broken filament detection module.

5) If you use a touch mode on display, the smart filament sensor can only be connected to the display and use.