

1. 09.touchpanel

2024/7/18 Table of Contents

09.touchpanel

目的

構成データ

タッチパネル制御

例題 tpevent

tslib

課題1 tpevent2

課題2 tpstamp

1.1. 目的

組込みアプリケーション開発 09.touchpanel

1.2. 構成データ

1.2.1. /media/sf_ArmadilloX1/hwpwm/work/R06_2024/Apllication_debug/text/practiceディレクトリ

▼ .../share/ArmadilloX1/hwpwm/work/R06_2024/Application_debug/text/practice/ の構成

```
1 | user@1204PC-Z490M:/mnt/v/VirtualBoxWork/share/ArmadilloX1/hwpwm/work/R06_2024/Application_debug/text/practice$ tr
2 | ./
3 | └─ 09.touchpanel/
4 |   └─ Makefile*           <── デバイス制御用Makefile
5 |   └─ stamp.bmp*         <── 課題2用ビットマップファイル
6 |   └─ tpevent2.c*        <── 課題1 デバイス制御用ソース
7 |   └─ tpevent.c*         <── 例題 デバイス制御用ソース
8 |   └─ tpstamp.c*         <── 課題1 デバイス制御用ソース
```

1.3. タッチパネル制御

1.3.1. デバイス仕様

- タッチもしくはリリース
- タッチ位置の座標



1.3.2. デバイスファイル

"/dev/input/event1"

⚠ ボタンスイッチ、センサなど複数の入力デバイスがある場合、ソースファイル内ではデバイスファイル/dev/input/event1を**決め打ち**しているので注意すること

1.3.3. イベント

読み出したイベントデータは次のinput_event構造体の形で表示

▼ input_event構造体

```
1 #include <linux/input.h>
2
3 struct input_event {
4     struct timeval time;
5     __u16 type;
6     __u16 code;
7     __s32 value;
8 };
```

Type	code	value
0(EV_SYN)	0	0
1(EV_KEY)	330(BTN_TOUCH)	1(touch)
		0(release)
3(EV_ABS)	0(ABS_X)	X:0-10000
	53(ABS_MT_POSITION_X)	
	1(ABS_Y)	Y:0-10000
	54(ABS_MT_POSITION_Y)	
	57(ABS_MT_TRACKING_ID)	0-65535
	47(ABS_MT_SLOT)	-1
		0-9

- EV_KEYは、タッチまたはリリースイベント
- イベントの種類はvalueで判別
- EV_ABSは、座標更新イベント
- ABS_X, ABS_MT_POSITION_Xは、X座標
- ABS_Y, ABS_MT_POSITION_Yは、Y座標
- ABS_MT_TRACKING_ID, ABS_MT_SLOTは、マルチタッチ（実習では使用しない）
- EV_SYN（同期）は、一連のイベントの終わり

1.4. 例題 tpevent

タッチパネルイベントを表示する

イベント	表示する文字列	備考
タッチパネル押す	"EV_KEY: down"	
タッチパネル離す	"EV_KEY: up"	
X座標更新	"EV_ABS: x = xxx"	xxx は座標
	"ABS_MT_POSITION: x = xxx"	
Y座標更新	"EV_ABS: y = yyy"	yyy は座標
	"ABS_MT_POSITION_Y: y = yyy"	
同期イベント	"EV_SYN: -----"	

※イベントコードABS_MT_TRACKING_ID, ABS_MT_SLOTが発生した場合は無視

表示例

▼ root@armadillo:/practice/09.touchpanel# ./tpevent

```
1 root@armadillo:/practice/09.touchpanel# ./tpevent
2 ABS_MT_POSITION: x = 1159
3 ABS_MT_POSITION: y = 1826
4 EV_KEY: down
5 EV_ABS: x = 1159
6 EV_ABS: y = 1826
7 EV_SYN: -----
8 EV_KEY: up
9 EV_SYN: -----
```

1.4.1. ソース

tpevent.c

▼ 09.touchpanel/tpevent.c

```

1  #include <stdio.h>
2  #include <fcntl.h>
3  #include <linux/input.h>
4  #include <unistd.h>
5
6  // イベントデバイスファイル。
7  #define DEVFILE "/dev/input/event1"
8
9  int main(void)
10 {
11     int fd;
12     int ret;
13     struct input_event ev;
14
15     // イベントデバイスファイルをオープンします。
16     fd = open(DEVFILE, O_RDONLY);
17     // ファイルがオープンできなかった場合、エラー終了します。
18     if (fd < 0){
19         perror("failed to open device");
20         return 1;
21     }
22
23     // イベント内容を表示する処理。
24     for(;;){
25         // 入力イベント構造体を読み込みます。
26         ret = read(fd, &ev, sizeof(ev));
27         // 読み込みに失敗した場合、エラー終了します。
28         if (ret < 0){
29             perror("failed to read events");
30             return 1;
31         }
32
33         // イベントのタイプで表示内容を変化させます。
34         switch (ev.type){
35             // タイプがEV_KEYの時の処理。
36             case EV_KEY:
37                 // コードがBTN_TOUCHなら状態を表示します。それ以外の場合、エラー終了します。
38                 if (ev.code != BTN_TOUCH){
39                     fprintf(stderr, "unknown event code %d\n", ev.code);
40                     return 2;
41                 }
42                 printf("EV_KEY: %s\n", ev.value ? "down" : "up");
43                 break;
44             // タイプがEV_ABSの時の処理。
45             case EV_ABS:
46                 switch (ev.code){
47                     // コードがABS_Xならxの値を表示します。
48                     case ABS_X:
49                         printf("EV_ABS: x = %d\n", ev.value);
50                         break;
51                     // コードがABS_MT_POSITION_Xならxの値を表示します。
52                     case ABS_MT_POSITION_X:
53                         printf("ABS_MT_POSITION: x = %d\n", ev.value);
54                         break;
55                     // コードがABS_Yならyの値を表示します。
56                     case ABS_Y:
57                         printf("EV_ABS: y = %d\n", ev.value);
58                         break;
59                     // コードがABS_MT_POSITION_Yならyの値を表示します。
60                     case ABS_MT_POSITION_Y:
61                         printf("ABS_MT_POSITION: y = %d\n", ev.value);
62                         break;
63                     // コードがABS_MT_TRACKING_IDなら無視します。
64                     case ABS_MT_TRACKING_ID:

```

```

65         break;
66         // コードがABS_MT_SLOTなら無視します。
67         case ABS_MT_SLOT:
68             break;
69         // コードが上記以外の場合、エラー終了します。
70         default:
71             fprintf(stderr, "unknown event code %d\n", ev.code);
72             return 2;
73     }
74     break;
75     // タイプがEV_SYNの時の処理。
76     case EV_SYN:
77         printf("EV_SYN: -----\\n");
78         break;
79     // タイプが上記以外なら、エラー終了します。
80     default:
81         fprintf(stderr, "unknown event\\n");
82         return 3;
83     }
84 }
85
86 // イベントデバイスファイルをクローズします。
87 close(fd);
88
89 return 0;
90 }

```

Makefile

▼ 09.touchpanel/Makefile

```

1  CC = arm-linux-gnueabi-gcc
2  #TARGET = tpevent tpevent2 tpstamp
3  TARGET = tpevent
4  CFLAGS = -I/work/linux/nfsroot/usr/local/include -gdwarf-2 -O0
5  LDFLAGS = -L/work/linux/nfsroot/usr/local/lib
6  LIBS = -lts
7
8  all: $(TARGET)
9
10 tpevent: tpevent.c
11     $(CC) -o $@ $^ $(CFLAGS) $(LDFLAGS) $(LIBS)
12
13 tpevent2: tpevent2.c
14     $(CC) -o $@ $^ $(CFLAGS) $(LDFLAGS) $(LIBS)
15
16 tpstamp: tpstamp.c
17     $(CC) -o $@ $^ $(CFLAGS) $(LDFLAGS) $(LIBS)
18
19 install :
20     cp -p $(TARGET) /work/linux/nfsroot/debug/04_practice
21     cp -p $(TARGET) /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
22     cp -p $(TARGET).c /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
23     cp -p ./*.bmp /work/linux/nfsroot/debug/04_practice
24     cp -p ./*.bmp /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
25
26 clean:
27     rm -f $(TARGET)
28
29 .PHONY: clean
30

```

1.4.2. 動作確認

make clean

▼ \$ make clean

```
1 | atmark@atde8:/media/sf_ArmadilloX1/hwpwm/work/R06_2024/Application_debug/text/practice-example/09.touchpanel$ mak
2 | rm -f tpevent
```

make

▼ \$ make

```
1 | atmark@atde8:/media/sf_ArmadilloX1/hwpwm/work/R06_2024/Application_debug/text/practice-example/09.touchpanel$ mak
2 | arm-linux-gnueabi-gcc -o tpevent tpevent.c -I/work/linux/nfsroot/usr/local/include -gdwarf-2 -O0 -L/work/linux/
```

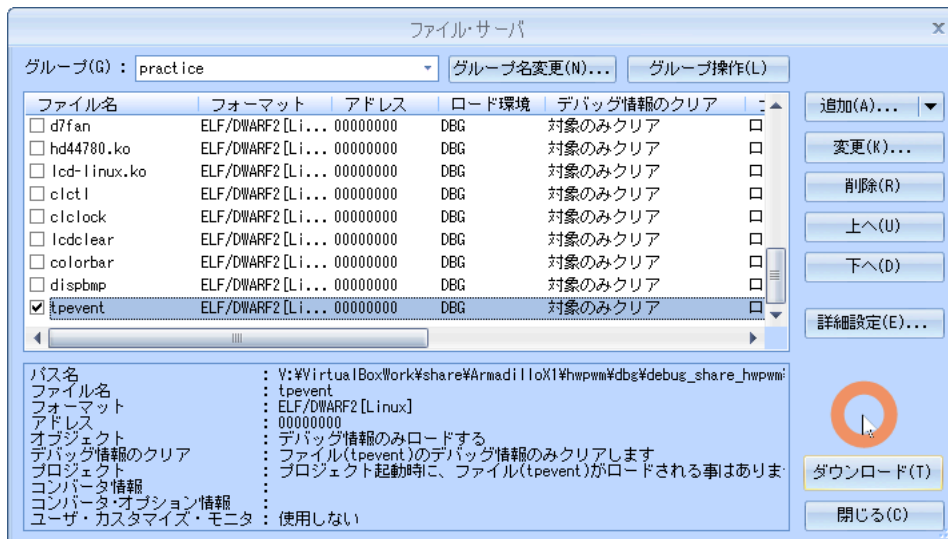
sudo make install

▼ \$ sudo make install

```
1 | atmark@atde8:/media/sf_ArmadilloX1/hwpwm/work/R06_2024/Application_debug/text/practice-example/09.touchpanel$ suc
2 | [sudo] atmark のパスワード:
3 | cp -p tpevent /work/linux/nfsroot/debug/04_practice
4 | cp -p tpevent /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
5 | cp -p tpevent.c /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
6 | cp -p ./*.bmp /work/linux/nfsroot/debug/04_practice
7 | cp -p ./*.bmp /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
```

CSIDEでロード

▼ メニュー「ファイル」 - 「ロード」



実行結果

▼ root@armadillo:/debug/04_practice# ./tpevent

```

1 root@armadillo:/debug/04_practice# ./tpevent
2 ABS_MT_POSITION: x = 0
3 ABS_MT_POSITION: y = 0
4 EV_KEY: down
5 EV_ABS: x = 0
6 EV_ABS: y = 0
7 EV_SYN: -----
8 EV_KEY: up
9 EV_SYN: -----
10 ABS_MT_POSITION: x = 9963
11 ABS_MT_POSITION: y = 36
12 EV_KEY: down
13 EV_ABS: x = 9963
14 EV_ABS: y = 36
15 EV_SYN: -----
16 EV_KEY: up
17 EV_SYN: -----
18 ABS_MT_POSITION: x = 36
19 ABS_MT_POSITION: y = 9963
20 EV_KEY: down
21 EV_ABS: x = 36
22 EV_ABS: y = 9963
23 EV_SYN: -----
24 EV_KEY: up
25 EV_SYN: -----
26 ABS_MT_POSITION: x = 10000
27 ABS_MT_POSITION: y = 10000
28 EV_KEY: down
29 EV_ABS: x = 10000
30 EV_ABS: y = 10000
31 EV_SYN: -----
32 EV_KEY: up
33 EV_SYN: -----
34 ABS_MT_POSITION: x = 5369
35 ABS_MT_POSITION: y = 4224
36 EV_KEY: down
37 EV_ABS: x = 5369
38 EV_ABS: y = 4224
39 EV_SYN: -----
40 EV_KEY: up
41 EV_SYN: -----
42 ABS_MT_POSITION: x = 5548
43 ABS_MT_POSITION: y = 36
44 EV_KEY: down
45 EV_ABS: x = 5548
46 EV_ABS: y = 36
47 EV_SYN: -----
48 EV_KEY: up
49 EV_SYN: -----
50 ABS_MT_POSITION: x = 19
51 ABS_MT_POSITION: y = 5079
52 EV_KEY: down
53 EV_ABS: x = 19
54 EV_ABS: y = 5079
55 EV_SYN: -----
56 EV_KEY: up
57 EV_SYN: -----
58 ABS_MT_POSITION: x = 9975
59 ABS_MT_POSITION: y = 4842
60 EV_KEY: down
61 EV_ABS: x = 9975
62 EV_ABS: y = 4842
63 EV_SYN: -----
64 EV_KEY: up

```



```

65 EV_SYN: -----
66 ABS_MT_POSITION: x = 4957
67 ABS_MT_POSITION: y = 9460
68 EV_KEY: down
69 EV_ABS: x = 4957
70 EV_ABS: y = 9460
71 EV_SYN: -----
72 EV_KEY: up
73 EV_SYN: -----
74 ABS_MT_POSITION: x = 0
75 ABS_MT_POSITION: y = 0
76 EV_KEY: down
77 EV_ABS: x = 0
78 EV_ABS: y = 0
79 EV_SYN: -----
80 EV_KEY: up
81 EV_SYN: -----
82 ABS_MT_POSITION: x = 9963
83 ABS_MT_POSITION: y = 36
84 EV_KEY: down
85 EV_ABS: x = 9963
86 EV_ABS: y = 36
87 EV_SYN: -----
88 EV_KEY: up
89 EV_SYN: -----
90 EV_KEY: down
91 EV_SYN: -----
92 EV_KEY: up
93 EV_SYN: -----
94 EV_KEY: down
95 EV_SYN: -----
96 EV_KEY: up
97 EV_SYN: -----
98 EV_KEY: down
99 EV_SYN: -----
100 EV_KEY: up
101 EV_SYN: -----
102 EV_KEY: down
103 EV_SYN: -----
104 EV_KEY: up
105 EV_SYN: -----
106 EV_KEY: down
107 EV_SYN: -----
108 EV_KEY: up
109 EV_SYN: -----
110 ABS_MT_POSITION: x = 9431
111 ABS_MT_POSITION: y = 539
112 EV_KEY: down
113 EV_ABS: x = 9431
114 EV_ABS: y = 539
115 EV_SYN: -----
116 EV_KEY: up
117 EV_SYN: -----
118 ABS_MT_POSITION: x = 9963
119 ABS_MT_POSITION: y = 36
120 EV_KEY: down
121 EV_ABS: x = 9963
122 EV_ABS: y = 36
123 EV_SYN: -----
124 EV_KEY: up
125 EV_SYN: -----
126 EV_KEY: down
127 EV_SYN: -----
128 EV_KEY: up
129 EV_SYN: -----

```

```

130 EV_KEY: down
131 EV_SYN: -----
132 EV_KEY: up
133 EV_SYN: -----
134 ABS_MT_POSITION: x = 36
135 ABS_MT_POSITION: y = 9963
136 EV_KEY: down
137 EV_ABS: x = 36
138 EV_ABS: y = 9963
139 EV_SYN: -----
140 EV_KEY: up
141 EV_SYN: -----
142 EV_KEY: down
143 EV_SYN: -----
144 EV_KEY: up
145 EV_SYN: -----
146 EV_KEY: down
147 EV_SYN: -----
148 EV_KEY: up
149 EV_SYN: -----
150 EV_KEY: down
151 EV_SYN: -----
152 EV_KEY: up
153 EV_SYN: -----
154 EV_KEY: down
155 EV_SYN: -----
156 EV_KEY: up
157 EV_SYN: -----
158 ABS_MT_POSITION: x = 10000
159 ABS_MT_POSITION: y = 10000
160 EV_KEY: down
161 EV_ABS: x = 10000
162 EV_ABS: y = 10000
163 EV_SYN: -----
164 EV_KEY: up
165 EV_SYN: -----
166 EV_KEY: down
167 EV_SYN: -----
168 EV_KEY: up
169 EV_SYN: -----
170 ABS_MT_POSITION: y = 9992
171 EV_KEY: down
172 EV_ABS: y = 9992
173 EV_SYN: -----
174 EV_KEY: up
175 EV_SYN: -----
176 ^C
177 root@armadillo:/debug/04_practice#

```

実行している様子

▼ tpevent を実行している動画

<https://youtu.be/UsarzH6bivM>



1.5. tslib

タッチパネル座標からスクリーン座標へ変換するライブラリ

tslib を利用した場合、タッチパネルの座標は左上を原点として800x480(0,0)-(799,479)

⚠ tslib を利用するにはあらかじめ **キャリブレーション** が必要

tslib_1.22.orig.tar.xz による tslib のインストール

⚠ VirtualBoxでスクリーンショットを撮ること

⚠ ArmadilloX1側で操作すること

apt update

▼ root@armadillo:~# apt update

```
1 root@armadillo:~# apt update
2 Get:1 http://security.debian.org buster/updates InRelease [34.8 kB]
3 Hit:2 http://archive.debian.org/debian buster InRelease
4 Ign:3 http://download.atmark-techno.com/debian buster InRelease
5 Hit:4 http://download.atmark-techno.com/debian buster Release
6 Fetched 34.8 kB in 7s (4810 B/s)
7 nf_conntrack: default automatic helper assignment has been turned off for security reasons and CT-based firewall
8 Reading package lists... Done
9 Building dependency tree
10 Reading state information... Done
11 All packages are up to date.
```

apt install libts-bin libts-dev libts0

▼ root@armadillo:~# apt install libts-bin libts-dev libts0

```
1 root@armadillo:~# apt update
2 Get:1 http://security.debian.org buster/updates InRelease [34.8 kB]
3 Hit:2 http://archive.debian.org/debian buster InRelease
4 Ign:3 http://download.atmark-techno.com/debian buster InRelease
5 Hit:4 http://download.atmark-techno.com/debian buster Release
6 Fetched 34.8 kB in 7s (4810 B/s)
7 nf_contrack: default automatic helper assignment has been turned off for security reasons and CT-based firewall
8 Reading package lists... Done
9 Building dependency tree
10 Reading state information... Done
11 All packages are up to date.
12 root@armadillo:~#
13 root@armadillo:~#
14 root@armadillo:~# apt install libts-bin libts-dev libts0
15 Reading package lists... Done
16 Building dependency tree
17 Reading state information... Done
18 The following packages were automatically installed and are no longer required:
19   libevent-core-2.1-6 libevent-pthreads-2.1-6 libopts25 sntp
20 Use 'apt autoremove' to remove them.
21 The following NEW packages will be installed:
22   libts-bin libts-dev libts0
23 0 upgraded, 3 newly installed, 0 to remove and 0 not upgraded.
24 Need to get 99.8 kB of archives.
25 After this operation, 369 kB of additional disk space will be used.
26 Get:1 http://archive.debian.org/debian buster/main armhf libts0 armhf 1.19-1 [55.0 kB]
27 Get:2 http://archive.debian.org/debian buster/main armhf libts-bin armhf 1.19-1 [37.6 kB]
28 Get:3 http://archive.debian.org/debian buster/main armhf libts-dev armhf 1.19-1 [7256 B]
29 Fetched 99.8 kB in 0s (434 kB/s)
30 debconf: delaying package configuration, since apt-utils is not installed
31 Selecting previously unselected package libts0:armhf.
32 (Reading database ... 44723 files and directories currently installed.)
33 Preparing to unpack .../libts0_1.19-1_armhf.deb ...
34 Unpacking libts0:armhf (1.19-1) ...
35 Selecting previously unselected package libts-bin.
36 Preparing to unpack .../libts-bin_1.19-1_armhf.deb ...
37 Unpacking libts-bin (1.19-1) ...
38 Selecting previously unselected package libts-dev:armhf.
39 Preparing to unpack .../libts-dev_1.19-1_armhf.deb ...
40 Unpacking libts-dev:armhf (1.19-1) ...
41 Setting up libts0:armhf (1.19-1) ...
42 Setting up libts-bin (1.19-1) ...
43 Setting up libts-dev:armhf (1.19-1) ...
44 Processing triggers for libc-bin (2.28-10+deb10u4) ...
45 Processing triggers for man-db (2.8.5-2+deb10u1) ...
46 Processing triggers for mime-support (3.62) ...
```

apt install autoconf automake libtool

▼ root@armadillo:~# apt install libts-bin libts-dev libts0

```

1 root@armadillo:~# apt install libts-bin libts-dev libts0
2 Reading package lists... Done
3 Building dependency tree
4 Reading state information... Done
5 The following packages were automatically installed and are no longer required:
6   libevent-core-2.1-6 libevent-pthreads-2.1-6 libopts25 sntp
7 Use 'apt autoremove' to remove them.
8 The following NEW packages will be installed:
9   libts-bin libts-dev libts0
10 0 upgraded, 3 newly installed, 0 to remove and 0 not upgraded.
11 Need to get 99.8 kB of archives.
12 After this operation, 369 kB of additional disk space will be used.
13 Get:1 http://archive.debian.org/debian buster/main armhf libts0 armhf 1.19-1 [55.0 kB]
14 Get:2 http://archive.debian.org/debian buster/main armhf libts-bin armhf 1.19-1 [37.6 kB]
15 Get:3 http://archive.debian.org/debian buster/main armhf libts-dev armhf 1.19-1 [7256 B]
16 Fetched 99.8 kB in 5s (20.3 kB/s)
17 debconf: delaying package configuration, since apt-utils is not installed
18 Selecting previously unselected package libts0:armhf.
19 (Reading database ... 44723 files and directories currently installed.)
20 Preparing to unpack .../libts0_1.19-1_armhf.deb ...
21 Unpacking libts0:armhf (1.19-1) ...
22 Selecting previously unselected package libts-bin.
23 Preparing to unpack .../libts-bin_1.19-1_armhf.deb ...
24 Unpacking libts-bin (1.19-1) ...
25 Selecting previously unselected package libts-dev:armhf.
26 Preparing to unpack .../libts-dev_1.19-1_armhf.deb ...
27 Unpacking libts-dev:armhf (1.19-1) ...
28 Setting up libts0:armhf (1.19-1) ...
29 Setting up libts-bin (1.19-1) ...
30 Setting up libts-dev:armhf (1.19-1) ...
31 Processing triggers for libc-bin (2.28-10+deb10u4) ...
32 Processing triggers for man-db (2.8.5-2+deb10u1) ...
33 Processing triggers for mime-support (3.62) ...
34 root@armadillo:~#
35 root@armadillo:~#
36 root@armadillo:~# apt install autoconf automake libtool
37 Reading package lists... Done
38 Building dependency tree
39 Reading state information... Done
40 The following packages were automatically installed and are no longer required:
41   libevent-core-2.1-6 libevent-pthreads-2.1-6 libopts25 sntp
42 Use 'apt autoremove' to remove them.
43 The following additional packages will be installed:
44   autotools-dev libltdl-dev libltdl7 libsigsegv2 m4
45 Suggested packages:
46   autoconf-archive gnu-standards autoconf-doc gettext libtool-doc gfortran
47   | fortran95-compiler gcj-jdk m4-doc
48 The following NEW packages will be installed:
49   autoconf automake autotools-dev libltdl-dev libltdl7 libsigsegv2 libtool m4
50 0 upgraded, 8 newly installed, 0 to remove and 0 not upgraded.
51 Need to get 2505 kB of archives.
52 After this operation, 6838 kB of additional disk space will be used.
53 Do you want to continue? [Y/n] Y
54 Get:1 http://archive.debian.org/debian buster/main armhf libsigsegv2 armhf 2.12-2 [32.1 kB]
55 Get:2 http://archive.debian.org/debian buster/main armhf m4 armhf 1.4.18-2 [190 kB]
56 Get:3 http://archive.debian.org/debian buster/main armhf autoconf all 2.69-11 [341 kB]
57 Get:4 http://archive.debian.org/debian buster/main armhf autotools-dev all 20180224.1 [77.0 kB]
58 Get:5 http://archive.debian.org/debian buster/main armhf automake all 1:1.16.1-4 [771 kB]
59 Get:6 http://archive.debian.org/debian buster/main armhf libltdl7 armhf 2.4.6-9 [387 kB]
60 Get:7 http://archive.debian.org/debian buster/main armhf libltdl-dev armhf 2.4.6-9 [160 kB]
61 Get:8 http://archive.debian.org/debian buster/main armhf libtool all 2.4.6-9 [547 kB]
62 Fetched 2505 kB in 5s (554 kB/s)
63 debconf: delaying package configuration, since apt-utils is not installed
64 Selecting previously unselected package libsigsegv2:armhf.

```

```

65 (Reading database ... 44793 files and directories currently installed.)
66 Preparing to unpack .../0-libsigsegv2_2.12-2_armhf.deb ...
67 Unpacking libsigsegv2:armhf (2.12-2) ...
68 Selecting previously unselected package m4.
69 Preparing to unpack .../1-m4_1.4.18-2_armhf.deb ...
70 Unpacking m4 (1.4.18-2) ...
71 Selecting previously unselected package autoconf.
72 Preparing to unpack .../2-autoconf_2.69-11_all.deb ...
73 Unpacking autoconf (2.69-11) ...
74 Selecting previously unselected package autotools-dev.
75 Preparing to unpack .../3-autotools-dev_20180224.1_all.deb ...
76 Unpacking autotools-dev (20180224.1) ...
77 Selecting previously unselected package automake.
78 Preparing to unpack .../4-automake_1%3a1.16.1-4_all.deb ...
79 Unpacking automake (1:1.16.1-4) ...
80 Selecting previously unselected package libltdl7:armhf.
81 Preparing to unpack .../5-libltdl7_2.4.6-9_armhf.deb ...
82 Unpacking libltdl7:armhf (2.4.6-9) ...
83 Selecting previously unselected package libltdl-dev:armhf.
84 Preparing to unpack .../6-libltdl-dev_2.4.6-9_armhf.deb ...
85 Unpacking libltdl-dev:armhf (2.4.6-9) ...
86 Selecting previously unselected package libtool.
87 Preparing to unpack .../7-libtool_2.4.6-9_all.deb ...
88 Unpacking libtool (2.4.6-9) ...
89 Setting up autotools-dev (20180224.1) ...
90 Setting up libsigsegv2:armhf (2.12-2) ...
91 Setting up libltdl7:armhf (2.4.6-9) ...
92 Setting up libtool (2.4.6-9) ...
93 Setting up m4 (1.4.18-2) ...
94 Setting up autoconf (2.69-11) ...
95 Setting up automake (1:1.16.1-4) ...
96 update-alternatives: using /usr/bin/automake-1.16 to provide /usr/bin/automake (automake) in auto mode
97 Setting up libltdl-dev:armhf (2.4.6-9) ...
98 Processing triggers for man-db (2.8.5-2+deb10u1) ...
99 Processing triggers for libc-bin (2.28-10+deb10u4) ...
100 root@armadillo:~#

```

tslib_1.22.orig.tar.xz の入手

[tslib_1.22.orig.tar.xz のダウンロード](#)

Releases · libts/tslib x Releases · libts/tslib x Index of /debian/pool/main/t/ x + - □ x

← → ↻ https://ftp.jaist.ac.jp/debian/pool/main/t/tslib/ ☆ 📁 🌐 ⋮

受信トレイ - s2.fujim... MATLAB Home Midjourney Docum... 映像デザイン | Coloso... Armadillo >> 📁 すべてのブックマーク

libts0 1.19-1 amd64.deb	2019-01-24 17:34	59K
libts0 1.19-1 arm64.deb	2019-01-24 18:14	57K
libts0 1.19-1 armhf.deb	2019-01-24 18:14	54K
libts0 1.19-1 i386.deb	2019-01-24 18:30	59K
libts0 1.22-1+b1 amd64.deb	2020-07-11 06:25	63K
libts0 1.22-1+b1 arm64.deb	2020-07-11 06:25	62K
libts0 1.22-1+b1 armel.deb	2020-07-11 06:25	60K
libts0 1.22-1+b1 armhf.deb	2020-07-11 06:25	58K
libts0 1.22-1+b1 i386.deb	2020-07-11 06:25	64K
libts0 1.22-1+b1 mips64el.deb	2020-07-11 12:12	62K
libts0 1.22-1+b1 mipsel.deb	2020-07-11 14:27	61K
libts0 1.22-1+b1 ppc64el.deb	2020-07-11 06:25	67K
libts0t64 1.22-1.1 amd64.deb	2024-02-29 20:48	60K
libts0t64 1.22-1.1 arm64.deb	2024-02-29 10:57	60K
libts0t64 1.22-1.1 armel.deb	2024-02-29 09:17	58K
libts0t64 1.22-1.1 armhf.deb	2024-02-29 08:50	56K
libts0t64 1.22-1.1 i386.deb	2024-02-29 16:03	62K
libts0t64 1.22-1.1 mips64el.deb	2024-02-29 09:22	60K
libts0t64 1.22-1.1 ppc64el.deb	2024-02-29 08:45	66K
libts0t64 1.22-1.1 riscv64.deb	2024-02-29 09:12	60K
libts0t64 1.22-1.1 s390x.deb	2024-02-29 12:11	62K
tslib 1.19-1.debian.tar.xz	2019-01-24 17:34	24K
tslib 1.19-1.dsc	2019-01-24 17:34	1.9K
tslib 1.19.orig.tar.xz	2019-01-24 17:34	338K
tslib 1.22-1.1.debian.tar.xz	2024-02-29 05:02	61K
tslib 1.22-1.1.dsc	2024-02-29 05:02	2.2K
tslib 1.22-1.debian.tar.xz	2020-07-01 20:05	60K
tslib 1.22-1.dsc	2020-07-01 20:05	2.1K
tslib 1.22.orig.tar.xz	2020-07-01 20:05	343K
tslib 1.22.orig.tar.xz.asc	2020-07-01 20:05	833

Apache/2.4.61 (Unix) OpenSSL/3.0.13 Server at ftp.jaist.ac.jp Port 443

ダウンロード後は、ArmadilloX1との共有フォルダへ移動

例) V:\VirtualBoxWork\share\ArmadilloX1\hwpwm\vbos_share_hwpwm\R06_2024

/work/linux/nfsroot/root へコピー

▼ atmark@atde8:~\$ sudo cp /media/sf_ArmadilloX1/hwpwm/vbos_share_hwpwm/R06_2024/tslib_1.22.orig.tar.xz

/work/linux/nfsroot/root

```
1 atmark@atde8:~$ sudo cp /media/sf_ArmadilloX1/hwpwm/vbos_share_hwpwm/R06_2024/tslib_1.22.orig.tar.xz /work/linux/
2 [sudo] atmark のパスワード:
3 atmark@atde8:~$
```

tar Jxvf tslib_1.22.orig.tar.xz

▼ root@armadillo:~# tar Jxvf tslib_1.22.orig.tar.xz

```
1 root@armadillo:~# tar Jxvf tslib-1.22.orig.tar.xz
2 tslib-1.22/
3 tslib-1.22/compile
4 tslib-1.22/tools/
5 tslib-1.22/tools/Makefile.in
6 tslib-1.22/tools/CMakeLists.txt
7 tslib-1.22/tools/Makefile.am
8 tslib-1.22/tools/ts_uinput_start.sh
9 tslib-1.22/tools/ts_uinput.c
10 tslib-1.22/README
11 tslib-1.22/acinclude.m4
12 tslib-1.22/Makefile.in
13 tslib-1.22/config.guess
14 tslib-1.22/ltmain.sh
15 tslib-1.22/install-sh
16 tslib-1.22/CMakeLists.txt
17 tslib-1.22/README.md
18 tslib-1.22/autogen.sh
19 tslib-1.22/Makefile.am
20 tslib-1.22/config.h.in
21 tslib-1.22/m4/
22 tslib-1.22/m4/external/
23 tslib-1.22/m4/external/PLACEHOLDER
24 tslib-1.22/m4/internal/
25 tslib-1.22/m4/internal/libtool.m4
26 tslib-1.22/m4/internal/ltversion.m4
27 tslib-1.22/m4/internal/tslib_modules.m4
28 tslib-1.22/m4/internal/ltsugar.m4
29 tslib-1.22/m4/internal/visibility.m4
30 tslib-1.22/m4/internal/lt~obsolete.m4
31 tslib-1.22/m4/internal/ltoptions.m4
32 tslib-1.22/COPYING
33 tslib-1.22/NEWS
34 tslib-1.22/tslib.pc.in
35 tslib-1.22/doc/
36 tslib-1.22/doc/ts_read_mt.3
37 tslib-1.22/doc/Makefile.in
38 tslib-1.22/doc/ts_print.1
39 tslib-1.22/doc/ts_close.3
40 tslib-1.22/doc/ts.conf.5
41 tslib-1.22/doc/ts_verify.1
42 tslib-1.22/doc/ts_libversion.3
43 tslib-1.22/doc/ts_conf_get.3
44 tslib-1.22/doc/CMakeLists.txt
45 tslib-1.22/doc/ts_print_raw.1
46 tslib-1.22/doc/ts_conf.1
47 tslib-1.22/doc/ts_open.3
48 tslib-1.22/doc/ts_fd.3
49 tslib-1.22/doc/ts_finddev.1
50 tslib-1.22/doc/ts_get_eventpath.3
51 tslib-1.22/doc/ts_conf_set.3
52 tslib-1.22/doc/ts_setup.3
53 tslib-1.22/doc/Makefile.am
54 tslib-1.22/doc/ts_print_mt.1
55 tslib-1.22/doc/ts_calibrate.1
56 tslib-1.22/doc/ts_harvest.1
57 tslib-1.22/doc/ts_close_restricted.3
58 tslib-1.22/doc/ts_read_raw_mt.3
59 tslib-1.22/doc/ts_test_mt.1
60 tslib-1.22/doc/tslib_version.3
61 tslib-1.22/doc/ts_test.1
62 tslib-1.22/doc/ts_read.3
63 tslib-1.22/doc/ts_error_fn.3
64 tslib-1.22/doc/ts_read_raw.3
```



```

65 tslib-1.22/doc/ts_open_restricted.3
66 tslib-1.22/doc/ts_config.3
67 tslib-1.22/doc/ts_print_ascii_logo.3
68 tslib-1.22/doc/ts_uinput.1
69 tslib-1.22/missing
70 tslib-1.22/ChangeLog
71 tslib-1.22/cmake/
72 tslib-1.22/cmake/config.h.in
73 tslib-1.22/cmake/tslibConfig.cmake.in
74 tslib-1.22/THANKS
75 tslib-1.22/plugins/
76 tslib-1.22/plugins/input-evdev-raw.c
77 tslib-1.22/plugins/iir.c
78 tslib-1.22/plugins/Makefile.in
79 tslib-1.22/plugins/input-raw.c
80 tslib-1.22/plugins/h3600-raw.c
81 tslib-1.22/plugins/touchkit-raw.c
82 tslib-1.22/plugins/debounce.c
83 tslib-1.22/plugins/collie-raw.c
84 tslib-1.22/plugins/median.c
85 tslib-1.22/plugins/CMakeLists.txt
86 tslib-1.22/plugins/ucb1x00-raw.c
87 tslib-1.22/plugins/linear.c
88 tslib-1.22/plugins/waveshare-raw.c
89 tslib-1.22/plugins/cy8mrln-palmpre.c
90 tslib-1.22/plugins/evthres.c
91 tslib-1.22/plugins/dmc_dus3000-raw.c
92 tslib-1.22/plugins/Makefile.am
93 tslib-1.22/plugins/plugins.h
94 tslib-1.22/plugins/one-wire-ts-input-raw.c
95 tslib-1.22/plugins/linear-h2200.c
96 tslib-1.22/plugins/skip.c
97 tslib-1.22/plugins/arctic2-raw.c
98 tslib-1.22/plugins/variance.c
99 tslib-1.22/plugins/mk712-raw.c
100 tslib-1.22/plugins/pthres.c
101 tslib-1.22/plugins/corgi-raw.c
102 tslib-1.22/plugins/galax-raw.c
103 tslib-1.22/plugins/tatung-raw.c
104 tslib-1.22/plugins/dejitter.c
105 tslib-1.22/plugins/invert.c
106 tslib-1.22/plugins/dmc-raw.c
107 tslib-1.22/plugins/cy8mrln.h
108 tslib-1.22/plugins/lowpass.c
109 tslib-1.22/AUTHORS
110 tslib-1.22/aclocal.m4
111 tslib-1.22/configure.ac
112 tslib-1.22/configure
113 tslib-1.22/etc/
114 tslib-1.22/etc/Makefile.in
115 tslib-1.22/etc/CMakeLists.txt
116 tslib-1.22/etc/ts.conf
117 tslib-1.22/etc/Makefile.am
118 tslib-1.22/depcomp
119 tslib-1.22/src/
120 tslib-1.22/src/ts_version.c
121 tslib-1.22/src/ts_read_raw.c
122 tslib-1.22/src/Makefile.in
123 tslib-1.22/src/ts_get_eventpath.c
124 tslib-1.22/src/ts_config.c
125 tslib-1.22/src/tslib-private.h
126 tslib-1.22/src/CMakeLists.txt
127 tslib-1.22/src/ts_read.c
128 tslib-1.22/src/ts_parse_vars.c
129 tslib-1.22/src/ts_close.c

```

```

130 tslib-1.22/src/Makefile.am
131 tslib-1.22/src/ts_setup.c
132 tslib-1.22/src/ts_open.c
133 tslib-1.22/src/ts_attach.c
134 tslib-1.22/src/ts_strsep.h
135 tslib-1.22/src/tslib-filter.h
136 tslib-1.22/src/ts_config_filter.c
137 tslib-1.22/src/ts_error.c
138 tslib-1.22/src/ts_fd.c
139 tslib-1.22/src/tslib.h
140 tslib-1.22/src/ts_strsep.c
141 tslib-1.22/src/ts_option.c
142 tslib-1.22/src/ts_load_module.c
143 tslib-1.22/INSTALL
144 tslib-1.22/config.sub
145 tslib-1.22/tests/
146 tslib-1.22/tests/ts_test_mt.c
147 tslib-1.22/tests/Makefile.in
148 tslib-1.22/tests/ts_calibrate.h
149 tslib-1.22/tests/fbutils.h
150 tslib-1.22/tests/fbutils-bsd.c
151 tslib-1.22/tests/ts_test_mt_sdl.c
152 tslib-1.22/tests/font.h
153 tslib-1.22/tests/ts_print_raw.c
154 tslib-1.22/tests/CMakeLists.txt
155 tslib-1.22/tests/testutils.h
156 tslib-1.22/tests/font_8x16.c
157 tslib-1.22/tests/ts_harvest.c
158 tslib-1.22/tests/ts_print.c
159 tslib-1.22/tests/ts_finddev.c
160 tslib-1.22/tests/ts_calibrate.c
161 tslib-1.22/tests/ts_calibrate_common.c
162 tslib-1.22/tests/Makefile.am
163 tslib-1.22/tests/sdlutils.c
164 tslib-1.22/tests/ts_test.c
165 tslib-1.22/tests/font_8x8.c
166 tslib-1.22/tests/COPYING
167 tslib-1.22/tests/ts_verify.c
168 tslib-1.22/tests/ts_calibrate_sdl.c
169 tslib-1.22/tests/ts_conf.c
170 tslib-1.22/tests/ts_print_mt.c
171 tslib-1.22/tests/sdlutils.h
172 tslib-1.22/tests/testutils.c
173 tslib-1.22/tests/fbutils-linux.c
174 root@armadillo:~# ls -al
175 total 380
176 drwx----- 5 root root 4096 Jul 11 15:22 .
177 drwxr-xr-x 18 root root 4096 Jun 10 20:09 ..
178 -rw----- 1 root root 7623 Jul 9 16:07 .bash_history
179 -rw-r--r-- 1 root root 570 Jan 31 2010 .bashrc
180 drwx----- 3 root root 4096 Jun 10 20:51 .gnupg
181 drwxr-xr-x 3 root root 4096 Jun 27 12:38 .local
182 -rw-r--r-- 1 root root 148 Aug 18 2015 .profile
183 drwxr-xr-x 10 atmark atmark 4096 Jul 1 2020 tslib-1.22
184 -rwxr-x--- 1 root root 351192 Jul 11 15:22 tslib_1.22.orig.tar.xz
185
186 root@armadillo:~# cd tslib-1.22/
187
188 root@armadillo:~/tslib-1.22# ls -al
189 total 1376
190 drwxr-xr-x 10 atmark atmark 4096 Jul 1 2020 .
191 drwx----- 5 root root 4096 Jul 11 15:22 ..
192 -rw-r--r-- 1 atmark atmark 322 May 19 2019 AUTHORS
193 -rw-r--r-- 1 atmark atmark 2184 Jul 1 2020 CMakeLists.txt
194 -rw-r--r-- 1 atmark atmark 26461 May 19 2019 COPYING

```

```

195 -rw-r--r-- 1 atmark atmark 216 May 19 2019 ChangeLog
196 -rw-r--r-- 1 atmark atmark 15756 Jul 1 2020 INSTALL
197 -rw-r--r-- 1 atmark atmark 495 May 19 2019 Makefile.am
198 -rw-r--r-- 1 atmark atmark 29169 Jul 1 2020 Makefile.in
199 -rw-r--r-- 1 atmark atmark 12520 Jul 1 2020 NEWS
200 -rw-r--r-- 1 atmark atmark 962 Apr 16 2020 README
201 -rw-r--r-- 1 atmark atmark 31735 Jul 1 2020 README.md
202 -rw-r--r-- 1 atmark atmark 2819 Apr 16 2020 THANKS
203 -rw-r--r-- 1 atmark atmark 294 May 19 2019 acinclude.m4
204 -rw-r--r-- 1 atmark atmark 52437 Jul 1 2020 aclocal.m4
205 -rwxr-xr-x 1 atmark atmark 51 May 19 2019 autogen.sh
206 drwxr-xr-x 2 atmark atmark 4096 May 19 2019 cmake
207 -rwxr-xr-x 1 atmark atmark 7383 Jul 1 2020 compile
208 -rwxr-xr-x 1 atmark atmark 44283 Jul 1 2020 config.guess
209 -rw-r--r-- 1 atmark atmark 10778 Jul 1 2020 config.h.in
210 -rwxr-xr-x 1 atmark atmark 36136 Jul 1 2020 config.sub
211 -rwxr-xr-x 1 atmark atmark 661217 Jul 1 2020 configure
212 -rw-r--r-- 1 atmark atmark 7383 Jul 1 2020 configure.ac
213 -rwxr-xr-x 1 atmark atmark 23568 Jul 1 2020 depcomp
214 drwxr-xr-x 2 atmark atmark 4096 Jul 1 2020 doc
215 drwxr-xr-x 2 atmark atmark 4096 Jul 1 2020 etc
216 -rwxr-xr-x 1 atmark atmark 15368 Jul 1 2020 install-sh
217 -rw-r--r-- 1 atmark atmark 327114 Jul 1 2020 ltmain.sh
218 drwxr-xr-x 4 atmark atmark 4096 Jul 1 2020 m4
219 -rwxr-xr-x 1 atmark atmark 6878 Jul 1 2020 missing
220 drwxr-xr-x 2 atmark atmark 4096 Jul 1 2020 plugins
221 drwxr-xr-x 2 atmark atmark 4096 Jul 1 2020 src
222 drwxr-xr-x 2 atmark atmark 4096 Jul 1 2020 tests
223 drwxr-xr-x 2 atmark atmark 4096 Jul 1 2020 tools
224 -rw-r--r-- 1 atmark atmark 208 May 19 2019 tslib.pc.in
225 root@armadillo:~/tslib-1.22#
226

```

./configure

▼ root@armadillo:~/tslib-1.22# ./configure

```

root@armadillo:~/tslib-1.22# ./configure
checking for a BSD-compatible install... /usr/bin/install -c
checking whether build environment is sane... yes
checking for a thread-safe mkdir -p... /usr/bin/mkdir -p
checking for gawk... no
checking for mawk... mawk
checking whether make sets $(MAKE)... yes
checking whether make supports nested variables... yes
checking whether make supports nested variables... (cached) yes
checking build system type... armv7l-unknown-linux-gnueabi
checking host system type... armv7l-unknown-linux-gnueabi
checking for gcc... gcc
checking whether the C compiler works... yes
checking for C compiler default output file name... a.out
checking for suffix of executables...
checking whether we are cross compiling... no
checking for suffix of object files... o
checking whether we are using the GNU C compiler... yes
checking whether gcc accepts -g... yes
checking for gcc option to accept ISO C89... none needed
checking whether gcc understands -c and -o together... yes
checking whether make supports the include directive... yes (GNU style)
checking dependency style of gcc... none
checking how to run the C preprocessor... gcc -E
checking whether the C compiler supports -fvisibility=hidden... yes
checking whether to use -fvisibility=hidden... yes
checking whether ln -s works... yes
checking whether make sets $(MAKE)... (cached) yes
checking how to print strings... printf
checking for a sed that does not truncate output... /usr/bin/sed
checking for grep that handles long lines and -e... /usr/bin/grep
checking for egrep... /usr/bin/grep -E
checking for fgrep... /usr/bin/grep -F
checking for ld used by gcc... /usr/bin/ld
checking if the linker (/usr/bin/ld) is GNU ld... yes
checking for BSD- or MS-compatible name lister (nm)... /usr/bin/nm -B
checking the name lister (/usr/bin/nm -B) interface... BSD nm
checking the maximum length of command line arguments... 1572864
checking how to convert armv7l-unknown-linux-gnueabi file names to armv7l-unknown-linux-gnueabi format... func
checking how to convert armv7l-unknown-linux-gnueabi file names to toolchain format... func_convert_file_noop
checking for /usr/bin/ld option to reload object files... -r
checking for objdump... objdump
checking how to recognize dependent libraries... pass_all
checking for dlltool... no
checking how to associate runtime and link libraries... printf %s\n
checking for ar... ar
checking for archiver @FILE support... @
checking for strip... strip
checking for ranlib... ranlib
checking command to parse /usr/bin/nm -B output from gcc object... ok
checking for sysroot... no
checking for a working dd... /usr/bin/dd
checking how to truncate binary pipes... /usr/bin/dd bs=4096 count=1
checking for mt... no
checking if : is a manifest tool... no
checking for ANSI C header files... yes
checking for sys/types.h... yes
checking for sys/stat.h... yes
checking for stdlib.h... yes
checking for string.h... yes
checking for memory.h... yes
checking for strings.h... yes
checking for inttypes.h... yes
checking for stdint.h... yes

```

```

checking for unistd.h... yes
checking for dlfcn.h... yes
checking for objdir... .libs
checking if gcc supports -fno-rtti -fno-exceptions... no
checking for gcc option to produce PIC... -fPIC -DPIC
checking if gcc PIC flag -fPIC -DPIC works... yes
checking if gcc static flag -static works... yes
checking if gcc supports -c -o file.o... yes
checking if gcc supports -c -o file.o... (cached) yes
checking whether the gcc linker (/usr/bin/ld) supports shared libraries... yes
checking whether -lc should be explicitly linked in... no
checking dynamic linker characteristics... GNU/Linux ld.so
checking how to hardcode library paths into programs... immediate
checking for shl_load... no
checking for shl_load in -ldld... no
checking for dlopen... no
checking for dlopen in -ldl... yes
checking whether a program can dlopen itself... yes
checking whether a statically linked program can dlopen itself... no
checking whether stripping libraries is possible... yes
checking if libtool supports shared libraries... yes
checking whether to build shared libraries... yes
checking whether to build static libraries... no
checking for dlopen in -ldl... (cached) yes
checking for size_t... yes
checking for working alloca.h... yes
checking for alloca... yes
checking for ANSI C header files... (cached) yes
checking fcntl.h usability... yes
checking fcntl.h presence... yes
checking for fcntl.h... yes
checking limits.h usability... yes
checking limits.h presence... yes
checking for limits.h... yes
checking for stdlib.h... (cached) yes
checking for string.h... (cached) yes
checking sys/ioctl.h usability... yes
checking sys/ioctl.h presence... yes
checking for sys/ioctl.h... yes
checking sys/time.h usability... yes
checking sys/time.h presence... yes
checking for sys/time.h... yes
checking for unistd.h... (cached) yes
checking for stdint.h... (cached) yes
checking for sys/types.h... (cached) yes
checking errno.h usability... yes
checking errno.h presence... yes
checking for errno.h... yes
checking dirent.h usability... yes
checking dirent.h presence... yes
checking for dirent.h... yes
checking linux/spi/cy8mrln.h usability... no
checking linux/spi/cy8mrln.h presence... no
checking for linux/spi/cy8mrln.h... no
checking for an ANSI C-conforming const... yes
checking for inline... inline
checking for size_t... (cached) yes
checking for uint16_t... yes
checking for uint8_t... yes
checking whether time.h and sys/time.h may both be included... yes
checking whether gcc needs -traditional... no
checking for stdlib.h... (cached) yes
checking for unistd.h... (cached) yes
checking for sys/param.h... yes
checking for getpagesize... yes

```

```

checking for working mmap... yes
checking sys/select.h usability... yes
checking sys/select.h presence... yes
checking for sys/select.h... yes
checking sys/socket.h usability... yes
checking sys/socket.h presence... yes
checking for sys/socket.h... yes
checking types of arguments for select... int,fd_set *,struct timeval *
checking return type of signal handlers... void
checking whether lstat correctly handles trailing slash... yes
checking whether stat accepts an empty string... no
checking for vprintf... yes
checking for _doprnt... no
checking for gettimeofday... yes
checking for memmove... yes
checking for memset... yes
checking for munmap... yes
checking for select... yes
checking for strcasecmp... yes
checking for strchr... yes
checking for strdup... yes
checking for strtoul... yes
checking for strtol... yes
checking for strsep... yes
checking for pkg-config... no
checking whether debounce module is requested... yes
checking whether dejitter module is requested... yes
checking whether evthres module is requested... yes
checking whether iir module is requested... yes
checking whether linear module is requested... yes
checking whether median module is requested... yes
checking whether pthres module is requested... yes
checking whether skip module is requested... yes
checking whether lowpass module is requested... yes
checking whether invert module is requested... yes
checking whether variance module is requested... yes
checking whether input module is requested... yes
checking whether touchkit module is requested... yes
checking whether waveshare module is requested... yes
checking whether input-evdev module is requested... no
checking whether tatung module is requested... no
checking whether ucb1x00 module is requested... no
checking whether mk712 module is requested... no
checking whether h3600 module is requested... no
checking whether dmc module is requested... no
checking whether linear-h2200 module is requested... no
checking whether corgi module is requested... no
checking whether collie module is requested... no
checking whether arctic2 module is requested... no
checking whether dmc_dus3000 module is requested... no
checking whether cy8mrln-palmpre module is requested... no
checking whether galax module is requested... no
checking whether one-wire-ts-input module is requested... no
checking where to place modules... ${libdir}/ts
checking whether to enable debugging... no
checking whether to enable tools... yes
checking that generated files are newer than configure... done
configure: creating ./config.status
config.status: creating Makefile
config.status: creating etc/Makefile
config.status: creating plugins/Makefile
config.status: creating src/Makefile
config.status: creating tests/Makefile
config.status: creating tools/Makefile
config.status: creating doc/Makefile

```

```
195 | config.status: creating tslib.pc
196 | config.status: creating config.h
197 | config.status: executing depfiles commands
198 | config.status: executing libtool commands
```

make

▼ root@armadillo:~/tslib-1.22# make

```

root@armadillo:~/tslib-1.22# make
make all-recursive
make[1]: Entering directory '/root/tslib-1.22'
Making all in etc
make[2]: Entering directory '/root/tslib-1.22/etc'
make[2]: Nothing to be done for 'all'.
make[2]: Leaving directory '/root/tslib-1.22/etc'
Making all in src
make[2]: Entering directory '/root/tslib-1.22/src'
CC      ts_attach.lo
CC      ts_close.lo
CC      ts_config.lo
CC      ts_error.lo
CC      ts_fd.lo
CC      ts_load_module.lo
CC      ts_open.lo
CC      ts_parse_vars.lo
CC      ts_read.lo
CC      ts_read_raw.lo
CC      ts_option.lo
CC      ts_setup.lo
CC      ts_version.lo
CC      ts_config_filter.lo
CC      ts_get_eventpath.lo
CC      ts_strsep.lo
CCLD    libts.la
make[2]: Leaving directory '/root/tslib-1.22/src'
Making all in plugins
make[2]: Entering directory '/root/tslib-1.22/plugins'
CC      linear.lo
CCLD    linear.la
CC      dejitter.lo
CCLD    dejitter.la
CC      variance.lo
CCLD    variance.la
CC      median.lo
CCLD    median.la
CC      pthres.lo
CCLD    pthres.la
CC      debounce.lo
debounce.c: In function 'debounce_read':
debounce.c:84:10: warning: comparison of integer expressions of different signedness: 'long int' and 'unsigned int'
    if (dt < p->drop_threshold)
        ^
debounce.c: In function 'debounce_read_mt':
debounce.c:181:11: warning: comparison of integer expressions of different signedness: 'long int' and 'unsigned int'
    if (dt < p->drop_threshold)
        ^
CCLD    debounce.la
CC      skip.lo
CCLD    skip.la
CC      invert.lo
CCLD    invert.la
CC      iir.lo
CCLD    iir.la
CC      evthres.lo
CCLD    evthres.la
CC      lowpass.lo
CCLD    lowpass.la
CC      input-raw.lo
CCLD    input.la
CC      touchkit-raw.lo
CCLD    touchkit.la
CC      waveshare-raw.lo

```



```

65      CCLD      waveshare.la
66  make[2]: Leaving directory '/root/tslib-1.22/plugins'
67  Making all in tests
68  make[2]: Entering directory '/root/tslib-1.22/tests'
69      CC      ts_test.o
70      CC      testutils.o
71      CC      font_8x8.o
72      CC      font_8x16.o
73      CC      fbutils-linux.o
74      CCLD     ts_test
75      CC      ts_test_mt.o
76      CCLD     ts_test_mt
77      CC      ts_calibrate.o
78      CC      ts_calibrate_common.o
79      CCLD     ts_calibrate
80      CC      ts_conf.o
81      CCLD     ts_conf
82      CC      ts_print.o
83      CCLD     ts_print
84      CC      ts_print_mt.o
85      CCLD     ts_print_mt
86      CC      ts_print_raw.o
87      CCLD     ts_print_raw
88      CC      ts_harvest.o
89      CCLD     ts_harvest
90      CC      ts_fnddev.o
91      CCLD     ts_fnddev
92      CC      ts_verify.o
93      CCLD     ts_verify
94  make[2]: Leaving directory '/root/tslib-1.22/tests'
95  Making all in tools
96  make[2]: Entering directory '/root/tslib-1.22/tools'
97      CC      ts_uinput.o
98      CCLD     ts_uinput
99  make[2]: Leaving directory '/root/tslib-1.22/tools'
100 Making all in doc
101 make[2]: Entering directory '/root/tslib-1.22/doc'
102 make[2]: Nothing to be done for 'all'.
103 make[2]: Leaving directory '/root/tslib-1.22/doc'
104 make[2]: Entering directory '/root/tslib-1.22'
105 make[2]: Leaving directory '/root/tslib-1.22'
106 make[1]: Leaving directory '/root/tslib-1.22'

```

make install

▼ root@armadillo:~/tslib-1.22# make install

```

root@armadillo:~/tslib-1.22# make install
Making install in etc
make[1]: Entering directory '/root/tslib-1.22/etc'
make[2]: Entering directory '/root/tslib-1.22/etc'
/usr/bin/mkdir -p '/usr/local/etc'
/usr/bin/install -c -m 644 ts.conf '/usr/local/etc'
make[2]: Nothing to be done for 'install-data-am'.
make[2]: Leaving directory '/root/tslib-1.22/etc'
make[1]: Leaving directory '/root/tslib-1.22/etc'
Making install in src
make[1]: Entering directory '/root/tslib-1.22/src'
make[2]: Entering directory '/root/tslib-1.22/src'
/usr/bin/mkdir -p '/usr/local/lib'
/bin/bash ../libtool --mode=install /usr/bin/install -c libts.la '/usr/local/lib'
libtool: install: /usr/bin/install -c .libs/libts.so.0.10.4 /usr/local/lib/libts.so.0.10.4
libtool: install: (cd /usr/local/lib && { ln -s -f libts.so.0.10.4 libts.so.0 || { rm -f libts.so.0 && ln -s libt
libtool: install: (cd /usr/local/lib && { ln -s -f libts.so.0.10.4 libts.so || { rm -f libts.so && ln -s libts.sc
libtool: install: /usr/bin/install -c .libs/libts.lai /usr/local/lib/libts.la
libtool: finish: PATH="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/sbin" ldconfig -n /usr/local/l
-----

```

Libraries have been installed in:
 /usr/local/lib

If you ever happen to want to link against installed libraries in a given directory, LIBDIR, you must either use libtool, and specify the full pathname of the library, or use the '-LLIBDIR' flag during linking and do at least one of the following:

- add LIBDIR to the 'LD_LIBRARY_PATH' environment variable during execution
- add LIBDIR to the 'LD_RUN_PATH' environment variable during linking
- use the '-Wl,-rpath -Wl,LIBDIR' linker flag
- have your system administrator add LIBDIR to '/etc/ld.so.conf'

See any operating system documentation about shared libraries for more information, such as the ld(1) and ld.so(8) manual pages.

```

-----
/usr/bin/mkdir -p '/usr/local/include'
/usr/bin/install -c -m 644 tslib.h '/usr/local/include'
make[2]: Leaving directory '/root/tslib-1.22/src'
make[1]: Leaving directory '/root/tslib-1.22/src'
Making install in plugins
make[1]: Entering directory '/root/tslib-1.22/plugins'
make[2]: Entering directory '/root/tslib-1.22/plugins'
/usr/bin/mkdir -p '/usr/local/lib/ts'
/bin/bash ../libtool --mode=install /usr/bin/install -c linear.la dejitter.la variance.la median.la pthres.l
libtool: warning: relinking 'linear.la'
libtool: install: (cd /root/tslib-1.22/plugins; /bin/bash "/root/tslib-1.22/libtool" --silent --tag CC --mode=re
libtool: install: /usr/bin/install -c .libs/linear.soT /usr/local/lib/ts/linear.so
libtool: install: /usr/bin/install -c .libs/linear.lai /usr/local/lib/ts/linear.la
libtool: warning: relinking 'dejitter.la'
libtool: install: (cd /root/tslib-1.22/plugins; /bin/bash "/root/tslib-1.22/libtool" --silent --tag CC --mode=re
libtool: install: /usr/bin/install -c .libs/dejitter.soT /usr/local/lib/ts/dejitter.so
libtool: install: /usr/bin/install -c .libs/dejitter.lai /usr/local/lib/ts/dejitter.la
libtool: warning: relinking 'variance.la'
libtool: install: (cd /root/tslib-1.22/plugins; /bin/bash "/root/tslib-1.22/libtool" --silent --tag CC --mode=re
libtool: install: /usr/bin/install -c .libs/variance.soT /usr/local/lib/ts/variance.so
libtool: install: /usr/bin/install -c .libs/variance.lai /usr/local/lib/ts/variance.la
libtool: warning: relinking 'median.la'
libtool: install: (cd /root/tslib-1.22/plugins; /bin/bash "/root/tslib-1.22/libtool" --silent --tag CC --mode=re
libtool: install: /usr/bin/install -c .libs/median.soT /usr/local/lib/ts/median.so
libtool: install: /usr/bin/install -c .libs/median.lai /usr/local/lib/ts/median.la
libtool: warning: relinking 'pthres.la'
libtool: install: (cd /root/tslib-1.22/plugins; /bin/bash "/root/tslib-1.22/libtool" --silent --tag CC --mode=re

```

```

libtool: install: /usr/bin/install -c .libs/pthres.soT /usr/local/lib/ts/pthres.so
libtool: install: /usr/bin/install -c .libs/pthres.lai /usr/local/lib/ts/pthres.la
libtool: warning: relinking 'debounce.la'
libtool: install: (cd /root/tslib-1.22/plugins; /bin/bash "/root/tslib-1.22/libtool" --silent --tag CC --mode=re
libtool: install: /usr/bin/install -c .libs/debounce.soT /usr/local/lib/ts/debounce.so
libtool: install: /usr/bin/install -c .libs/debounce.lai /usr/local/lib/ts/debounce.la
libtool: warning: relinking 'skip.la'
libtool: install: (cd /root/tslib-1.22/plugins; /bin/bash "/root/tslib-1.22/libtool" --silent --tag CC --mode=re
libtool: install: /usr/bin/install -c .libs/skip.soT /usr/local/lib/ts/skip.so
libtool: install: /usr/bin/install -c .libs/skip.lai /usr/local/lib/ts/skip.la
libtool: warning: relinking 'invert.la'
libtool: install: (cd /root/tslib-1.22/plugins; /bin/bash "/root/tslib-1.22/libtool" --silent --tag CC --mode=re
libtool: install: /usr/bin/install -c .libs/invert.soT /usr/local/lib/ts/invert.so
libtool: install: /usr/bin/install -c .libs/invert.lai /usr/local/lib/ts/invert.la
libtool: warning: relinking 'iir.la'
libtool: install: (cd /root/tslib-1.22/plugins; /bin/bash "/root/tslib-1.22/libtool" --silent --tag CC --mode=re
libtool: install: /usr/bin/install -c .libs/iir.soT /usr/local/lib/ts/iir.so
libtool: install: /usr/bin/install -c .libs/iir.lai /usr/local/lib/ts/iir.la
libtool: warning: relinking 'evthres.la'
libtool: install: (cd /root/tslib-1.22/plugins; /bin/bash "/root/tslib-1.22/libtool" --silent --tag CC --mode=re
libtool: install: /usr/bin/install -c .libs/evthres.soT /usr/local/lib/ts/evthres.so
libtool: install: /usr/bin/install -c .libs/evthres.lai /usr/local/lib/ts/evthres.la
libtool: warning: relinking 'lowpass.la'
libtool: install: (cd /root/tslib-1.22/plugins; /bin/bash "/root/tslib-1.22/libtool" --silent --tag CC --mode=re
libtool: install: /usr/bin/install -c .libs/lowpass.soT /usr/local/lib/ts/lowpass.so
libtool: install: /usr/bin/install -c .libs/lowpass.lai /usr/local/lib/ts/lowpass.la
libtool: warning: relinking 'input.la'
libtool: install: (cd /root/tslib-1.22/plugins; /bin/bash "/root/tslib-1.22/libtool" --silent --tag CC --mode=re
libtool: install: /usr/bin/install -c .libs/input.soT /usr/local/lib/ts/input.so
libtool: install: /usr/bin/install -c .libs/input.lai /usr/local/lib/ts/input.la
libtool: install: /usr/bin/install -c .libs/touchkit.so /usr/local/lib/ts/touchkit.so
libtool: install: /usr/bin/install -c .libs/touchkit.lai /usr/local/lib/ts/touchkit.la
libtool: warning: relinking 'waveshare.la'
libtool: install: (cd /root/tslib-1.22/plugins; /bin/bash "/root/tslib-1.22/libtool" --silent --tag CC --mode=re
libtool: install: /usr/bin/install -c .libs/waveshare.soT /usr/local/lib/ts/waveshare.so
libtool: install: /usr/bin/install -c .libs/waveshare.lai /usr/local/lib/ts/waveshare.la
libtool: finish: PATH="/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/sbin" ldconfig -n /usr/local/l
-----

```

Libraries have been installed in:
 /usr/local/lib/ts

If you ever happen to want to [link](#) against installed libraries
[in](#) a given directory, LIBDIR, you must either use libtool, and
 specify the full pathname of the library, or use the '-LLIBDIR'
 flag during linking and [do](#) at least one of the following:

- add LIBDIR to the 'LD_LIBRARY_PATH' environment variable
 during execution
- add LIBDIR to the 'LD_RUN_PATH' environment variable
 during linking
- use the '-Wl,-rpath -Wl,LIBDIR' linker flag
- have your system administrator add LIBDIR to '/etc/ld.so.conf'

See any operating system documentation about shared libraries [for](#)
[more](#) information, such as the [ld\(1\)](#) and [ld.so\(8\)](#) manual pages.

```

-----
make[2]: Nothing to be done for 'install-data-am'.
make[2]: Leaving directory '/root/tslib-1.22/plugins'
make[1]: Leaving directory '/root/tslib-1.22/plugins'
Making install in tests
make[1]: Entering directory '/root/tslib-1.22/tests'
make[2]: Entering directory '/root/tslib-1.22/tests'
  /usr/bin/mkdir -p '/usr/local/bin'
  /bin/bash ../libtool --mode=install /usr/bin/install -c ts_test ts_test_mt ts_calibrate ts_conf ts_print ts_p
libtool: install: /usr/bin/install -c .libs/ts_test /usr/local/bin/ts_test
libtool: install: /usr/bin/install -c .libs/ts_test_mt /usr/local/bin/ts_test_mt

```

```

130 libtool: install: /usr/bin/install -c .libs/ts_calibrate /usr/local/bin/ts_calibrate
131 libtool: install: /usr/bin/install -c .libs/ts_conf /usr/local/bin/ts_conf
132 libtool: install: /usr/bin/install -c .libs/ts_print /usr/local/bin/ts_print
133 libtool: install: /usr/bin/install -c .libs/ts_print_mt /usr/local/bin/ts_print_mt
134 libtool: install: /usr/bin/install -c .libs/ts_print_raw /usr/local/bin/ts_print_raw
135 libtool: install: /usr/bin/install -c .libs/ts_harvest /usr/local/bin/ts_harvest
136 libtool: install: /usr/bin/install -c .libs/ts_finddev /usr/local/bin/ts_finddev
137 libtool: install: /usr/bin/install -c .libs/ts_verify /usr/local/bin/ts_verify
138 make[2]: Nothing to be done for 'install-data-am'.
139 make[2]: Leaving directory '/root/tslib-1.22/tests'
140 make[1]: Leaving directory '/root/tslib-1.22/tests'
141 Making install in tools
142 make[1]: Entering directory '/root/tslib-1.22/tools'
143 make[2]: Entering directory '/root/tslib-1.22/tools'
144 /usr/bin/mkdir -p '/usr/local/bin'
145 /bin/bash ../libtool --mode=install /usr/bin/install -c ts_uinput '/usr/local/bin'
146 libtool: install: /usr/bin/install -c .libs/ts_uinput /usr/local/bin/ts_uinput
147 make[2]: Nothing to be done for 'install-data-am'.
148 make[2]: Leaving directory '/root/tslib-1.22/tools'
149 make[1]: Leaving directory '/root/tslib-1.22/tools'
150 Making install in doc
151 make[1]: Entering directory '/root/tslib-1.22/doc'
152 make[2]: Entering directory '/root/tslib-1.22/doc'
153 make[2]: Nothing to be done for 'install-exec-am'.
154 /usr/bin/mkdir -p '/usr/local/share/man/man1'
155 /usr/bin/install -c -m 644 ts_calibrate.1 ts_conf.1 ts_finddev.1 ts_harvest.1 ts_print.1 ts_print_mt.1 ts_print_r
156 /usr/bin/mkdir -p '/usr/local/share/man/man3'
157 /usr/bin/install -c -m 644 ts_close.3 ts_close_restricted.3 ts_conf_get.3 ts_config.3 ts_conf_set.3 ts_error_fn.3
158 /usr/bin/mkdir -p '/usr/local/share/man/man5'
159 /usr/bin/install -c -m 644 ts.conf.5 '/usr/local/share/man/man5'
160 make[2]: Leaving directory '/root/tslib-1.22/doc'
161 make[1]: Leaving directory '/root/tslib-1.22/doc'
162 make[1]: Entering directory '/root/tslib-1.22'
163 make[2]: Entering directory '/root/tslib-1.22'
164 make[2]: Nothing to be done for 'install-exec-am'.
165 /usr/bin/mkdir -p '/usr/local/lib/pkgconfig'
166 /usr/bin/install -c -m 644 tslib.pc '/usr/local/lib/pkgconfig'
167 make[2]: Leaving directory '/root/tslib-1.22'
168 make[1]: Leaving directory '/root/tslib-1.22'

```

/usr/local/lib/ts と /usr/local/include/tslib.h の確認

▼ root@armadillo:~/tslib-1.22# find / -name "ts" -type d

```

1 | root@armadillo:~/tslib-1.22# find / -name "ts" -type d
2 | /usr/local/lib/ts
3 | /run/sudo/ts

```


▼ root@armadillo:~/tslib-1.22# find / -name "tslib.h"

```

1 | root@armadillo:~/tslib-1.22# find / -name "tslib.h"
2 | /root/tslib-1.22/src/tslib.h
3 | /usr/local/include/tslib.h
4 | /usr/include/tslib.h

```

キャリブレーションファイルの指定

 ArmadilloX1 起動時してから、ts_calibrate する前に export しておく

▼ root@armadillo:~/tslib-1.22# export TSLIB_CALIBFILE=/etc/pointercal

```
1 | root@armadillo:~/tslib-1.22# export TSLIB_CALIBFILE=/etc/pointercal
```

キャリブレーション

▼ root@armadillo:/usr/lib# TSLIB_TSDEVICE=/dev/input/event1 ts_calibrate

```
1 | root@armadillo:~# TSLIB_TSDEVICE=/dev/input/event1 ts_calibrate
2 | xres = 800, yres = 480
3 | Took 1 samples...
4 | Top left : X = 732 Y = 774
5 | Took 1 samples...
6 | Top right : X = 9565 Y = 1128
7 | Took 1 samples...
8 | Bot right : X = 9619 Y = 9306
9 | Took 1 samples...
10 | Bot left : X = 766 Y = 9069
11 | Took 1 samples...
12 | Center : X = 4984 Y = 5387
13 | -4.377563 0.079142 -0.000365
14 | 11.211487 -0.001511 0.046085
15 | Calibration constants: -286888 5186 -23 734756 -99 3020 65536
```

キャリブレーション結果の確認

▼ root@armadillo:~/tslib-1.19# cat /etc/pointercal

```
1 | root@armadillo:~# cat /etc/pointercal
2 | 5186 -23 -286888 -99 3020 734756 65536 800 480 0
```

キャリブレーションの様子

▼ キャリブレーションの様子

<https://youtu.be/k75Hq7tPMxE>



tslib インストールの様子

▼ tslib インストールの様子

<https://youtu.be/Qyp1aZJCSQ8>



1.5.1. tslib 設定ファイル

- tslib は入力から出力までの一連の処理をフィルタという形で実行
- 設定ファイルに、フィルタモジュールの設定

▼ /etc/ts.conf (初期設定のまま)

```

1 root@armadillo:~# cat /etc/ts.conf
2 # Access plugins
3 #####
4
5 # Uncomment if you wish to use the linux input layer event interface
6 module_raw input
7
8 # For other driver modules, see the ts.conf man page
9
10
11 # Filter plugins
12 #####
13
14 # Uncomment if first or last samples are unreliable
15 # module skip nhead=1 ntail=1
16
17 # Uncomment if needed for devices that measure pressure
18 module pthres pmin=1
19
20 # Uncomment if needed
21 # module debounce drop_threshold=40
22
23 # Uncomment if needed to filter spikes
24 # module median depth=5
25
26 # Uncomment to enable smoothing of fraction N/D
27 # module iir N=6 D=10
28
29 # Uncomment if needed
30 # module lowpass factor=0.1 threshold=1
31
32 # Uncomment if needed to filter noise samples
33 module dejitter delta=100
34
35 # Uncomment and adjust if you need to invert an axis or both
36 # module invert x0=800 y0=480
37
38 # Uncomment to use ts_calibrate's settings
39 module linear

```

項目	コメント
module_raw input	use the linux input layer event interface
module pthres pmin=1	devices that measure pressure
module dejitter delta=100	filter noise samples
module linear	use ts_calibrate's settings

linear が座標変換モジュール

linear が座標変換モジュールを利用するには、キャリブレーションが必要

tslib が用意しているプログラム

▼ root@armadillo:/practice/09.touchpanel# ts

```

1 root@armadillo:/practice/09.touchpanel# ts
2 ts_calibrate ts_harvest ts_print_raw ts_uinput tsort
3 ts_conf ts_print ts_test ts_verify
4 ts_finddev ts_print_mt ts_test_mt tset

```

▼ /etc/pointercal

```
1 root@armadillo:/practice/09.touchpanel# cat /etc/pointercal
2 5052 63 220156 -30 2969 799232 65536 800 480 0
```

1.5.2. tslib の利用方法

以下のオプションを Makefile に追加

- -I/work/linux/nfsroot/usr/local/include
- -L/work/linux/nfsroot/usr/local/lib
- -lts (小文字のエル)

1.5.3. tslib ライブラリ関数

[tslib_1.22.orig.tar.xz](#) のダウンロード

tslibが提供する主なライブラリ関数

function	用途
ts_open()	タッチパネルデバイスをオープン
ts_config()	設定ファイルを読み込む
ts_read()	イベントを取得
ts_close()	タッチパネルデバイスをクローズ

ts_open()

[tslib/src/ts_open.c](#)

struct tsdev *ts_open(const char *dev_name, int nonblock)	
arg1	デバイスファイル名
arg2	0: イベント発生するまでブロック
	1: ブロックしない
戻り値	成功: tsdev構造体アドレス
	失敗: NULL

ts_config()

[tslib/src/ts_config.c](#)

int ts_config(struct tsdev *ts)	
arg1	tsdev構造体(ts_open関数の戻り値)
戻り値	成功: 0
	失敗: -1

ts_read()

[tslib/src/ts_read.c](#)

int ts_read(struct tsdev *ts, struct ts_sample *samp, int nr)	
arg1	tsdev構造体(ts_open関数の戻り値)
arg2	ts_sample構造体

int ts_read(struct tsdev *ts, struct ts_sample *samp, int nr)	
arg3	取得するイベント数
戻り値	成功: 取得したイベント数
	失敗: -1

ts_sample構造体

struct ts_sample	
int x	X座標
int y	Y座標
unsigned int pressure	圧力
struct timeval tv	サンプル取得時刻

ts_close()

[tslib/src/ts_close.c](#)

int ts_close(struct tsdev *ts)	
arg1	tsdev構造体(ts_open関数の戻り値)
戻り値	成功: 0
	失敗: -1

1.5.4. 参考サイト

- [Armadillo-840でtslibを使う方法](#)
- [Qt タッチパネル操作](#)

1.6. 課題1 tpevent2

tslib を利用したタッチパネルイベントを表示する

イベント	表示する文字列	備考
発生時	"x: XXX y: YYY p:PPP"	XXX, YYY は座標、PPPは圧力

表示例

▼

```

1 root@armadillo:/practice/09.touchpanel# ./tpevent2
2 x: 8 y: 52 p: 255
3 x: 8 y: 52 p: 0
4 x: 9 y: 463 p: 255
5 x: 9 y: 463 p: 0
6 x: 785 y: 471 p: 255

```

1.6.1. ソース

tpevent2.c

▼ 09.touchpanel/tpevent2.c

```

1  #include <stdio.h>
2  #include <fcntl.h>
3  #include <tslib.h>
4
5  // イベントデバイスファイル。
6  #define DEVFILE "/dev/input/event1"
7
8  int main(void)
9  {
10     int ret;
11     struct tsdev *ts;
12     struct ts_sample samp;
13
14     // タッチパネルデバイスをオープンします。(tslib使用)
15     ts = XXXXX(XXXXX, 0);
16     // ファイルがオープンできなかった場合、エラー終了します。
17     if (!ts){
18         perror("ts_open");
19         return 1;
20     }
21
22     // 設定ファイルを読み込みます。(tslib使用)
23     ret = XXXXX(XXXXX);
24     // 設定ファイルが読み込めなかった場合、エラー終了します。
25     if (ret){
26         perror("ts_config");
27         return 1;
28     }
29
30     // イベント内容を表示する処理。(tslib使用)
31     for(;;){
32         // イベントを取得します。
33         ret = XXXXX(XXXXX, XXXXX, 1);
34         // イベントを取得できなかった場合、エラー終了します。
35         if (ret < 0){
36             perror("ts_read");
37             return 1;
38         }
39
40         // 取得したイベント数が1でないなら処理を繰り返します。
41         if (ret != 1)
42             continue;
43
44         printf("x:%6d y:%6d p:%6d\n", XXXXX, XXXXX, XXXXX);
45     }
46
47     // タッチパネルデバイスをクローズします。(tslib使用)
48     XXXXX(ts);
49
50     return 0;
51 }
52
53

```

Makefile



-I/work/linux/nfsroot/usr/local/include



-L/work/linux/nfsroot/usr/local/lib

▼ 09.touchpanel/Makefile

```
1 CC = arm-linux-gnueabi-gcc
2 #TARGET = tpevent tpevent2 tpstamp
3 TARGET = tpevent2
4 CFLAGS = -I/work/linux/nfsroot/usr/local/include -gdwarf-2 -O0
5 LDFLAGS = -L/work/linux/nfsroot/usr/local/lib
6 LIBS = -lts
7
8 all: $(TARGET)
9
10 tpevent: tpevent.c
11     $(CC) -o $@ $^ $(CFLAGS) $(LDFLAGS) $(LIBS)
12
13 tpevent2: tpevent2.c
14     $(CC) -o $@ $^ $(CFLAGS) $(LDFLAGS) $(LIBS)
15
16 tpstamp: tpstamp.c
17     $(CC) -o $@ $^ $(CFLAGS) $(LDFLAGS) $(LIBS)
18
19 install :
20     cp -p $(TARGET) /work/linux/nfsroot/debug/04_practice
21     cp -p $(TARGET) /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
22     cp -p $(TARGET).c /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
23     cp -p ./*.bmp /work/linux/nfsroot/debug/04_practice
24     cp -p ./*.bmp /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
25
26 clean:
27     rm -f $(TARGET)
28
29 .PHONY: clean
30
```

1.6.2. 動作確認

make clean

▼ \$ make clean

```
1 atmark@atde8:/media/sf_ArmadilloX1/hwpwm/work/R06_2024/Application_debug/text/practice-example/09.touchpanel$ make
2 rm -f tpevent2
```

make

▼ \$ make

```
1 atmark@atde8:/media/sf_ArmadilloX1/hwpwm/work/R06_2024/Application_debug/text/practice-example/09.touchpanel$ make
2 arm-linux-gnueabi-gcc -o tpevent2 tpevent2.c -I/work/linux/nfsroot/usr/local/include -gdwarf-2 -O0 -L/work/linux
```

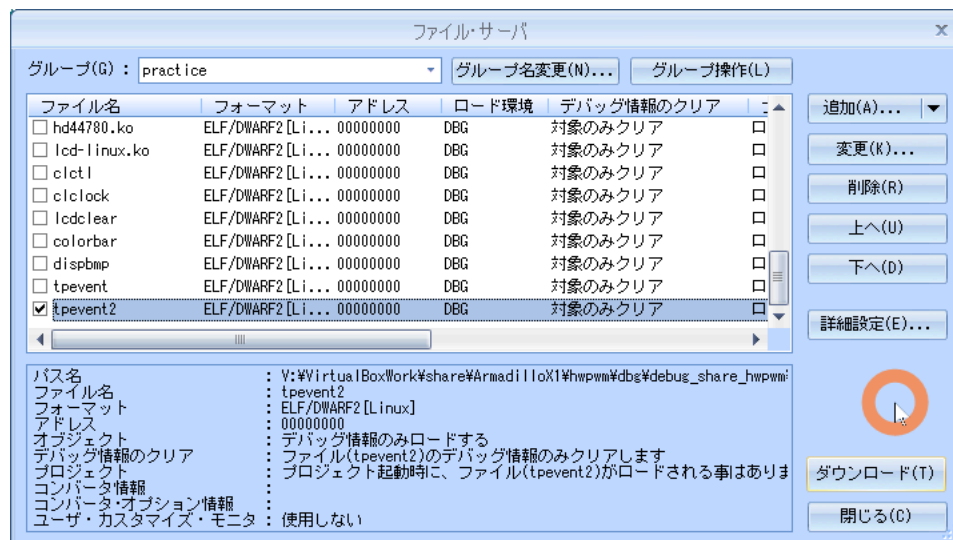
sudo make install

▼ \$ sudo make install

```
1 atmark@atde8:/media/sf_ArmadilloX1/hwpwm/work/R06_2024/Application_debug/text/practice-example/09.touchpanel$ sudo
2 [sudo] atmark のパスワード:
3 cp -p tpevent2 /work/linux/nfsroot/debug/04_practice
4 cp -p tpevent2 /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
5 cp -p tpevent2.c /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
6 cp -p ./*.bmp /work/linux/nfsroot/debug/04_practice
7 cp -p ./*.bmp /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
```

CSIDEでロード

▼ メニュー「ファイル」 - 「ロード」



キャリブレーション (割愛)

実行

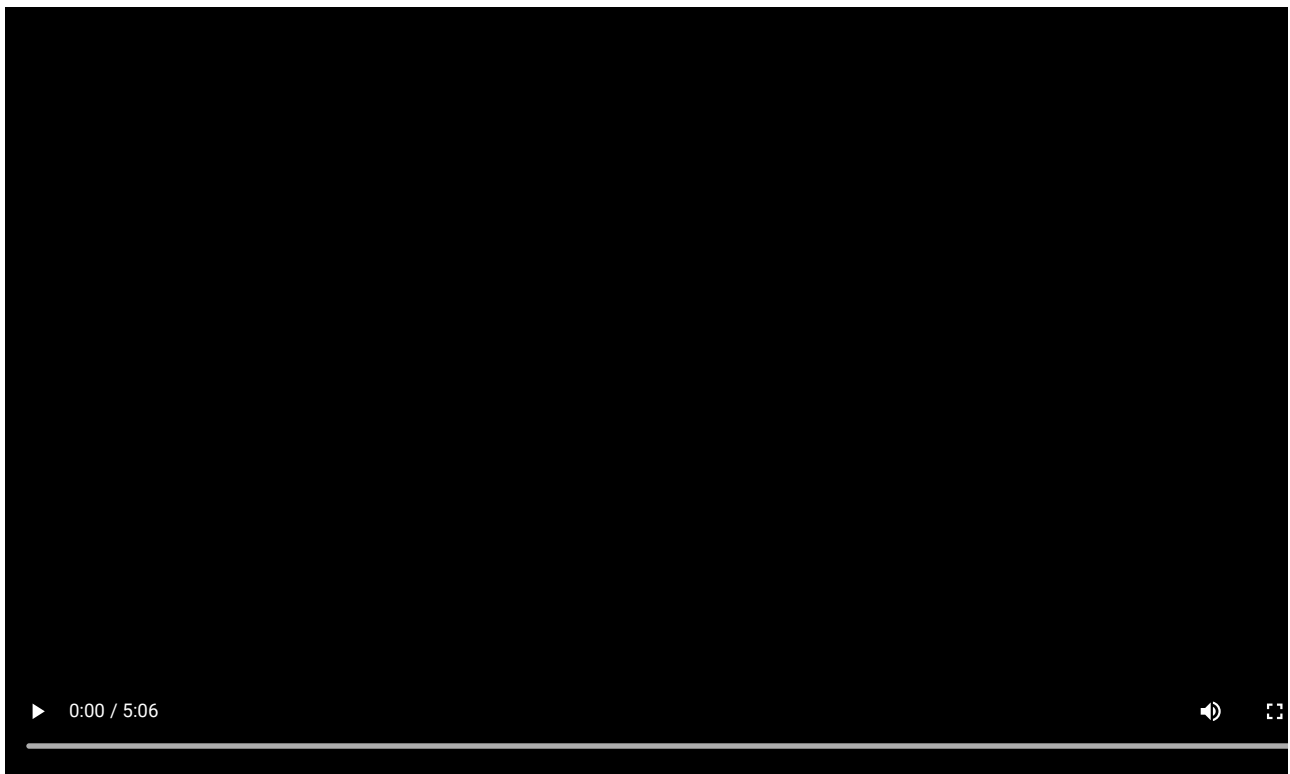
▼ root@armadillo:/debug/04_practice# ./tpevent2

```
1 root@armadillo:/debug/04_practice# ./tpevent2
2 x: 18 y: 11 p: 255
3 x: 18 y: 11 p: 0
4 x: 777 y: 10 p: 255
5 x: 777 y: 10 p: 0
6 x: 9 y: 452 p: 255
7 x: 9 y: 452 p: 0
8 x: 786 y: 452 p: 255
9 x: 786 y: 452 p: 0
10 x: 786 y: 452 p: 255
11 x: 786 y: 452 p: 0
12 x: 786 y: 452 p: 255
13 x: 786 y: 452 p: 0
14 x: 786 y: 452 p: 255
15 x: 786 y: 452 p: 0
16 x: 786 y: 452 p: 255
17 x: 786 y: 452 p: 0
```

実行している様子

▼ tpevent2 を実行している様子

<https://youtu.be/FLKHKoy0Zwc>



1.7. 課題2 tpstamp

パネル上をタッチした位置にビットマップ画像を表示



1.7.1. ソース

tpstamp.c

▼ 09.touchpanel/tpstamp.c

```

#include <stdio.h>
#include <stdlib.h>
#include <fcntl.h>
#include <sys/mman.h>
#include <string.h>
#include <unistd.h>
#include <tslib.h>

// イベントデバイスファイル。
#define DEV_FILE      "/dev/input/event1"
#define IMG_FILE      "stamp.bmp"

// LCDの情報。
#define SCREENWIDTH   800
#define SCREENHEIGHT  480
#define SCREENSIZE    (SCREENWIDTH * SCREENHEIGHT * 4)
#define RGB888(r, g, b) ( r << 16 | g << 8 | b)

// ビットファイルヘッダ構造体の宣言。
typedef struct tagBITMAPFILEHEADER{
    unsigned short  bfType;
    unsigned long   bfSize;
    unsigned short  bfReserved1;
    unsigned short  bfReserved2;
    unsigned long   bfOffBits;
} __attribute__((packed)) BITMAPFILEHEADER;

// ビットマップ情報ヘッダ構造体の宣言。
typedef struct tagBITMAPINFOHEADER{
    unsigned long   biSize;
    long            biWidth;
    long            biHeight;
    unsigned short  biPlanes;
    unsigned short  biBitCount;
    unsigned long   biCompression;
    unsigned long   biSizeImage;
    long            biXPixPerMeter;
    long            biYPixPerMeter;
    unsigned long   biClrUsed;
    unsigned long   biClrImporant;
} __attribute__((packed)) BITMAPINFOHEADER;

// ビットマップ画像を描画する処理。
// PFB : フレームバッファへのポインタ
// bmpdata : 画像データへのポインタ
// w : 画像の幅
// h : 画像の高さ
// x : は、画像のx座標
// Y : 画像のy座標
//
void draw_bmp(unsigned int *pfb, unsigned char *bmpdata, int w, int h, int x, int y)
{
    int x0 = x;
    int x1 = x0 + w;
    int y0 = y;
    int y1 = y0 + h;
    int padding = w % 4;
    int c = 0;
    unsigned char r, g, b;
    int xx, yy;

    for(yy = y1 - 1; yy >= y0; yy--){
        for(xx = x0; xx < x1; xx++){

```

```

        b = bmpdata[c++];
        g = bmpdata[c++];
        r = bmpdata[c++];
        if (xx >= 0 && xx < SCREENWIDTH
            && yy >= 0 && yy < SCREENHEIGHT)
            pfb[yy * SCREENWIDTH + xx] = RGB888(r, g, b);
    }
    c += padding;
}

}

int main(int argc, char **argv) {
    int fd_in, fd_fb;
    int ret;
    unsigned int *pfb;
    unsigned char *bmpdata;
    int datasize;
    int x, y;
    struct tsdev *ts;
    struct ts_sample samp;
    int enable = 1;

    struct bmpheader_t{
        BITMAPFILEHEADER fh;
        BITMAPINFOHEADER ih;
    } bmp;

    // イメージファイルをオープンします。できなかった場合、エラー終了します。
    if ((fd_in = open(IMG_FILE, O_RDONLY)) < 0) {
        perror("open(file)");
        return 1;
    }

    // イメージファイルのヘッダ情報を読み込みます。できなかった場合、エラー終了します。
    if (read(fd_in, &bmp, sizeof(bmp)) != sizeof(bmp)){
        perror("read(file)");
        return 1;
    }

    // 読み込んだイメージファイルがビットマップ形式と異なったり、
    // ファイルサイズなどが想定と異なる場合、エラー終了します。
    if (bmp.fh.bfType != 0x4d42 || bmp.ih.biBitCount != 24
        || bmp.ih.biCompression != 0 || bmp.ih.biHeight < 0){
        fprintf(stderr, "unsupported bitmap format\n");
        return 1;
    }

    // 読み込んだイメージファイルの画像の幅と高さが設定値と異なる場合、エラー終了します。
    if (bmp.ih.biWidth > SCREENWIDTH || bmp.ih.biHeight > SCREENHEIGHT){
        fprintf(stderr, "image size too big\n");
        return 1;
    }

    // 読み込んだイメージファイルのヘッダをなくしたサイズを計算します。
    datasize = bmp.fh.bfSize - sizeof(bmp);
    // 計算したサイズで動的にメモリを確保します。できなかった場合、エラー終了します。
    if (!(bmpdata = malloc(datasize))){
        perror("malloc");
        return 1;
    }

    // イメージファイルをヘッダをなくしたサイズで読み込みます。
    // できなかった場合、確保したメモリを開放し、エラー終了します。
    if (read(fd_in, bmpdata, datasize) != datasize){
        perror("read(file)");
    }
}

```

```

        free(bmpdata);
        return 1;
    }

    // イメージファイルをクローズします。
    close(fd_in);

    // タッチパネルデバイスをオープンします。(tslib使用)
    ts = ts_open(DEV_FILE, 0);
    // ファイルがオープンできなかった場合、エラー終了します。
    if (!ts){
        perror("ts_open");
        return 1;
    }

    // 設定ファイルを読み込みます。(tslib使用)
    ret = ts_config(ts);
    // 設定ファイルが読み込めなかった場合、エラー終了します。
    if (ret){
        perror("ts_config");
        return 1;
    }

    // LCDデバイスファイルをオープンします。できなかった場合、エラー終了します。
    if ((fd_fb = open("/dev/fb0", O_RDWR)) < 0) {
        perror("open(fb)");
        free(bmpdata);
        return 1;
    }

    // LCDデバイスファイルをメモリにマップします。できなかった場合、エラー終了します。
    pfb = mmap(0, SCREENSIZE, PROT_READ|PROT_WRITE, MAP_SHARED, fd_fb, 0);
    if (pfb == MAP_FAILED){
        perror("mmap");
        free(bmpdata);
        return 1;
    }

    // SCREENSIZE分だけ0xffでメモリ領域を埋め、初期化します。
    memset(pfb, 0xff, SCREENSIZE);

    // イベント内容を表示する処理。(tslib使用)
    for(;;){
        // イベントを取得します。
        ret = ts_read(ts, &samp, 1);
        // イベントを取得できなかった場合、エラー終了します。
        if (ret < 0){
            perror("ts_read");
            return 1;
        }

        // 取得したイベント数が1でないなら処理を繰り返します。
        if (ret != 1)
            continue;

        // 次にタッチされたときビットマップ画像を描画するための処理をします。
        if (samp.pressure == 0){
            enable = 1;
            continue;
        }

        // タッチされたときビットマップ画像を描画します。
        if (enable){
            draw_bmp(pfb, bmpdata, bmp.ih.biWidth, bmp.ih.biHeight, samp.x - bmp.ih.biWidth / 2, samp.y - bmp.ih.biHeight / 2);
            enable = 0;
        }
    }
}

```



```

195     }
196 }
197
198 // タッチパネルデバイスをクローズします。
199 ts_close(ts);
200 // LCDデバイスファイルをメモリからアンマップします。
201 munmap(pfb, SCREENSIZE);
202 // LCDデバイスファイルをクローズします。
203 close(fd_fb);
204 // 確保したメモリを開放します。
205 free(bmpdata);
206
207 return 0;
208 }
209

```

Makefile

▼ 09.touchpanel/Makefile

```

1  CC = arm-linux-gnueabi-gcc
2  #TARGET = tpevent tpevent2 tpstamp
3  TARGET = tpstamp
4  CFLAGS = -I/work/linux/nfsroot/usr/local/include -gdwarf-2 -O0
5  LDFLAGS = -L/work/linux/nfsroot/usr/local/lib
6  LIBS = -lts
7
8  all: $(TARGET)
9
10 tpevent: tpevent.c
11     $(CC) -o $@ $^ $(CFLAGS) $(LDFLAGS) $(LIBS)
12
13 tpevent2: tpevent2.c
14     $(CC) -o $@ $^ $(CFLAGS) $(LDFLAGS) $(LIBS)
15
16 tpstamp: tpstamp.c
17     $(CC) -o $@ $^ $(CFLAGS) $(LDFLAGS) $(LIBS)
18
19 install :
20     cp -p $(TARGET) /work/linux/nfsroot/debug/04_practice
21     cp -p $(TARGET) /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
22     cp -p $(TARGET).c /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
23     cp -p ./*.bmp /work/linux/nfsroot/debug/04_practice
24     cp -p ./*.bmp /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
25
26 clean:
27     rm -f $(TARGET)
28
29 .PHONY: clean

```

1.7.2. 動作確認

make clean

▼ \$ make clean

```

1  atmark@atde8:/media/sf_ArmadilloX1/hwpwm/work/R06_2024/Application_debug/text/practice-example/09.touchpanel$ make
2  rm -f tpstamp

```

make

▼ \$ make

```

1 | atmark@atde8:/media/sf_ArmadilloX1/hwpwm/work/R06_2024/Application_debug/text/practice-example/09.touchpanel$ mak
2 | arm-linux-gnueabi-gcc -o tpstamp tpstamp.c -I/work/linux/nfsroot/usr/local/include -gdwarf-2 -O0 -L/work/linux/

```

sudo make install

▼ \$ sudo make install

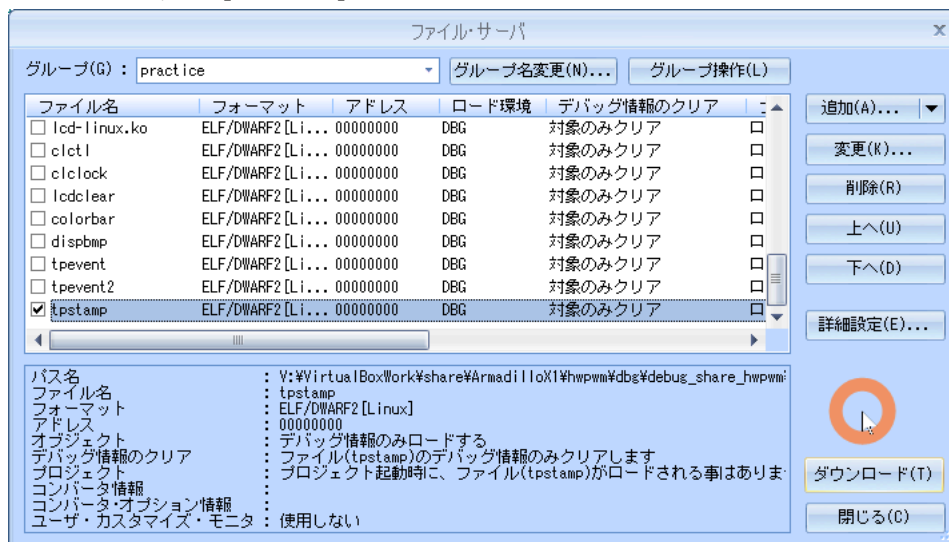
```

1 | atmark@atde8:/media/sf_ArmadilloX1/hwpwm/work/R06_2024/Application_debug/text/practice-example/09.touchpanel$ sud
2 | [sudo] atmark のパスワード:
3 | cp -p tpstamp /work/linux/nfsroot/debug/04_practice
4 | cp -p tpstamp /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
5 | cp -p tpstamp.c /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice
6 | cp -p ./*.bmp /work/linux/nfsroot/debug/04_practice
7 | cp -p ./*.bmp /media/sf_ArmadilloX1/hwpwm/dbg/debug_share_hwpwm/R06_2024/04_practice

```

CSIDEでロード

▼ メニュー「ファイル」-「ロード」



キャリブレーション (割愛)

実行

▼ root@armadillo:/debug/04_practice# ./tpstamp

```

1 | root@armadillo:/debug/04_practice# ./tpstamp
2 | ^C
3 | root@armadillo:/debug/04_practice#

```

実行している様子

▼ tpstamp を実行している様子

<https://youtu.be/Wg5nwXQLsmw>

