



Application Note

AN_311

FT800 Demo Application - Absolute & Relative Dials

Version 1.0

Issue Date: 2014-03-25

This document is to introduce the setup of a Sample Application running on MSVC. The objective of the Sample Application is to enable users to become familiar with the usage of the FT800, the design flow, and display list used to design the desired user interface or visual effect.

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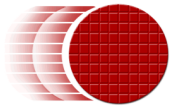
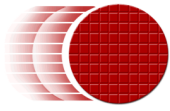


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1 Introduction

This application demonstrates interactive Absolute and Relative dials using points, track and button commands on an FT800 platform.

The Absolute dial user interactive function involves moving the knob around from its minimum to maximum position, while playing sound. This dial can be activated by enabling the following define statement in "FT_Platform.h". Absolute Dial is enabled by default.

```
#define Absolute Dial
```

The Relative dial user interactive function involves moving the knob, while playing sound which increases or decreases in volume. This dial can be activated by enabling the following define statement in "FT_Platform.h"

```
#define Relative Dial
```

It is not possible to enable both modes at the same time.

1.1 Overview

The document will present a basic understanding of the FT800 CPU features Track, Points and Buttons commands.

1.2 Scope

This document will be used by software programmers to develop GUI applications by using FT800 with any MCU via SPI .



2 Application Flow

2.1 Absolute Dial Flowchart

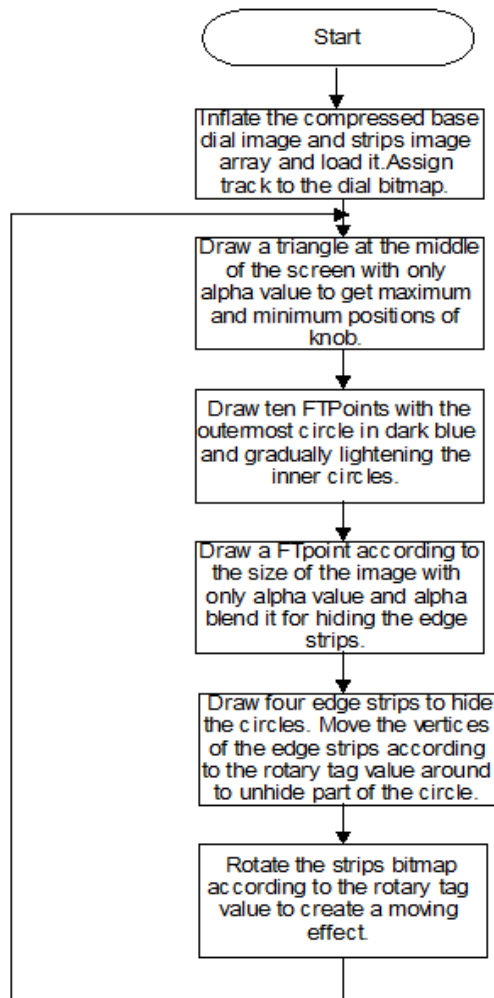
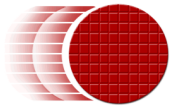


Figure 2-1 Absolute Dial Flowchart



2.2 Relative Dial Flowchart

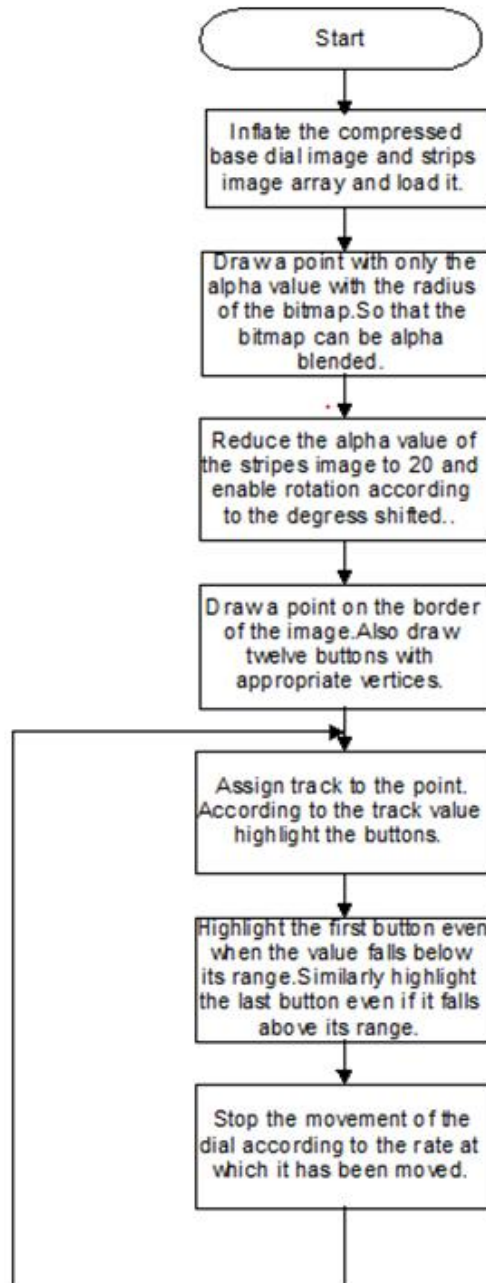
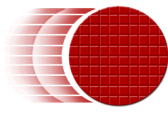


Figure 2-2 Relative Dial Flowchart



3 Description

Parameters needed to be initialized are described below before constructing the display list.

3.1 Initialization

3.1.1 Download Bitmaps

The bitmaps are downloaded into the desired FT800 memory locations. The bitmap handles are also assigned here.

Note: After these configurations are set, swap the display list and flush into the Graphics Co-Processor memory.

3.1.2 Set the Tracker Properties to Point Using CMD_TRACK

In the Function

```
Ft_Gpu_CoCmd_Track(phost,240, 136, 1, 1, tagval);
```

where 'tagval'– Tag value of the white circle.

A w and h of (1,1) means that the tracker is rotary, and reports an angle value in REG_TRACKER.

3.2 Functionality

3.2.1 Absolute Dial

The Absolute Dial demo has been designed to work like a volume dial.

In this demo, the knob has to be moved according to the minimum or maximum limit on its position.

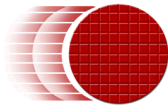
Before the demo is started, the info screen is displayed with information. When the play button is pressed, the absolute dial demo is started.

3.2.1.1 Output of the Dial

Ten FTpoints are drawn with the outermost circle in dark colour, gradually lightening the inner circles to have a glowing effect.

The Dial is rotated with minimum and maximum positions. When the dial is moved away from its initial position, the circles are unhidden to show the output.

In the dial, the bottom part of the FTPOINTS should not be seen. So an edge strip is used to get the triangle shape with only its alpha value. Stencil functions are used to mask the bottom part of the Points as shown in the code below.



```
Ft_App_WrCoCmd_Buffer(phost, COLOR_MASK(0,0,0,1) );//only alpha is
enabled,so that no color is used for strip
Ft_App_WrCoCmd_Buffer(phost, LINE_WIDTH(1*16));
Ft_App_WrCoCmd_Buffer(phost, STENCIL_OP(INCR,DECR) );
Ft_App_WrCoCmd_Buffer(phost, STENCIL_FUNC(EQUAL,0,255) );
Ft_App_WrCoCmd_Buffer(phost, BEGIN(EDGE_STRIP_B));
Ft_App_WrCoCmd_Buffer(phost, COLOR_RGB(136 ,136 ,136));

Ft_App_WrCoCmd_Buffer(phost, VERTEX2II(Tx1,FT_DispHeight,0,0));
Ft_App_WrCoCmd_Buffer(phost, VERTEX2II(Tx2,Ty2,0,0));
Ft_App_WrCoCmd_Buffer(phost, VERTEX2II(Tx3,FT_DispHeight,0,0));

Ft_App_WrCoCmd_Buffer(phost, STENCIL_OP(KEEP,INCR) );
Ft_App_WrCoCmd_Buffer(phost, STENCIL_FUNC(NOTEQUAL,255,255) );
Ft_App_WrCoCmd_Buffer(phost, COLOR_MASK(1,1,1,1) );//enable all colors
```

3.2.1.2 Edge Strips

Four edge strips are drawn. The first is from the left, second from above, third from the right, fourth is from below. The edge strips are drawn according to the vertices that need to be hidden. The edge strips are moved around according to the rotary tag value to unhide the FTpoints that are drawn.

3.2.1.3 Blend the bitmap

Place the dial bitmap. On top of it place another bitmap like the one shown below. Rotate this bitmap whenever the dial is moved to give an effect that the dial is rotating.

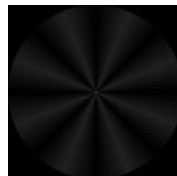


Figure 3-1 Strips Dial Bitmap

Reduce the alpha value of the strips bitmap to 20 and rotate it according to the rotary value.

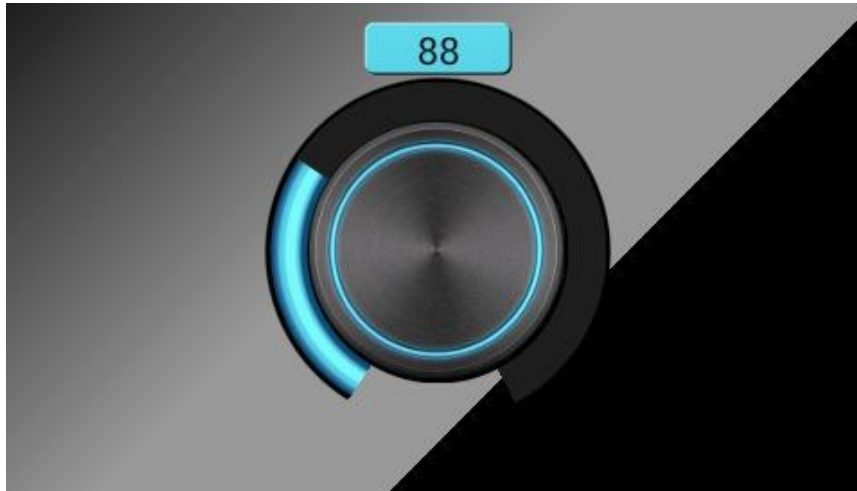


Figure 3-2 Absolute Dial Screen

3.2.2 Relative Dial

The Relative Dial demo has been designed to work like a volume dial.

In this demo, the knob can be moved without any minimum or maximum limit on its position. The rate at which the knob is rotated determines the velocity at which the knob will stop its movement.

Before the demo is started, the info screen is displayed with info. When the play button is pressed, the relative dial demo is started.

3.2.2.1 Movement of the Dial

The Dial is rotated according to the rate at which it has been moved. So after the dial is rotated and pen-up has been done the knob reaches its minimum value by slowly reducing its speed. Velocity calculations are done in the MCU, not the FT800.

3.2.2.2 Button Highlight

There are twelve buttons above the dial. The buttons are highlighted according to the track movement of the dial as shown in the code below.

```
if(BaseTrackVal < 11*65535)/* BaseTrackVal is the track value of the dial*/
{
    /* Rotary tag when within range of particular index, highlight only the indexed
    button in yellow*/
    if(((BaseTrackVal >= k*65535)&&(BaseTrackVal < (k+1)*65535)
    {
        Ft_Gpu_CoCmd_FgColor(phost,0xE3F914);/*yellow
        Ft_Gpu_CoCmd_Button(phost,Vx1,Vy1,20,30,16,0,"");
    }
    else/* Color the non indexed buttons in grey color*/
    {
        Ft_Gpu_CoCmd_FgColor(phost,0x787878);/*grey
        Ft_Gpu_CoCmd_Button(phost,Vx1,Vy1,20,30,16,0,"");
    }
}
```




3.2.2.3 Bitmaps Rotation

The dial bitmap is placed at a specific location. The strips bitmap alpha value is reduced to 20 and it is rotated according to the value at which it has been rotated.

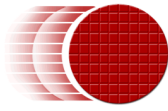
```
Ft_Gpu_CoCmd_LoadIdentity(phost);  
Ft_Gpu_CoCmd_Translate(phost,F16(73),F16(73));  
Ft_Gpu_CoCmd_Rotate(phost,PrevValDeg*65536/360);  
Ft_Gpu_CoCmd_Translate(phost,F16(-(73)),F16(-(73)));  
Ft_Gpu_CoCmd_SetMatrix(phost);  
Ft_App_WrCoCmd_Buffer(phost,TAG(1));  
Ft_App_WrCoCmd_Buffer(phost,VERTEX2II((CircleX - 146/2)+40,CircleY -  
146/2,0,0));
```

3.2.2.4 Audio

Audio is played according to the volume that is selected. The Carousel effect (08H) is played continuously.



Figure 3-3 Relative Dial Screen



4 Contact Information

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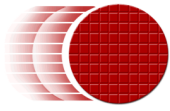
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Appendix A – References

Document References

[FT800 Embedded Video Engine Datasheet](#)

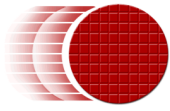
[FT800 programmer guide](#)

[Datasheet for VM800B](#)

[Datasheet for VM800C](#)

Acronyms and Abbreviations

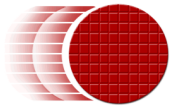
Terms	Description
Arduino Pro	The Open Source platform variety based on the Atmel ATmega chipset
EVE	Embedded Video Engine
SPI	Serial Peripheral Interface
UI	User Interface



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Appendix C – Revision History

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Revision	Changes	Date
1.0	Initial Release	YYYY-MM-DD
1.0	Revised according to comments	2014-03-20