Application Note

AN_423

AN_424_FT_App_RotaryDial

Version 1.0

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This document describes the operation of Rotary Dial Demo Application running on Visual Studio. The objective of the demo applications and this document is to help users to become familiar with FT8xx commands and display lists to create visual effects.

Table of Contents

1 Introduction

This application demonstrates an interactive Rotary Demo using points, track, and stencil commands based on an FT8xx platform.

The user interactive functions involve moving the dial around until the finger stop button, along with the playing of sounds while dialling the numbers. DTMF sounds are played for the numbers that are dialled when the Call button is pressed. A Reject/Cancel Call button clears the numbers that are dialled.

1.1 Overview

The project delivers a basic understanding of the usage of FT8xx track, stencil, and point commands.

For information on the Project file, and Source code building refer to [AN_391 EVE Platform Guide](). Scope

This document will be used by software programmers to develop GUI applications using FT8xx devices with any MCU via SPI.

2 Application Flow

2.1 Flowchart
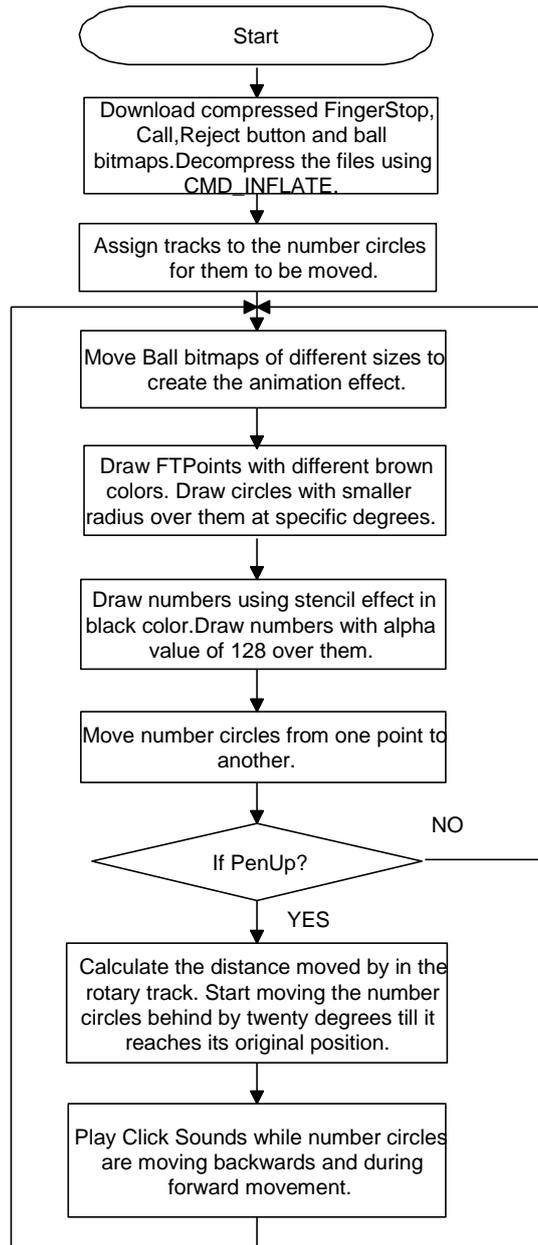
Figure 2.1-1 Flowchart

3 Description

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

3.1 Initialization

3.1.1 Calculate the vertices

Calculate the vertices where the fonts 0 to 9 have to be placed. The fonts are placed beginning from fifty degrees to three hundred twenty degrees at an interval of thirty degrees.

3.1.2 Calculate the background balls offsets and rates

The offsets and rates of the forty background balls are calculated and stored in an array.

3.1.3 Set the tracker properties to circles using CMD_TRACK

(Refer to the Programming Guide).

/* 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.

(Refer to the Programming Guide).

3.1.4 Download the Bitmaps

The bitmaps are downloaded onto the desired locations. The bitmap handles are also assigned here.

Note: After these configurations are set, swap the display list and flush into the J1 Memory.

3.2 Functionality

The Rotary Dial demo has been designed to look like a rotary phone. So it has the functions of the phone.

In this demo, the numbers on the phone can be moved from their original position to the location of the Finger Stop image. When any number has been moved to its Finger Stop area, the number has been considered dialled. The dialled number is shown in the centre of the screen and it's also updated on the button which is present in the top of the screen.

The numbers that are seen on the button are stored in an array.

The Demo has three user interactive parameters,

1. Dial the numbers.

2. Place a Call.

3. Reject/Cancel Call.

Before the demo is started, the info screen is displayed with info as shown in the pic below (Figure 3.2-1 Info Screen). When the play button is pressed, the rotary dial demo is started.
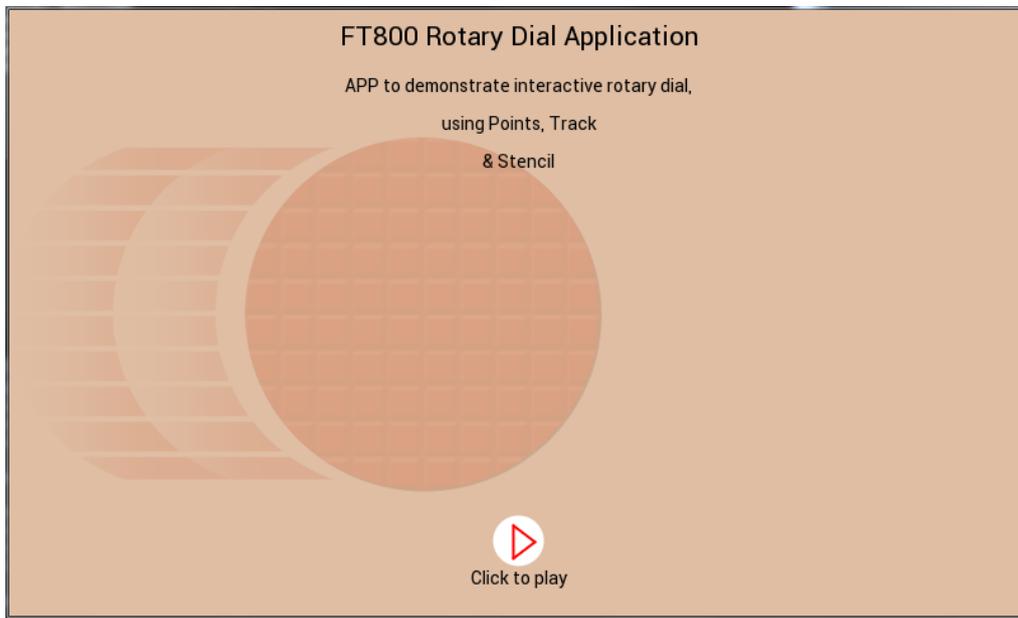
Figure 3.2-1 Info Screen

3.2.1 Draw Circles and assign tracks and tags

The circles are drawn using the FTPOINTS. Draw circles with specific colours for the two main base colours. Draw circles around the main base circles with 24 pixel difference in vertices for a 3D effect. By using the register, REG_TRACKER the rotary position can be read. By using the register, REG_TOUCH_TAG, the tag values can be read.

The white circles are placed above the point at an interval of 30 degrees. The track is assigned to each of the white circles. Based on the maximum track value, their movement is clipped at the finger stop location. Tag values are assigned to each of the white circles.
/ In the Function*/*

```
Ft_Gpu_CoCmd_Track (phost, 240, 136, 1, 1, 1);
Where 240 is the Xvalue, 136 is the Yvalue, 1 is the width, and height for rotary track,
1 is the tag value.

Tagcheck = Ft_Gpu_Hal_Rd8 (phost, REG_TOUCH_TAG);
RotaryTag = Ft_Gpu_Hal_Rd32 (phost, REG_TRACKER);
CurrTh = (ft_int16_t) ((RotaryTag >> 16) & 0xffff);
```

3.2.2 Movement of the Number Circles

As the individual number circles are assigned tracks, the distance of the white circle is calculated based on the track value. The distance is converted to degrees for a precise location calculation. The anticlockwise movement of the white circles is stopped based on the Pen Up and track value.

When the number circle that has been touched and moved to the finger stop position, the number that has been dialled is shown in the centre of the screen and also updated on the button in the top of the screen.

3.2.3 Set the Stencil Parameters

Set the stencil properties using STENCIL_FUNC for the numbers that are placed inside the circles. Stencil values are incremented for each of the white circles beginning from one. The Numbers with the default alpha values are placed inside the circles. The Alpha value is reduced to 128 and the numbers are overwritten inside the circles.

 /* In the Function*/

```
Ft_App_WrCoCmd_Buffer (phost, STENCIL_FUNC (GEQUAL, 1,255));
Ft_App_WrCoCmd_Buffer (phost, COLOR_RGB (0, 0, 0));
Ft_App_WrCoCmd_Buffer (phost, BEGIN (BITMAPS));
Ft_App_WrCoCmd_Buffer (phost, STENCIL_OP (KEEP, KEEP));
Ft_App_WrCoCmd_Buffer (phost, STENCIL_FUNC (ALWAYS, 0,255));
Ft_App_WrCoCmd_Buffer (phost, COLOR_A (128));
```

3.2.4 Play the Sounds

Play the click sound during the circles movement back & forth. Also, DTMF sounds are played at an interval of 80ms for the Mark and Space effect when the Dial button is pressed.

/* In the Function*/

```
Ft_Gpu_Hal_Wr8(phost, REG_VOL_SOUND,0xFF);
Ft_Gpu_Hal_Wr16(phost, REG_SOUND,0x51);//switch sound
Ft_Gpu_Hal_Wr8(phost, REG_PLAY,1);
```

3.2.5 Decompress the compressed zlib files

The raw files are compressed to zlib format to reduce the file size. Using the CMD_INFLATE, the zlib files are decompressed which are in an array.

/* In the Function*/

Ft_Gpu_Hal_WrCmd32 (phost, CMD_INFLATE);
Ft_Gpu_Hal_WrCmd32 (phost, 0);

Assign Bitmap handles and place the image at the required vertices.
Ft_App_WrCoCmd_Buffer (phost, BITMAP_HANDLE (1));
Ft_App_WrCoCmd_Buffer (phost, BITMAP_SOURCE (0));
Ft_App_WrCoCmd_Buffer (phost, BITMAP_LAYOUT (Format, Stride, Height));
Ft_App_WrCoCmd_Buffer (phost, BITMAP_SIZE (NEAREST, BORDER, BORDER, Width, Height));
Ft_App_WrCoCmd_Buffer (phost, VERTEX2II (0,0,1,0));

3.2.6 Background Animation

A Ball Bitmap of four different sizes as shown (in the picture below) is used for animation. Forty balls are moving around with their vertices being plotted using the ft_random() function to generate random values.
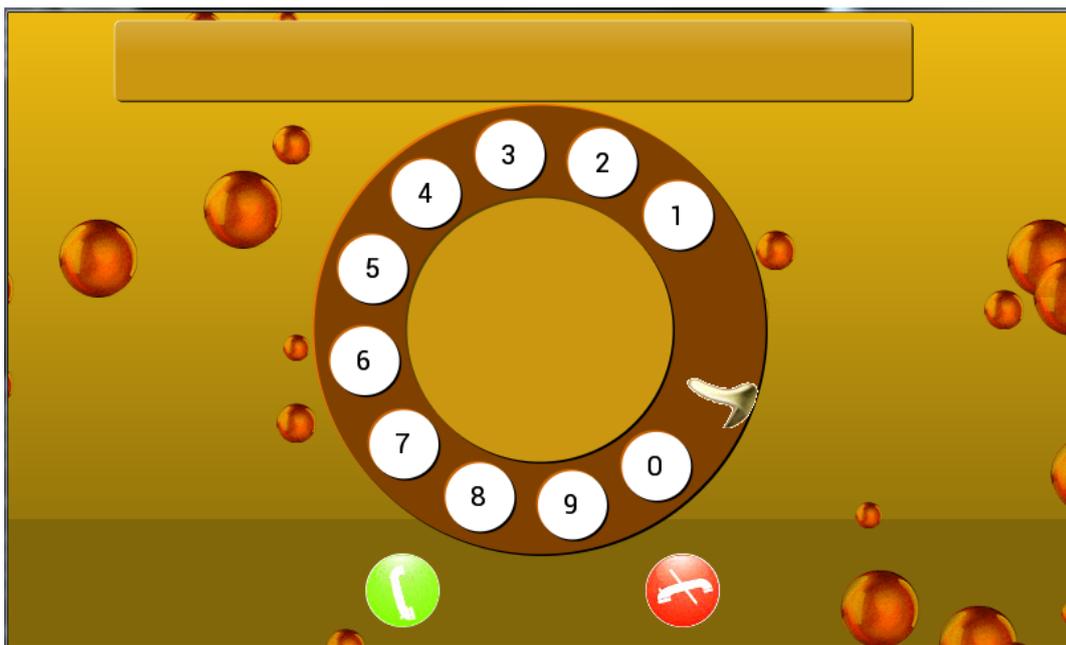
Figure 3.2-2 Rotary Dial Screenshot

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Appendix A– References

Document References

FT800 Embedded Video Engine Datasheet
FT81x Embedded Video Engine Datasheet
FT800 Programmer guide
FT81x Programmer guide
Project sources

Acronyms and Abbreviations

Terms	Description
Arduino Pro	The open source platform variety based on ATMEL's ATMEGA chipset
EVE	Embedded Video Engine
SPI	Serial Peripheral Interface
UI	User Interface
USB	Universal Serial Bus

Appendix B – List of Tables & Figures

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Appendix C– Revision History

Document Title: AN_424_FT_App_RotaryDial

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Clearance No.:   FTDI#515

Product Page: http://www.ftdichip.com/FTProducts.htm

Document Feedback: Send Feedback

Revision	Changes	Date
1.0	Initial Release	2016-11-03

Revision History

(Internal use only, please clearly state all changes here before saving the file)

Revision	Date YYYY-MM-DD	Changes	Editor
Draft	2013-07-18	Initial draft release	prabhakaran.d
Draft	2013-08-21	Version 1.0 updated with respect to review comments	
Draft	2013-09-27	Formatting headers/footers	G Lunn
Draft	2013-11-01	Approved LCE/DS	G Moore
Draft	2016-07-19	Adjusted header, footer, title page and revision history page (this page) to reflect the format in gradient demo application note Changed the camera captured photos by Emulator generated screen shots Grammar check carried out.	Rashmi
Draft	2016-10-21	Reviewed Grammar edits Corrected contact details Some comments to be closed	G Lunn
Draft	2016-10-24	Comments actioned Recommend for approval	G Lunn
1.0	2016-11-03	Formatted the document as per application note template standards; Modified the document reference number Approved LCE	L Subramanian