Application Note

AN_382

FT800 Metaballs Application

Version 1.0

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This application note is to introduce the Metaballs Demo Application running on both MSVC, Arduino and FT9XX. The objective of the Demo Application is to enable users to become familiar with the usage of the FT8XX, the design flow, and display list used to design the desired user interface or visual effect.

Bridgetek Pte Ltd (BRTChip)
178 Paya Lebar Road, #07-03, Singapore 409030
Tel: +65 6547 4827 Fax: +65 6841 6071
Web Site: http://www.brtchip.com

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1 Introduction

This application demonstrates the usage of graphics primitives such as points and bitmaps.

In this application, 80 random balls and three background fireball are drawn. The fireball is generated by additive colour blending 80 Random balls of different sizes are generated with the primitives "POINTS".

The MCU continuously monitors the touch. If the user touches the screen, the base of the ball origin is changed.

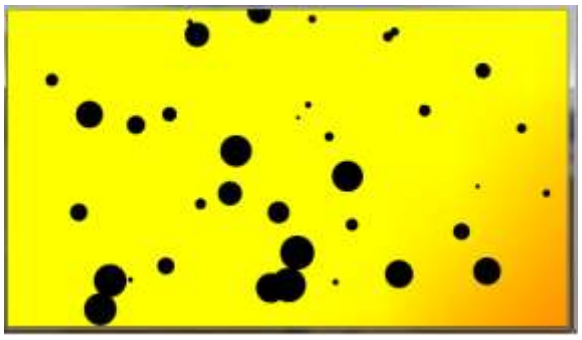

Figure 1 - Metaball Snapshot

1.1 Overview

The application will be useful to understand the FT8XX Primitives Points, Blend function, and Bitmap. Also the application will be useful to understand the concept of additive blending.

This example demonstrates that in addition to providing an attractive graphical user interface for an application, the FT8xx's tracking features can be used to allow this to be manipulated interactively by the user.

1.2 Scope

This document can be used by designers to develop GUI applications by using the FT8xx with an SPI host. In this case, a PC running Visual Studio (C++) with a C232HM cable is used as the SPI master. Arduino, FT8XX emulator and FT9XX platforms are also supported.

It covers the following topics:

- Brief overview of the Metaball demonstration
- Application code flow including FT8xx initialization and Metaball code
- Description of the Metaball function within the application
- Running the demonstration code

Additional documentation can be found at http://brtchip.com/eve/.

2 Design Flow

2.1 Initialization

Every EVE design follows the same basic principles as highlighted in Figure 3.1. After configuring the SPI Host itself (such as the PC through the C232HM cable, or an MCU), the application will wake up the FT8XX and write to the registers in the FT8XX to configure.

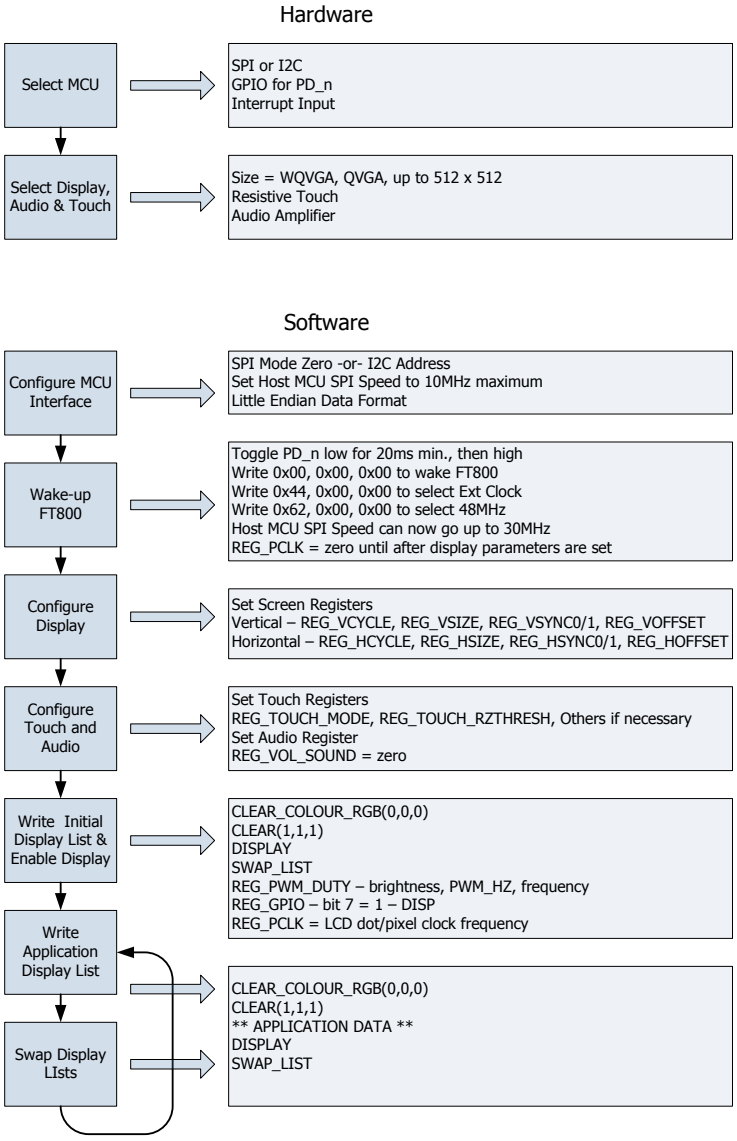

Figure 2 - Generic EVE Design Flow

2.2 Application Flow

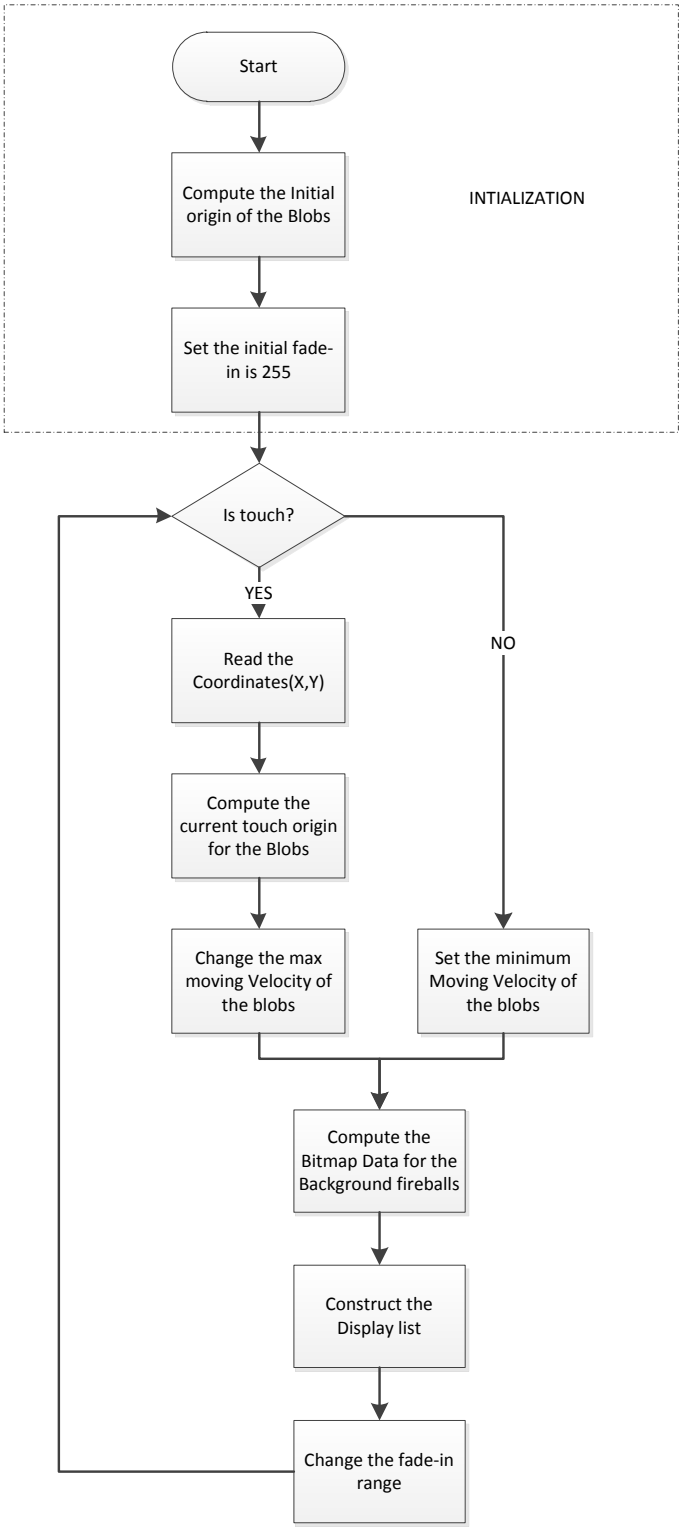

Figure 3 – Application Flow Chart

3 Description

Refer to AN_391_EVE_Platform_Guide for information pertaining to platform setup and the necessary development environment.

3.1 Application Start Screen

Upon setting up the platform, the start-up screen will be displayed.

Figure 4 – Application Start Screen

3.2 Functionality

This application starts up with an animation of moving metaballs. When user drags finger on the screen, the velocity of the balls will be increased. And the center of the moving area is the touch point of the screen.

While no touching is detected, the center is

```
	centerx = DispWidth * 16 / 2;
	centery = DispHeight * 16 / 2;
If touching is detected, then
	sx = Gpu_Hal_Rd16(phost,REG_TOUCH_SCREEN_XY + 2);
	sy = Gpu_Hal_Rd16(phost,REG_TOUCH_SCREEN_XY);
	centerx = 16 * sx;
	centery = 16 * sy;
```

The velocity is 4 times faster when touch is detected.

```
VEL = touching ? 8 : 2;
```

Here is the code to control the ball velocity and moving range.

```
{
for (tval=0; tval<numBlobs; ++tval)
    {
       if (blobs[tval].x < centerx)   blobs[tval].dx += VEL;
       else blobs[tval].dx -= VEL;
       if (blobs[tval].y < centery)   blobs[tval].dy += VEL;
       else blobs[tval].dy -= VEL;
      blobs[tval].x += blobs[tval].dx << 3;
      blobs[tval].y += blobs[tval].dy << 3;
    }
    blobs[random(numBlobs)].dx = v();
    blobs[random(numBlobs)].dy = v();
    for (tval1 = 0; tval1 < h; tval1++)
    {
      for (tval2 = 0; tval2 < w; tval2++)
      {
       m = fadein;
       for (tval = 0; tval < 3; tval++)
       {
         bx = blobs[tval].x >> 8;
         by = blobs[tval].y >> 8;
         dx = bx - tval2;
         dy = by - tval1;
          d = SQ(dx) + SQ(dy);
         m += recip[min(d >> 2, recipsz - 1)];

       }

       }

     }
```

4 Running the Demonstration Code

This example is shown when running on a PC with Visual Studio (C++) installed. The FT8XX development module (VM800B/VM800C) is connected to the PC using the C232HM cable which acts as a USB to SPI converter.

SCK	ORANGE
MOSI	YELLOW
MISO	GREEN
CS#	BROWN
PD#	BLUE
GND	**BLACK**

Table 1 - CM232H Connections to the VM800 Pins

The code can now be compiled and run. The debug button can be used to start the application.

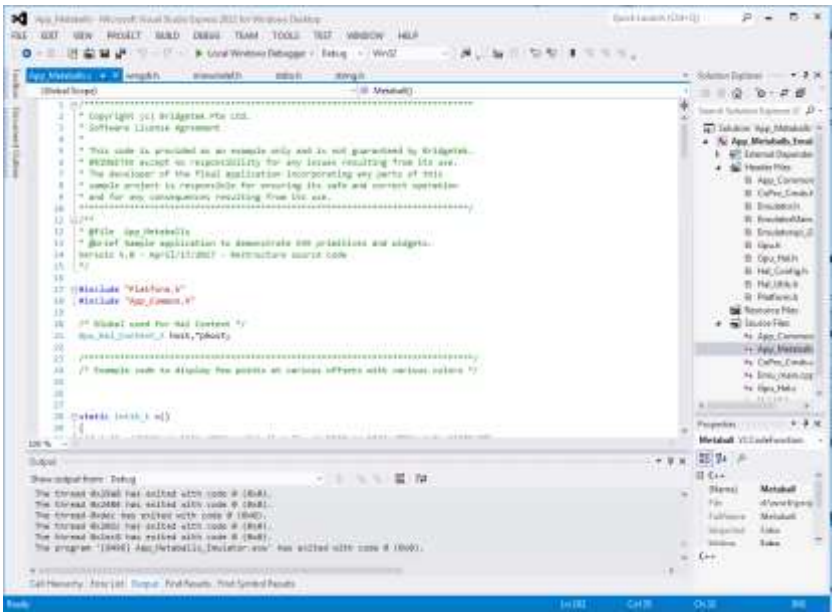

Figure 5 - Visual Studio Screenshot

Alternatively the FT9XX platform is also supported for this application. Upon installing the Toolchain "Eclipse for FT90X", users can import the project into the workspace. Please refer to figure 8.

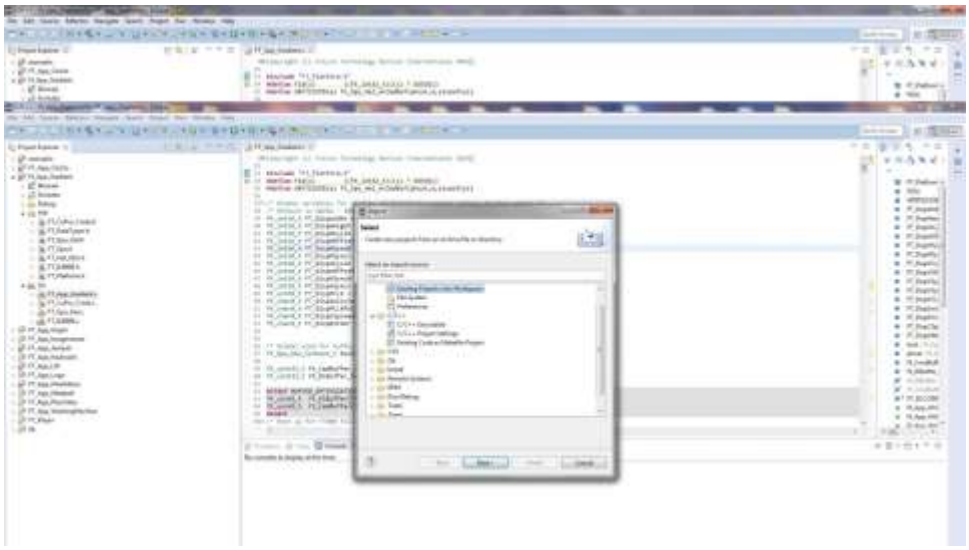

Figure 6 - Eclipse for FT90X Screenshot

The code can be compiled and generate a '.bin' file, which can be downloaded to the FT900 board with a UMFTPD2A module. Please refer to figure 9 given below -

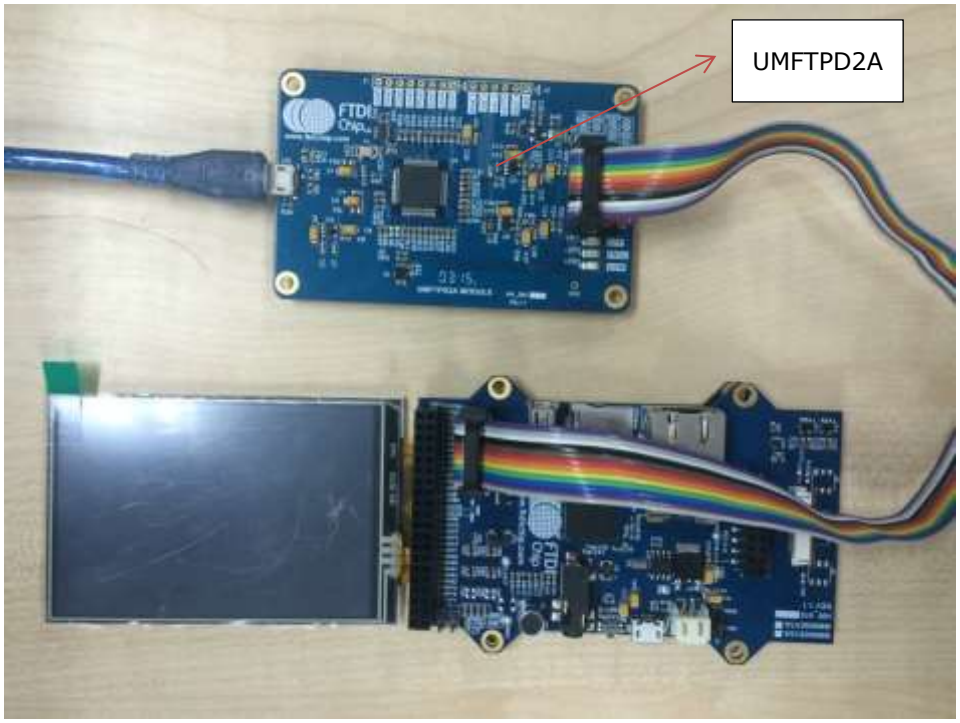

Figure 7 - Connections between MM900EV2A & UMFTPD2A Modules

FT900Prog GUI Launcher is a UI program used for downloading the program to the FT90X board; it is installed together with the FT90X Tool chain. Please see figure 10 given below -

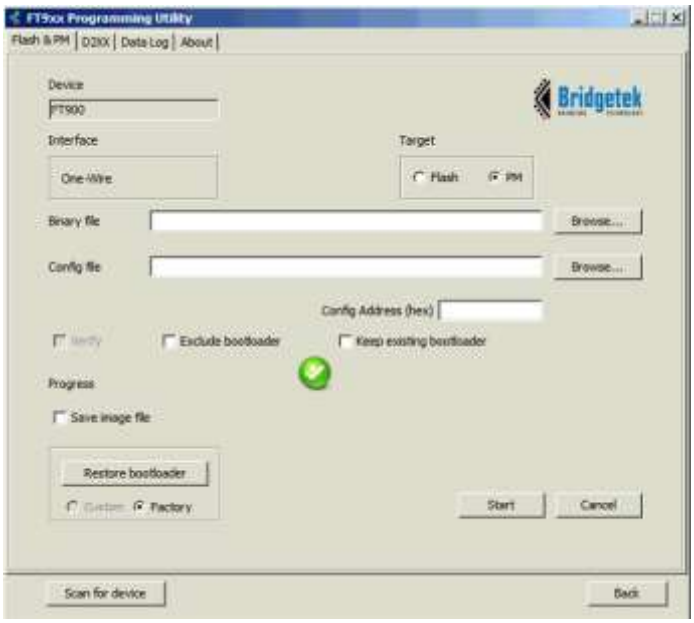

Figure 8 - FT900Prog GUI Launcher Screenshot

FT900 board (ex. MM900 board) acts as a shield and it can be easily connected to an FT8xx module. Please see figure 11 given below -

Figure 9 - Connections between FT900 & FT8xx Modules

When running the application, the calibration screen will be displayed first. This uses the FT8XX's built-in calibration routine. It ensures that the FT8XX can align inputs from the touch panel to the image on the screen below accurately. The routine will display a dot and ask the user to tap on this dot. It will then repeat this twice more (with the dot at a different location on the screen in each case).

Figure 10 - Calibration Screen

The Bridgetek logo animation will then appear on the screen (not shown here).

The Metaball introduction screen is then displayed and the application waits for the 'Click to play' button to be pressed, before loading the Metaball screen.

The main Metaball screen will now be displayed. Initially, the ball will move at normal speed, and faster when touch is detected. The moving range of the balls also changed.

Figure 11 - Metaball Snapshot with & without touch

This application is also supported on an Arduino platform. Users can select different modules in "Platform.h". After that open "App_Metaball.ino" with the Arduino IDE located at "App_Metaball\Project\Arduino\App_Metaball", try to compile the code and upload the program to the Arduino board. Make sure the right COM port and Arduino board is selected before uploading.

5 Contact Information

Head Quarters – Singapore

Bridgetek Pte Ltd
178 Paya Lebar Road, #07-03
Singapore 409030
Tel: +65 6547 4827
Fax: +65 6841 6071

E-mail (Sales) sales.apac@brtchip.com
E-mail (Support) support.apac@brtchip.com

Branch Office – Taipei, Taiwan

Bridgetek Pte Ltd, Taiwan Branch
2 Floor, No. 516, Sec. 1, Nei Hu Road, Nei Hu District
Taipei 114
Taiwan , R.O.C.
Tel: +886 (2) 8797 5691
Fax: +886 (2) 8751 9737

E-mail (Sales) sales.apac@brtchip.com
E-mail (Support) support.apac@brtchip.com

Branch Office - Glasgow, United Kingdom

Bridgetek Pte. Ltd.
Unit 1, 2 Seaward Place, Centurion Business Park
Glasgow G41 1HH
United Kingdom
Tel: +44 (0) 141 429 2777
Fax: +44 (0) 141 429 2758

E-mail (Sales) sales.emea@brtichip.com
E-mail (Support) support.emea@brtchip.com

Branch Office – Vietnam

Bridgetek VietNam Company Limited
Lutaco Tower Building, 5th Floor, 173A Nguyen Van Troi,
Ward 11, Phu Nhuan District,
Ho Chi Minh City, Vietnam
Tel : 08 38453222
Fax : 08 38455222

E-mail (Sales) sales.apac@brtchip.com
E-mail (Support) support.apac@brtchip.com

Web Site

http://brtchip.com/

Distributor and Sales Representatives

Please visit the Sales Network page of the Bridgetek Web site for the contact details of our distributor(s) and sales representative(s) in your country.

Appendix A– References

Document References

- FT800 datasheet
- Programming Guide covering EVE command language
- AN_391 EVE Platform Guide
- AN_240 FT800 From the Ground Up
- AN_245 VM800CB_SampleApp_PC_Introduction -Covering detailed design flow with a PC and USB to SPI bridge cable
- AN_246 VM800CB_SampleApp_Arduino_Introduction - Covering detailed design flow in an Arduino platform
- AN_281_FT800_Emulator_Library_User_Guide - covering API interface for FT800 Emulator.
- AN_252 FT800 Audio Primer

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

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Appendix C – Revision History

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Document Feedback: Send Feedback

Revision	Changes	Date
1.0	Initial Release Document migrated from FTDI to BRT (Updated company logo; copyright info; contact information; hyperlinks)	2018-01-04