

Frappy Birds

Generated by Doxygen 1.8.13

Contents

1	Module Index	1
1.1	Modules	1
2	Data Structure Index	3
2.1	Data Structures	3
3	File Index	5
3.1	File List	5
4	Module Documentation	7
4.1	Flappy_Bird	7
4.1.1	Detailed Description	8
4.1.2	Function Documentation	8
4.1.2.1	createPipeQueue()	8
4.1.2.2	displayLeaderboard()	9
4.1.2.3	drawBirdChoice()	9
4.1.2.4	drawEverything()	9
4.1.2.5	drawHighscores()	10
4.1.2.6	drawProgress()	10
4.1.2.7	hits()	10
4.1.2.8	initBird()	11
4.1.2.9	initCoin()	11
4.1.2.10	initPipes()	12
4.1.2.11	initPregame()	12
4.1.2.12	isbirdAlive()	12

4.1.2.13	setDifficulty()	13
4.1.2.14	setupGameInfo()	13
4.1.2.15	upBirdy()	14
4.1.2.16	updateAllPipes()	14
4.1.2.17	updateBirdy()	14
4.1.2.18	updateCoin()	15
4.1.2.19	updateScores()	15
4.1.3	Variable Documentation	15
4.1.3.1	bmHard	16
4.1.3.2	bmKingBirdy	16
4.1.3.3	bmlogo2	16
4.1.3.4	bmPregame	16
4.2	Game_Start_Functions	17
4.2.1	Detailed Description	17
4.2.2	Function Documentation	17
4.2.2.1	initGame()	17
4.2.2.2	main()	17
4.2.2.3	MainTask()	18
4.3	Queue_Structure	19
4.3.1	Detailed Description	19
4.3.2	Function Documentation	19
4.3.2.1	deq()	19
4.3.2.2	enq()	19
4.3.2.3	isOffScreen()	20
4.3.2.4	queueCreate()	20
4.3.2.5	queueDestroy()	21
4.3.2.6	queueEmpty()	21
4.3.2.7	updatePipes()	21

5	Data Structure Documentation	23
5.1	Bird Struct Reference	23
5.1.1	Detailed Description	23
5.1.2	Field Documentation	23
5.1.2.1	gravity	23
5.1.2.2	lift	24
5.1.2.3	up	24
5.1.2.4	velocity	24
5.1.2.5	x	24
5.1.2.6	y	24
5.2	Coin Struct Reference	24
5.2.1	Detailed Description	25
5.2.2	Field Documentation	25
5.2.2.1	x	25
5.2.2.2	y	25
5.3	DIR Struct Reference	25
5.4	FATFS Struct Reference	26
5.5	FIL Struct Reference	26
5.6	FILESEM Struct Reference	27
5.7	FILINFO Struct Reference	27
5.8	GameInfo Struct Reference	27
5.8.1	Detailed Description	28
5.8.2	Field Documentation	28
5.8.2.1	alive	28
5.8.2.2	birdy	28
5.8.2.3	coin	28
5.8.2.4	difficulty	28
5.8.2.5	frameCount	28
5.8.2.6	highScore	28
5.8.2.7	pipeDistance	29

5.8.2.8	pipeGap	29
5.8.2.9	playerLevel	29
5.8.2.10	que	29
5.8.2.11	score	29
5.8.2.12	scores	29
5.9	Pipe Struct Reference	29
5.9.1	Detailed Description	30
5.9.2	Field Documentation	30
5.9.2.1	bottomY	30
5.9.2.2	next	30
5.9.2.3	speed	30
5.9.2.4	topY	30
5.9.2.5	up	31
5.9.2.6	x	31
5.10	PlayerLevel Struct Reference	31
5.10.1	Detailed Description	31
5.10.2	Field Documentation	31
5.10.2.1	currentXp	31
5.10.2.2	playerLevel	32
5.10.2.3	requiredXp	32
5.11	putbuff Struct Reference	32
5.12	queue Struct Reference	32
5.12.1	Detailed Description	32
5.12.2	Field Documentation	33
5.12.2.1	head	33
5.12.2.2	tail	33
5.13	Rectangle Struct Reference	33
5.13.1	Detailed Description	33
5.13.2	Field Documentation	33
5.13.2.1	Xpos	34
5.13.2.2	Xpos2	34
5.13.2.3	Ypos	34
5.13.2.4	Ypos2	34
5.14	Score Struct Reference	34
5.14.1	Detailed Description	34
5.14.2	Field Documentation	35
5.14.2.1	difficulty	35
5.14.2.2	score	35

6 File Documentation	37
6.1 Absurd.c File Reference	37
6.1.1 Detailed Description	37
6.1.2 Variable Documentation	37
6.1.2.1 bmAbsurd	38
6.2 Background.c File Reference	38
6.2.1 Detailed Description	38
6.2.2 Variable Documentation	38
6.2.2.1 bmBackground	39
6.3 BlueBird.c File Reference	39
6.3.1 Detailed Description	39
6.3.2 Variable Documentation	39
6.3.2.1 bmBlueBird	40
6.4 Coin.c File Reference	40
6.4.1 Detailed Description	40
6.4.2 Variable Documentation	41
6.4.2.1 bmCoin	41
6.5 Easy.c File Reference	41
6.5.1 Detailed Description	41
6.5.2 Variable Documentation	42
6.5.2.1 bmEasy	42
6.6 flappyBird.c File Reference	42
6.6.1 Detailed Description	43
6.7 Hard.c File Reference	44
6.7.1 Detailed Description	44
6.7.2 Variable Documentation	44
6.7.2.1 bmHard	44
6.8 main.c File Reference	45
6.8.1 Detailed Description	45
6.9 main.h File Reference	45
6.9.1 Detailed Description	47
6.9.2 Typedef Documentation	47
6.9.2.1 Bird	48
6.9.2.2 Coin	48
6.9.2.3 GameInfo	48
6.9.2.4 Pipe	48
6.9.2.5 PlayerLevel	48
6.9.2.6 queue	48
6.9.2.7 Score	49
6.10 Pregame.c File Reference	49
6.10.1 Detailed Description	49
6.10.2 Variable Documentation	49
6.10.2.1 bmPregame	49

Chapter 1

Module Index

1.1 Modules

Here is a list of all modules:

Flappy_Bird	7
Game_Start_Functions	17
Queue_Structure	19

Chapter 2

Data Structure Index

2.1 Data Structures

Here are the data structures with brief descriptions:

Bird	Models a bird	23
Coin	Models a coin	24
DIR	. . . . .	25
FATFS	. . . . .	26
FIL	. . . . .	26
FILESEM	. . . . .	27
FILINFO	. . . . .	27
GameInfo	Models Game State	27
Pipe	Models a pipe	29
PlayerLevel	Tracks the user's current level	31
putbuff	. . . . .	32
queue	Queue of pipes	32
Rectangle	Models a prectangle	33
Score	All score information	34

Chapter 3

File Index

3.1 File List

Here is a list of all documented files with brief descriptions:

Absurd.c	Bitmap image of Absurd button	37
Background.c	Bitmap image of background	38
BlueBird.c	Bitmap image of bird player	39
Coin.c	Bitmap image of arrow	40
diskio.h	. . . . .	??
Easy.c	Bitmap image of easy button	41
fatfs_sd_sdio.h	. . . . .	??
ff.h	. . . . .	??
ffconf.h	. . . . .	??
flappyBird.c	File containing all methods to update the gamestate	42
Hard.c	Bitmap image of Hard button	44
integer.h	. . . . .	??
main.c	File containing all setup methods to get the game initialised	45
main.h	Header file containing all methods and structs	45
Pregame.c	Bitmap image of pregame background	49

Chapter 4

Module Documentation

4.1 Flappy_Bird

Functions

- void `setupGameInfo` ()
SetupGameInfo, sets up game based on difficulty.
- void `setDifficulty` (int choice)
Sets game difficulty.
- void `updateScores` ()
Updates the scoreboard.
- void `createPipeQueue` ()
Assigns a pipe queue to the game state.
- bool `hits` (Pipe *p)
Detects collisions.
- void `initPipes` ()
Initialises a pipe.
- void `updateAllPipes` ()
Updates all pipes in the queue.
- bool `isbirdAlive` ()
If the bird is alive or not.
- void `initBird` ()
Initialises a bird.
- void `upBirdy` (void)
Moves the bird up.
- void `updateBirdy` (void)
Updates the birds state.
- void `initCoin` ()
Initialises a coin.
- void `updateCoin` ()
Updates coin positioning.
- void `drawProgress` ()
Draws progress circles.
- void `drawBirdChoice` ()
Draws the bird selector.
- void `drawHighscores` (void *pData)

- Displays scores and difficulty associated with that score.*
 - void [displayLeaderboard](#) (TOUCH_STATE tsc_state, GUI_RECT Rect)
- Creates a window to display scores and select difficulty.*
 - void [initPregame](#) (TOUCH_STATE tsc_state, GUI_RECT Rect)
- Initilise pregame.*
 - void [drawEverything](#) (GUI_RECT Rect)
- Allocates memory for drawing elements.*

Variables

- GUI_CONST_STORAGE GUI_BITMAP **bmCowboyBirdy**
- GUI_CONST_STORAGE GUI_BITMAP **bmBlueBird**
- GUI_CONST_STORAGE GUI_BITMAP **bmKingBirdy**
- GUI_CONST_STORAGE GUI_BITMAP **bmBackground**
- GUI_CONST_STORAGE GUI_BITMAP **bmCoin**
- GUI_CONST_STORAGE GUI_BITMAP **bmPregame**
- GUI_CONST_STORAGE GUI_BITMAP **bmEasy**
- GUI_CONST_STORAGE GUI_BITMAP **bmHard**
- GUI_CONST_STORAGE GUI_BITMAP **bmAbsurd**
- GUI_CONST_STORAGE GUI_BITMAP **bmArrow**
- GUI_CONST_STORAGE GUI_BITMAP **bmlogo2**
- GUI_CONST_STORAGE GUI_BITMAP **bmEgg**
- [GameInfo](#) **gameInfo**
- int **turn** = 0
- bool **xpSet** = false

4.1.1 Detailed Description

4.1.2 Function Documentation

4.1.2.1 createPipeQueue()

```
void createPipeQueue (
    void )
```

Assigns a pipe queue to the game state.

Parameters

None	
------	--

Return values

None	
------	--

queueCreate methods is called and returned value is saved within gameinfo structs queue

4.1.2.2 displayLeaderboard()

```
void displayLeaderboard (
    TOUCH_STATE tsc_state,
    GUI_RECT Rect )
```

Creates a window to display scores and select difficulty.

Parameters

<i>TOUCH_STATE</i>	where the screen has been pressed, <i>GUI_RECT</i> where to display
--------------------	---

Return values

<i>None.</i>	
--------------	--

Sets the game mode based on what button is pressed and calls **drawHighScores** to display scores and buttons.

4.1.2.3 drawBirdChoice()

```
void drawBirdChoice ( )
```

Draws the bird selector.

Parameters

<i>None</i>	
-------------	--

Return values

<i>None.</i>	
--------------	--

Note

lv 0 = normal, lv3 = cowboy bird, lv5 = king bird

Gives an option on what bird the game is to be played with

4.1.2.4 drawEverything()

```
void drawEverything (
    GUI_RECT Rect )
```

Allocates memory for drawing elements.

Parameters

<i>None</i>	
-------------	--

Return values

None.	
-------	--

Allocates the memory for **drawGame** as well as incrementing games frame-counter

4.1.2.5 drawHighscores()

```
void drawHighscores (
    void * pData )
```

Displays scores and difficulty associated with that score.

Parameters

None	
------	--

Return values

None	
------	--

Note

Normal = Green, Hard = Orange, Insane = Red

Method that displays all scores saved within the game state, displaying newest score first in the colour of difficulty played. Also displays the game states highest score achieved.

4.1.2.6 drawProgress()

```
void drawProgress ( )
```

Draws progress circles.

Parameters

None	
------	--

Return values

None	
------	--

Draws progress circles that grow the closer the user is to obtaining the next level

4.1.2.7 hits()

```
bool hits (
    Pipe * p )
```

Detects collisions.

Parameters

<i>pointer</i>	to the head pipe
----------------	------------------

Return values

<i>bool</i>	True of False
-------------	---------------

Takes in the head of the pipe queue to get the position on screen, if the birds position is in the same co-ordinates true is returned otherwise false.

4.1.2.8 initBird()

```
void initBird (
    void )
```

Initialises a bird.

Parameters

<i>None</i>	
-------------	--

Return values

<i>None</i>	
-------------	--

Initialises a bird and adds it to the game states

4.1.2.9 initCoin()

```
void initCoin (
    void )
```

Initialises a coin.

Parameters

<i>None</i>	
-------------	--

Return values

<i>None</i>	
-------------	--

Initialises a coin to a random position in the game state

4.1.2.10 initPipes()

```
void initPipes (
    void )
```

Initialises a pipe.

Parameters

None	
------	--

Return values

None	
------	--

Creates a pipe and enques pipe to the game info pipe queue

4.1.2.11 initPregame()

```
void initPregame (
    TOUCH_STATE tsc_state,
    GUI_RECT Rect )
```

Initilise pregame.

Parameters

TOUCH_STATE	where the screen has been pressed, GUI_RECT where to display
-------------	--

Return values

None.	
-------	--

Creates the window for the pregame to be drawn and waits for input

4.1.2.12 isbirdAlive()

```
bool isbirdAlive (
    void )
```

If the bird is alive or not.

Parameters

None	
------	--

Return values

<i>bool</i>	true or false
-------------	---------------

Returns the gameinfo struct alive boolean variable that is altered by **updateScores**

4.1.2.13 setDifficulty()

```
void setDifficulty (
    int choice )
```

Sets game difficulty.

Parameters

<i>int</i>	difficulty choice, num between 0-2
------------	------------------------------------

Return values

<i>None</i>	
-------------	--

Note

0 = Normal, 1 = Hard, 2 = Insane

sets gameinfo struct game difficulty to later be used by **setupGameInfo**

4.1.2.14 setupGameInfo()

```
void setupGameInfo (
    void )
```

SetupGameInfo, sets up game based on difficulty.

Parameters

<i>None</i>	
-------------	--

Return values

<i>None</i>	
-------------	--

Based on gameinfo struct difficulty variable this method sets up the speed of the game, distance between concurrent pipes and the gap between the middle of a pipe.

4.1.2.15 upBirdy()

```
void upBirdy (
    void )
```

Moves the bird up.

Parameters

None	
------	--

Return values

None	
------	--

Alters the bird position based on gravity, moving it up

4.1.2.16 updateAllPipes()

```
void updateAllPipes (
    void )
```

Updates all pipes in the queue.

Parameters

None	
------	--

Return values

None	
------	--

Note

also changes pipe gap size and position for insane dif

updates co-ordinates for all pipes currently in the pipequeue, as well as calling **hits** to see if bird is still alive

4.1.2.17 updateBirdy()

```
void updateBirdy (
    void )
```

Updates the birds state.

Parameters

None	
------	--

Return values

None	
------	--

Updates the birds y positioning (up and down movements), as well as checking the bird hasn't fell below the screen line calling **updatesScores** and ending a game loop

4.1.2.18 updateCoin()

```
void updateCoin (
                void )
```

Updates coin positioning.

Parameters

None	
------	--

Return values

None	
------	--

Update coins x position to move it across the screen, calling **initCoin** when a new coin needs initialising (every 1170 frames)

4.1.2.19 updateScores()

```
void updateScores ( )
```

Updates the scoreboard.

Parameters

None	
------	--

Return values

None	
------	--

Once a bird dies, this method updates the scoreboard in order of most recent 1st and what difficulty the score was achieved on

4.1.3 Variable Documentation

4.1.3.1 bmHard

GUI_CONST_STORAGE GUI_BITMAP bmHard

Initial value:

```
= {
    80,
    50,
    320,
    32,
    (unsigned char *)_acHard,
    NULL,
    GUI_DRAW_BMP8888
}
```

4.1.3.2 bmKingBirdy

GUI_CONST_STORAGE GUI_BITMAP bmKingBirdy

Initial value:

```
= {
    34,
    31,
    136,
    32,
    (unsigned char *)_acKingBirdy,
    NULL,
    GUI_DRAW_BMP8888
}
```

4.1.3.3 bmlogo2

GUI_CONST_STORAGE GUI_BITMAP bmlogo2

Initial value:

```
= {
    240,
    52,
    960,
    32,
    (unsigned char *)_aclogo2,
    NULL,
    GUI_DRAW_BMP8888
}
```

4.1.3.4 bmPregame

GUI_CONST_STORAGE GUI_BITMAP bmPregame

Initial value:

```
= {
    120,
    141,
    480,
    32,
    (unsigned char *)_acPregame,
    NULL,
    GUI_DRAW_BMP8888
}
```


4.2 Game_Start_Functions

Functions

- void `initGame` ()
Initialise the game state.
- void `MainTask` (void)
Task container.
- int `main` (void)
Main.

4.2.1 Detailed Description

4.2.2 Function Documentation

4.2.2.1 `initGame()`

```
void initGame (  
    void )
```

Initialise the game state.

Parameters

None	
------	--

Return values

None	
------	--

Calling `initGame()` creates the initial game state by creating a bird, setting all game variables, creating the pipe queue and adding an extra points coin in.

4.2.2.2 `main()`

```
int main (  
    void )
```

Main.

Parameters

None	
------	--

Return values

<i>int</i>	
------------	--

Configures all hardware used and calls **MainTask**

4.2.2.3 MainTask()

```
void MainTask (  
                void )
```

Task container.

Parameters

<i>None</i>	
-------------	--

Return values

<i>None.</i>	
--------------	--

Holds all method calls to run the game, a while loop to setup the game and an inner loop to update all positions of elements on screen whilst the bird is alive

4.3 Queue_Structure

Functions

- `queue * queueCreate` (void)
Creates empty queue structure.
- void `enq` (queue *q, Pipe *p)
Push pipe to queue.
- int `queueEmpty` (const struct queue *q)
Checks if the queue is empty.
- bool `isOffScreen` (queue *q)
Checks if the queue is off screen.
- void `deq` (queue *q)
Removes pipe at the head of the queue.
- void `queueDestroy` (struct queue *q)
Removes entire queue and frees memory.
- void `updatePipes` (queue *q)
Updates pipe positions.

4.3.1 Detailed Description

4.3.2 Function Documentation

4.3.2.1 deq()

```
void deq (
    queue * q )
```

Removes pipe at the head of the queue.

Parameters

<code>queue</code>	<code>*q</code>
--------------------	-----------------

Return values

<code>None</code>	
-------------------	--

4.3.2.2 enq()

```
void enq (
    queue * q,
    Pipe * p )
```

Push pipe to queue.

Parameters

<i>queue</i>	<i>*q</i> , <i>Pipe</i> <i>*p</i>
--------------	-----------------------------------

Return values

<i>None</i>	
-------------	--

Method pushes given pipe to the top of a given queue

4.3.2.3 isOffScreen()

```
bool isOffScreen (
    queue * q )
```

Checks if the queue is off screen.

Parameters

<i>queue</i>	<i>*q</i>
--------------	-----------

Return values

<i>bool</i>	
-------------	--

4.3.2.4 queueCreate()

```
queue* queueCreate (
    void )
```

Creates empty queue structure.

Parameters

<i>None</i>	
-------------	--

Return values

<i>queue</i>	
--------------	--

4.3.2.5 queueDestroy()

```
void queueDestroy (
    struct queue * q )
```

Removes entire queue and frees memory.

Parameters

<i>queue</i>	*q
--------------	----

Return values

<i>None</i>	
-------------	--

4.3.2.6 queueEmpty()

```
int queueEmpty (
    const struct queue * q )
```

Checks if the queue is empty.

Parameters

<i>None</i>	
-------------	--

Return values

<i>None</i>	
-------------	--

4.3.2.7 updatePipes()

```
void updatePipes (
    queue * q )
```

Updates pipe positions.

Parameters

<i>queue</i>	*q
--------------	----

Return values

<i>None</i>	
-------------	--

Chapter 5

Data Structure Documentation

5.1 Bird Struct Reference

Models a bird.

```
#include <main.h>
```

Data Fields

- int `x`
- int `y`
- int `gravity`
- int `velocity`
- int `lift`
- bool `up`

5.1.1 Detailed Description

Models a bird.

Structure to model all information needed to draw a bird.

5.1.2 Field Documentation

5.1.2.1 gravity

```
int Bird::gravity
```

Strength of the gravity

5.1.2.2 lift

```
int Bird::lift
```

?

5.1.2.3 up

```
bool Bird::up
```

Weather the bird is moving up or down

5.1.2.4 velocity

```
int Bird::velocity
```

Velocity speed

5.1.2.5 x

```
int Bird::x
```

x co-ordinate of birds position

5.1.2.6 y

```
int Bird::y
```

y co-ordinate of birds position

The documentation for this struct was generated from the following file:

- [main.h](#)

5.2 Coin Struct Reference

Models a coin.

```
#include <main.h>
```

Data Fields

- [int x](#)
- [int y](#)

5.2.1 Detailed Description

Models a coin.

Structure to model all information needed to draw a coin.

5.2.2 Field Documentation

5.2.2.1 x

```
int Coin::x
```

x co-ordinate of coins position

5.2.2.2 y

```
int Coin::y
```

y co-ordinate of coins position

The documentation for this struct was generated from the following file:

- [main.h](#)

5.3 DIR Struct Reference

Data Fields

- [FATFS](#) * **fs**
- WORD **id**
- WORD **index**
- DWORD **sclust**
- DWORD **clust**
- DWORD **sect**
- BYTE * **dir**
- BYTE * **fn**
- UINT **lockid**
- WCHAR * **lfn**
- WORD **lfn_idx**
- const TCHAR * **pat**

The documentation for this struct was generated from the following file:

- [ff.h](#)

5.4 FATFS Struct Reference

Data Fields

- BYTE **fs_type**
- BYTE **drv**
- BYTE **csize**
- BYTE **n_fats**
- BYTE **wflag**
- BYTE **fsi_flag**
- WORD **id**
- WORD **n_rootdir**
- DWORD **last_clust**
- DWORD **free_clust**
- DWORD **cdir**
- DWORD **n_fatent**
- DWORD **fsize**
- DWORD **volbase**
- DWORD **fatbase**
- DWORD **dirbase**
- DWORD **database**
- DWORD **winsect**
- BYTE **win** [_MAX_SS]

The documentation for this struct was generated from the following file:

- ff.h

5.5 FIL Struct Reference

Data Fields

- [FATFS](#) * **fs**
- WORD **id**
- BYTE **flag**
- BYTE **err**
- DWORD **fptr**
- DWORD **fsize**
- DWORD **sclust**
- DWORD **clust**
- DWORD **dsect**
- DWORD **dir_sect**
- BYTE * **dir_ptr**
- UINT **lockid**
- BYTE **buf** [_MAX_SS]

The documentation for this struct was generated from the following file:

- ff.h

5.6 FILESEM Struct Reference

Data Fields

- [FATFS](#) * **fs**
- DWORD **clu**
- WORD **idx**
- WORD **ctr**

The documentation for this struct was generated from the following file:

- ff.c

5.7 FILINFO Struct Reference

Data Fields

- DWORD **fsize**
- WORD **fdate**
- WORD **ftime**
- BYTE **fattrib**
- TCHAR **fname** [13]
- TCHAR * **lname**
- UINT **lsize**

The documentation for this struct was generated from the following file:

- ff.h

5.8 GameInfo Struct Reference

Models Game State.

```
#include <main.h>
```

Data Fields

- [Bird](#) * **birdy**
- [queue](#) * **que**
- [Coin](#) * **coin**
- [PlayerLevel](#) * **playerLevel**
- bool **alive**
- int **difficulty**
- int **frameCount**
- int **score**
- int **pipeGap**
- [Score](#) **highScore**
- int **pipeDistance**
- [Score](#) **scores** [4]
- int **birdType**

5.8.1 Detailed Description

Models Game State.

Stores all game information regarding the current state of the game.

5.8.2 Field Documentation

5.8.2.1 alive

```
bool GameInfo::alive
```

Boolean check to see if the game is still playing

5.8.2.2 birdy

```
Bird* GameInfo::birdy
```

Pointer to bird in play

5.8.2.3 coin

```
Coin* GameInfo::coin
```

Pointer to coin in play

5.8.2.4 difficulty

```
int GameInfo::difficulty
```

Difficulty rating (0-2)

5.8.2.5 frameCount

```
int GameInfo::frameCount
```

Counter for frames

5.8.2.6 highScore

```
Score GameInfo::highScore
```

Highest score achieved in game state

5.8.2.7 pipeDistance

```
int GameInfo::pipeDistance
```

Distance between concurrent pipes

5.8.2.8 pipeGap

```
int GameInfo::pipeGap
```

Distance between top and bottom pipe

5.8.2.9 playerLevel

```
PlayerLevel* GameInfo::playerLevel
```

Pointer to player level in play

5.8.2.10 que

```
queue* GameInfo::que
```

Pointer to queue containing all pipes

5.8.2.11 score

```
int GameInfo::score
```

Current score of the game

5.8.2.12 scores

```
Score GameInfo::scores[4]
```

Saves n most current scores

The documentation for this struct was generated from the following file:

- [main.h](#)

5.9 Pipe Struct Reference

Models a pipe.

```
#include <main.h>
```

Data Fields

- bool `up`
- int `x`
- int `speed`
- int `topY`
- int `bottomY`
- struct `Pipe` * `next`

5.9.1 Detailed Description

Models a pipe.

Structure to model all information needed to draw a pipe. a pipe will be added to the pipeQueue

5.9.2 Field Documentation

5.9.2.1 `bottomY`

```
int Pipe::bottomY
```

Y position of the bottom half of the pipe

5.9.2.2 `next`

```
struct Pipe* Pipe::next
```

Pointer to the following piper

5.9.2.3 `speed`

```
int Pipe::speed
```

Speed the pipe moves at

5.9.2.4 `topY`

```
int Pipe::topY
```

Y position of the top half of the pipe

5.9.2.5 up

```
bool Pipe::up
```

Weather the pipe is moving up or down (insane difficulty)

5.9.2.6 x

```
int Pipe::x
```

x co-ordinate

The documentation for this struct was generated from the following file:

- [main.h](#)

5.10 PlayerLevel Struct Reference

Tracks the user's current level.

```
#include <main.h>
```

Data Fields

- int [playerLevel](#)
- int [currentXp](#)
- int [requiredXp](#)

5.10.1 Detailed Description

Tracks the user's current level.

Stores all game information regarding the current level of the player.

5.10.2 Field Documentation

5.10.2.1 currentXp

```
int PlayerLevel::currentXp
```

amount of xp on current level

5.10.2.2 playerLevel

```
int PlayerLevel::playerLevel
```

Stores level progress for user

5.10.2.3 requiredXp

```
int PlayerLevel::requiredXp
```

amount of xp till next level

The documentation for this struct was generated from the following file:

- [main.h](#)

5.11 putbuff Struct Reference

Data Fields

- [FIL * fp](#)
- int **idx**
- int **nchr**
- BYTE **buf** [64]

The documentation for this struct was generated from the following file:

- [ff.c](#)

5.12 queue Struct Reference

Queue of pipes.

```
#include <main.h>
```

Data Fields

- [Pipe * head](#)
- [Pipe * tail](#)

5.12.1 Detailed Description

Queue of pipes.

Creates a queue of pipes that is used by the game state

5.12.2 Field Documentation

5.12.2.1 head

`Pipe* queue::head`

Points to the head pipe of the queue

5.12.2.2 tail

`Pipe* queue::tail`

Points to the tail pipe of the queue

The documentation for this struct was generated from the following file:

- [main.h](#)

5.13 Rectangle Struct Reference

Models a prectangle.

```
#include <main.h>
```

Data Fields

- `int Xpos`
- `int Ypos`
- `int Xpos2`
- `int Ypos2`

5.13.1 Detailed Description

Models a prectangle.

Stores all the points of a rectangle

5.13.2 Field Documentation

5.13.2.1 Xpos

```
int Rectangle::Xpos
```

Top left corner

5.13.2.2 Xpos2

```
int Rectangle::Xpos2
```

Top right corner

5.13.2.3 Ypos

```
int Rectangle::Ypos
```

Bottom left corner

5.13.2.4 Ypos2

```
int Rectangle::Ypos2
```

Bottom right corner

The documentation for this struct was generated from the following file:

- [main.h](#)

5.14 Score Struct Reference

All score information.

```
#include <main.h>
```

Data Fields

- int [score](#)
- int [difficulty](#)

5.14.1 Detailed Description

All score information.

Stores all information regarding score

5.14.2 Field Documentation

5.14.2.1 difficulty

```
int Score::difficulty
```

Level of difficulty when score was achieved

5.14.2.2 score

```
int Score::score
```

[Score](#) achieved

The documentation for this struct was generated from the following file:

- [main.h](#)

Chapter 6

File Documentation

6.1 Absurd.c File Reference

bitmap image of Absurd button

```
#include <stdlib.h>
#include "GUI.h"
```

Macros

- #define **GUI_CONST_STORAGE** const

Variables

- GUI_CONST_STORAGE GUI_BITMAP **bmAbsurd**

6.1.1 Detailed Description

bitmap image of Absurd button

Author

Luke Garrigan, Shane Sturgeon

Date

17 March 2017

6.1.2 Variable Documentation

6.1.2.1 bmAbsurd

GUI_CONST_STORAGE GUI_BITMAP bmAbsurd

Initial value:

```
= {  
    80,  
    50,  
    320,  
    32,  
    (unsigned char *)_acAbsurd,  
    NULL,  
    GUI_DRAW_BMP8888  
}
```

6.2 Background.c File Reference

bitmap image of background

```
#include <stdlib.h>  
#include "GUI.h"
```

Macros

- #define **GUI_CONST_STORAGE** const

Variables

- GUI_CONST_STORAGE GUI_BITMAP **bmBackground**

6.2.1 Detailed Description

bitmap image of background

Author

Luke Garrigan, Shane Sturgeon

Date

17 March 2017

6.2.2 Variable Documentation

6.2.2.1 bmBackground

GUI_CONST_STORAGE GUI_BITMAP bmBackground

Initial value:

```
= {  
    490,  
    280,  
    490,  
    8,  
    _acBackground,  
    &_PalBackground  
}
```

6.3 BlueBird.c File Reference

bitmap image of bird player

```
#include <stdlib.h>  
#include "GUI.h"
```

Macros

- #define **GUI_CONST_STORAGE** const

Variables

- GUI_CONST_STORAGE GUI_BITMAP **bmBlueBird**

6.3.1 Detailed Description

bitmap image of bird player

Author

Luke Garrigan, Shane Sturgeon

Date

17 March 2017

6.3.2 Variable Documentation

6.3.2.1 bmBlueBird

GUI_CONST_STORAGE GUI_BITMAP bmBlueBird

Initial value:

```
= {
    34,
    24,
    136,
    32,
    (unsigned char *)_acBlueBird,
    NULL,
    GUI_DRAW_BMP8888
}
```

6.4 Coin.c File Reference

bitmap image of arrow

```
#include <stdlib.h>
#include "GUI.h"
```

Macros

- #define **GUI_CONST_STORAGE** const

Variables

- GUI_CONST_STORAGE GUI_BITMAP **bmCoin**

6.4.1 Detailed Description

bitmap image of arrow

bitmap image of Logo 2

bitmap image of logo

bitmap image of King [Bird](#)

bitmap image of easter egg

bitmap image of cowboy bird

bitmap image of coin

Author

Luke Garrigan, Shane Sturgeon

Date

17 March 2017

6.4.2 Variable Documentation

6.4.2.1 bmCoin

```
GUI_CONST_STORAGE GUI_BITMAP bmCoin
```

Initial value:

```
= {  
    25,  
    25,  
    100,  
    32,  
    (unsigned char *)_acCoin,  
    NULL,  
    GUI_DRAW_BMP8888  
}
```

6.5 Easy.c File Reference

bitmap image of easy button

```
#include <stdlib.h>  
#include "GUI.h"
```

Macros

- #define **GUI_CONST_STORAGE** const

Variables

- GUI_CONST_STORAGE GUI_BITMAP **bmEasy**

6.5.1 Detailed Description

bitmap image of easy button

Author

Luke Garrigan, Shane Sturgeon

Date

17 March 2017

6.5.2 Variable Documentation

6.5.2.1 bmEasy

GUI_CONST_STORAGE GUI_BITMAP bmEasy

Initial value:

```
= {
    80,
    50,
    320,
    32,
    (unsigned char *)_acEasy,
    NULL,
    GUI_DRAW_BMP8888
}
```

6.6 flappyBird.c File Reference

File containing all methods to update the gamestate.

```
#include "stm32f7xx_hal.h"
#include "stm32746g_discovery_sdram.h"
#include "RTE_Components.h"
#include "GUI.h"
#include <stdlib.h>
#include "main.h"
#include "Progbar.h"
#include <math.h>
```

Functions

- void [setupGameInfo](#) ()
SetupGameInfo, sets up game based on difficulty.
- void [setDifficulty](#) (int choice)
Sets game difficulty.
- void [updateScores](#) ()
Updates the scoreboard.
- void [createPipeQueue](#) ()
Assigns a pipe queue to the game state.
- bool [hits](#) (Pipe *p)
Detects collisions.
- void [initPipes](#) ()
Initialises a pipe.
- void [updateAllPipes](#) ()
Updates all pipes in the queue.
- bool [isbirdAlive](#) ()
If the bird is alive or not.

- void `initBird` ()
Initialises a bird.
- void `upBirdy` (void)
Moves the bird up.
- void `updateBirdy` (void)
Updates the birds state.
- void `initCoin` ()
Initialises a coin.
- void `updateCoin` ()
Updates coin positioning.
- void `drawProgress` ()
Draws progress circles.
- void `drawBirdChoice` ()
Draws the bird selector.
- void `drawHighscores` (void *pData)
Displays scores and difficulty associated with that score.
- void `displayLeaderboard` (TOUCH_STATE tsc_state, GUI_RECT Rect)
Creates a window to display scores and select difficulty.
- void `initPregame` (TOUCH_STATE tsc_state, GUI_RECT Rect)
Initilise pregame.
- void `drawEverything` (GUI_RECT Rect)
Allocates memory for drawing elements.

Variables

- GUI_CONST_STORAGE GUI_BITMAP **bmCowboyBirdy**
- GUI_CONST_STORAGE GUI_BITMAP **bmBlueBird**
- GUI_CONST_STORAGE GUI_BITMAP **bmKingBirdy**
- GUI_CONST_STORAGE GUI_BITMAP **bmBackground**
- GUI_CONST_STORAGE GUI_BITMAP **bmCoin**
- GUI_CONST_STORAGE GUI_BITMAP **bmPregame**
- GUI_CONST_STORAGE GUI_BITMAP **bmEasy**
- GUI_CONST_STORAGE GUI_BITMAP **bmHard**
- GUI_CONST_STORAGE GUI_BITMAP **bmAbsurd**
- GUI_CONST_STORAGE GUI_BITMAP **bmArrow**
- GUI_CONST_STORAGE GUI_BITMAP **bmlogo2**
- GUI_CONST_STORAGE GUI_BITMAP **bmEgg**
- `GameInfo` **gameInfo**
- int **turn** = 0
- bool **xpSet** = false

6.6.1 Detailed Description

File containing all methods to update the gamestate.

Author

Luke Garrigan, Shane Sturgeon

Date

17 March 2017

6.7 Hard.c File Reference

bitmap image of Hard button

```
#include <stdlib.h>
#include "GUI.h"
```

Macros

- `#define GUI_CONST_STORAGE` const

Variables

- `GUI_CONST_STORAGE GUI_BITMAP` **bmHard**

6.7.1 Detailed Description

bitmap image of Hard button

Author

Luke Garrigan, Shane Sturgeon

Date

17 March 2017

6.7.2 Variable Documentation

6.7.2.1 **bmHard**

`GUI_CONST_STORAGE GUI_BITMAP` **bmHard**

Initial value:

```
= {
    80,
    50,
    320,
    32,
    (unsigned char *)_acHard,
    NULL,
    GUI_DRAW_BMP8888
}
```

6.8 main.c File Reference

File containing all setup methods to get the game initialised.

```
#include "stm32f7xx_hal.h"
#include "stm32746g_discovery_sdram.h"
#include "RTE_Components.h"
#include "GUI.h"
#include <stdlib.h>
#include "main.h"
#include "Board_Touch.h"
```

Functions

- void `initGame` ()
Initialise the game state.
- void `MainTask` (void)
Task container.
- int `main` (void)
Main.

Variables

- FILE * `file`

6.8.1 Detailed Description

File containing all setup methods to get the game initialised.

Author

Luke Garrigan, Shane Sturgeon

Date

17 March 2017

6.9 main.h File Reference

header file containing all methods and structs

```
#include <stdbool.h>
#include "Board_Touch.h"
```

Data Structures

- struct [Rectangle](#)
Models a prectangle.
- struct [Pipe](#)
Models a pipe.
- struct [queue](#)
Queue of pipes.
- struct [Bird](#)
Models a bird.
- struct [Coin](#)
Models a coin.
- struct [Score](#)
All score information.
- struct [PlayerLevel](#)
Tracks the user's current level.
- struct [GameInfo](#)
Models Game State.

Typedefs

- typedef struct [Pipe](#) [Pipe](#)
Models a pipe.
- typedef struct [queue](#) [queue](#)
Queue of pipes.
- typedef struct [Bird](#) [Bird](#)
Models a bird.
- typedef struct [Coin](#) [Coin](#)
Models a coin.
- typedef struct [Score](#) [Score](#)
All score information.
- typedef struct [PlayerLevel](#) [PlayerLevel](#)
Tracks the user's current level.
- typedef struct [GameInfo](#) [GameInfo](#)
Models Game State.

Functions

- void [queueDestroy](#) (struct [queue](#) *q)
Removes entire queue and frees memory.
- int [queueEmpty](#) (const struct [queue](#) *q)
Checks if the queue is empty.
- void [updateAllPipes](#) (void)
Updates all pipes in the queue.
- void [deq](#) ([queue](#) *q)
Removes pipe at the head of the queue.
- void [updatePipes](#) ([queue](#) *q)
Updates pipe positions.
- void [erasePipes](#) ([queue](#) *q)
- void [enq](#) ([queue](#) *q, [Pipe](#) *p)

- Push pipe to queue.*
- `queue * queueCreate` (void)
Creates empty queue structure.
- `Pipe * getList` (int position)
- `bool isOffScreen` (`queue *q`)
Checks if the queue is off screen.
- `void initGame` (void)
Initialise the game state.
- `void initBird` (void)
Initialises a bird.
- `void initCoin` (void)
Initialises a coin.
- `void setupGameInfo` (void)
SetupGameInfo, sets up game based on difficulty.
- `void initPipes` (void)
Initialises a pipe.
- `void displayLeaderboard` (TOUCH_STATE tsc_state, GUI_RECT Rect)
Creates a window to display scores and select difficulty.
- `void initPregame` (TOUCH_STATE tsc_state, GUI_RECT Rect)
Initialise pregame.
- `bool isbirdAlive` (void)
If the bird is alive or not.
- `void updateCoin` (void)
Updates coin positioning.
- `void updateBirdy` (void)
Updates the birds state.
- `void drawEverything` (GUI_RECT Rect)
Allocates memory for drawing elements.
- `void createPipeQueue` (void)
Assigns a pipe queue to the game state.
- `void setDifficulty` (int choice)
Sets game difficulty.

6.9.1 Detailed Description

header file containing all methods and structs

Author

Luke Garrigan, Shane Sturgeon

Date

17 March 2017

6.9.2 Typedef Documentation

6.9.2.1 Bird

```
typedef struct Bird Bird
```

Models a bird.

Structure to model all information needed to draw a bird.

6.9.2.2 Coin

```
typedef struct Coin Coin
```

Models a coin.

Structure to model all information needed to draw a coin.

6.9.2.3 GameInfo

```
typedef struct GameInfo GameInfo
```

Models Game State.

Stores all game information regarding the current state of the game.

6.9.2.4 Pipe

```
typedef struct Pipe Pipe
```

Models a pipe.

Structure to model all information needed to draw a pipe. a pipe will be added to the pipeQueue

6.9.2.5 PlayerLevel

```
typedef struct PlayerLevel PlayerLevel
```

Tracks the user's current level.

Stores all game information regarding the current level of the player.

6.9.2.6 queue

```
typedef struct queue queue
```

Queue of pipes.

Creates a queue of pipes that is used by the game state

6.9.2.7 Score

```
typedef struct Score Score
```

All score information.

Stores all information regarding score

6.10 Pregame.c File Reference

bitmap image of pregame background

```
#include <stdlib.h>
#include "GUI.h"
```

Macros

- `#define GUI_CONST_STORAGE` const

Variables

- `GUI_CONST_STORAGE GUI_BITMAP` **bmPregame**

6.10.1 Detailed Description

bitmap image of pregame background

Author

Luke Garrigan, Shane Sturgeon

Date

17 March 2017

6.10.2 Variable Documentation

6.10.2.1 bmPregame

```
GUI_CONST_STORAGE GUI_BITMAP bmPregame
```

Initial value:

```
= {
    120,
    141,
    480,
    32,
    (unsigned char *)_acPregame,
    NULL,
    GUI_DRAW_BMP8888
}
```


Index

- Absurd.c, [37](#)
 - bmAbsurd, [37](#)
- alive
 - GameInfo, [28](#)
- Background.c, [38](#)
 - bmBackground, [38](#)
- Bird, [23](#)
 - gravity, [23](#)
 - lift, [23](#)
 - main.h, [47](#)
 - up, [24](#)
 - velocity, [24](#)
 - x, [24](#)
 - y, [24](#)
- birdy
 - GameInfo, [28](#)
- BlueBird.c, [39](#)
 - bmBlueBird, [39](#)
- bmAbsurd
 - Absurd.c, [37](#)
- bmBackground
 - Background.c, [38](#)
- bmBlueBird
 - BlueBird.c, [39](#)
- bmCoin
 - Coin.c, [41](#)
- bmEasy
 - Easy.c, [42](#)
- bmHard
 - Flappy_Bird, [15](#)
 - Hard.c, [44](#)
- bmKingBirdy
 - Flappy_Bird, [16](#)
- bmPregame
 - Flappy_Bird, [16](#)
 - Pregame.c, [49](#)
- bmlogo2
 - Flappy_Bird, [16](#)
- bottomY
 - Pipe, [30](#)
- Coin, [24](#)
 - main.h, [48](#)
 - x, [25](#)
 - y, [25](#)
- coin
 - GameInfo, [28](#)
- Coin.c, [40](#)
 - bmCoin, [41](#)
- createPipeQueue
 - Flappy_Bird, [8](#)
- currentXp
 - PlayerLevel, [31](#)
- DIR, [25](#)
- deq
 - Queue_Structure, [19](#)
- difficulty
 - GameInfo, [28](#)
 - Score, [35](#)
- displayLeaderboard
 - Flappy_Bird, [8](#)
- drawBirdChoice
 - Flappy_Bird, [9](#)
- drawEverything
 - Flappy_Bird, [9](#)
- drawHighscores
 - Flappy_Bird, [10](#)
- drawProgress
 - Flappy_Bird, [10](#)
- Easy.c, [41](#)
 - bmEasy, [42](#)
- enq
 - Queue_Structure, [19](#)
- FATFS, [26](#)
- FILESEM, [27](#)
- FILINFO, [27](#)
- FIL, [26](#)
- Flappy_Bird, [7](#)
 - bmHard, [15](#)
 - bmKingBirdy, [16](#)
 - bmPregame, [16](#)
 - bmlogo2, [16](#)
 - createPipeQueue, [8](#)
 - displayLeaderboard, [8](#)
 - drawBirdChoice, [9](#)
 - drawEverything, [9](#)
 - drawHighscores, [10](#)
 - drawProgress, [10](#)
 - hits, [10](#)
 - initBird, [11](#)
 - initCoin, [11](#)
 - initPipes, [11](#)
 - initPregame, [12](#)
 - isbirdAlive, [12](#)
 - setDifficulty, [13](#)
 - setupGameInfo, [13](#)

- upBirdy, 13
 - updateAllPipes, 14
 - updateBirdy, 14
 - updateCoin, 15
 - updateScores, 15
- flappyBird.c, 42
- frameCount
 - GameInfo, 28
- Game_Start_Functions, 17
 - initGame, 17
 - main, 17
 - MainTask, 18
- GameInfo, 27
 - alive, 28
 - birdy, 28
 - coin, 28
 - difficulty, 28
 - frameCount, 28
 - highScore, 28
 - main.h, 48
 - pipeDistance, 28
 - pipeGap, 29
 - playerLevel, 29
 - que, 29
 - score, 29
 - scores, 29
- gravity
 - Bird, 23
- Hard.c, 44
 - bmHard, 44
- head
 - queue, 33
- highScore
 - GameInfo, 28
- hits
 - Flappy_Bird, 10
- initBird
 - Flappy_Bird, 11
- initCoin
 - Flappy_Bird, 11
- initGame
 - Game_Start_Functions, 17
- initPipes
 - Flappy_Bird, 11
- initPregame
 - Flappy_Bird, 12
- isOffScreen
 - Queue_Structure, 20
- isbirdAlive
 - Flappy_Bird, 12
- lift
 - Bird, 23
- main
 - Game_Start_Functions, 17
- main.c, 45
- main.h, 45
 - Bird, 47
 - Coin, 48
 - GameInfo, 48
 - Pipe, 48
 - PlayerLevel, 48
 - queue, 48
 - Score, 48
- MainTask
 - Game_Start_Functions, 18
- next
 - Pipe, 30
- Pipe, 29
 - bottomY, 30
 - main.h, 48
 - next, 30
 - speed, 30
 - topY, 30
 - up, 30
 - x, 31
- pipeDistance
 - GameInfo, 28
- pipeGap
 - GameInfo, 29
- PlayerLevel, 31
 - currentXp, 31
 - main.h, 48
 - playerLevel, 31
 - requiredXp, 32
- playerLevel
 - GameInfo, 29
 - PlayerLevel, 31
- Pregame.c, 49
 - bmPregame, 49
- putbuff, 32
- que
 - GameInfo, 29
- queue, 32
 - head, 33
 - main.h, 48
 - tail, 33
- Queue_Structure, 19
 - deq, 19
 - enq, 19
 - isOffScreen, 20
 - queueCreate, 20
 - queueDestroy, 20
 - queueEmpty, 21
 - updatePipes, 21
- queueCreate
 - Queue_Structure, 20
- queueDestroy
 - Queue_Structure, 20
- queueEmpty
 - Queue_Structure, 21

- Rectangle, [33](#)
 - Xpos, [33](#)
 - Xpos2, [34](#)
 - Ypos, [34](#)
 - Ypos2, [34](#)
- requiredXp
 - PlayerLevel, [32](#)
- Score, [34](#)
 - difficulty, [35](#)
 - main.h, [48](#)
 - score, [35](#)
- score
 - GameInfo, [29](#)
 - Score, [35](#)
- scores
 - GameInfo, [29](#)
- setDifficulty
 - Flappy_Bird, [13](#)
- setupGameInfo
 - Flappy_Bird, [13](#)
- speed
 - Pipe, [30](#)
- tail
 - queue, [33](#)
- topY
 - Pipe, [30](#)
- up
 - Bird, [24](#)
 - Pipe, [30](#)
- upBirdy
 - Flappy_Bird, [13](#)
- updateAllPipes
 - Flappy_Bird, [14](#)
- updateBirdy
 - Flappy_Bird, [14](#)
- updateCoin
 - Flappy_Bird, [15](#)
- updatePipes
 - Queue_Structure, [21](#)
- updateScores
 - Flappy_Bird, [15](#)
- velocity
 - Bird, [24](#)
- x
 - Bird, [24](#)
 - Coin, [25](#)
 - Pipe, [31](#)
- Xpos
 - Rectangle, [33](#)
- Xpos2
 - Rectangle, [34](#)
- y
 - Bird, [24](#)
 - Coin, [25](#)
- Ypos
 - Rectangle, [34](#)
- Ypos2
 - Rectangle, [34](#)