Archived:Animated Bubbles with QPainter

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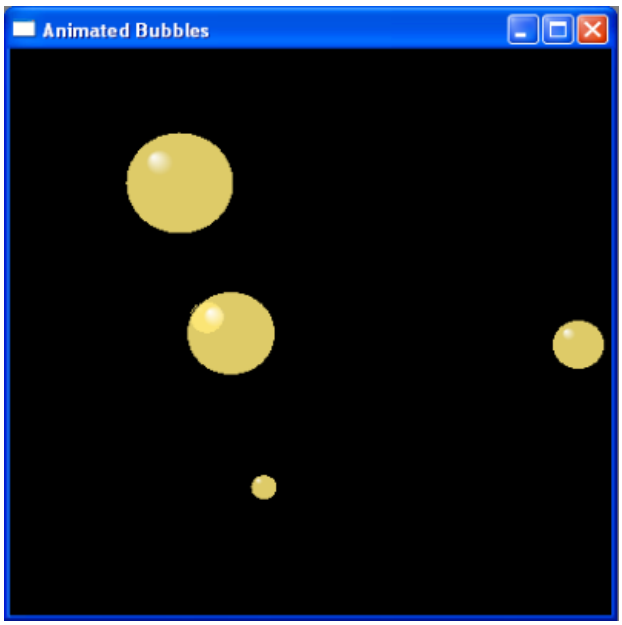
Qt Quick should be used for all UI development on mobile devices. The approach described in this article (using C++ for the Qt app UI) is deprecated.

This article shows how QPainter can be used to paint a scene rendered using OpenGL in a QGLWidget. Note that this example only runs on Windows Desktop.

Overview

`OpenGL` is being integrated in QGLWidget widget. QGLWidget also behaves like other standard Qt widget which supports widget properties also. Usually, QGLWidget is subclassed to display a pure 3D scene. In this example we will create translucent 2D bubbles.



Project File (.pro)

Add **opengl** to the project file

```
QT += opengl
```

Class Definition

```
#ifndef BUBBLESQT_H
#define BUBBLESQT_H

#include <QMainWindow>
#include <QGLWidget>
#include <QtGui>
#include <QtOpenGL>
#include "bubble.h"
#include <QTimer>
class Bubble;
class QPaintEvent;
```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```
class QWidget;
namespace Ui {
    class BubblesQt;
}
class BubblesQt : public QGLWidget
{
    Q_OBJECT
public:
    explicit BubblesQt(QWidget *parent = 0);
    ~BubblesQt();
 QSize sizeHint() const;
private:
    Ui::BubblesQt *ui;
protected:
    void paintEvent(QPaintEvent *event);
    void showEvent(QShowEvent *event);
private:
    void createBubbles(int number);
    QList<Bubble*> bubbles;
    QTimer animationTimer;
private slots:
   void animate();
};
#endif // BUBBLESQT_H
```

The **BubblesQt** class inherits from QGLWidget. We reimplement the `paintEvent()` function to update the drawing area. `showEvent()` is used to initialise the 2D graphics used. The `animate()` slot is called periodically by the *animationTimer* to update the widget; the `createBubbles()` function initializes the bubbles.

Class Implementation

```
BubblesQt::BubblesQt(QWidget *parent) :
    QGLWidget( parent)
{
    animationTimer.setSingleShot(false);
    connect(&animationTimer, SIGNAL(timeout()), this, SLOT(animate()));
    animationTimer.start(25);
    setAutoFillBackground(false);
    setMinimumSize(200, 200);
    setWindowTitle(tr("Animated Bubbles"));
}
```

In the constructor, a timer is initialize to control the animation. `setAutoFillBackground()` is set to *false* to instruct `OpenGL` not to paint a background for the widget.

```
    QPainter painter(this);
    painter.setRenderHint(QPainter::Antialiasing);
    foreach (Bubble *bubble, bubbles) {
        if (bubble->rect().intersects(event->rect()))
            bubble->drawBubble(&painter);
    }
    painter.end();
```

We construct a QPainter to paint the widget with 2D graphics; in this case, we will draw a number of translucent bubbles onto

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the widget. When `QPainter::end()` is called, suitable OpenGL-specific calls are made to write the scene, and its additional contents, onto the widget.

```
void BubblesQt::showEvent(QShowEvent *event)
{
    Q_UNUSED(event);
    createBubbles(5);
}
```

`showEvent()` can be reimplemented in a subclass to receive widget show events which are passed in the event parameter.

```
void BubblesQt::animate()
{
    QMutableListIterator<Bubble*> iter(bubbles);
    while (iter.hasNext()) {
        Bubble *bubble = iter.next();
        bubble->move(rect());
    }
    update();
}
```

The `animate()` slot is called every time the widget's `animationTimer` emits the `timeout()` signal. This keeps the bubbles moving around.We simply iterate over the bubbles in the bubbles list, updating the widget before and after each of them is moved.

```
void BubblesQt::createBubbles(int number)
{
    for (int i = 0; i < number; ++i) {
        QPointF position(width()*(0.1 + (0.8*qrand()/(RAND_MAX+1.0))),
                         height()*(0.1 + (0.8*qrand()/(RAND_MAX+1.0))));
        qreal radius = qMin(width(), height())*(0.0125 + 0.0875*qrand()/(RAND_MAX+1.0));
        QPointF velocity(width()*0.0125*(-0.5 + qrand()/(RAND_MAX+1.0)),
                         height()*0.0125*(-0.5 + qrand()/(RAND_MAX+1.0)));
        bubbles.append(new Bubble(position, radius, velocity));
    }
}
```

`createBubbles()` is used to create number of bubbles in the scene.

Source Code

The full source code presented in this article is available here: File:BubblesQt.zip

Related Article

OpenGL with Qt

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