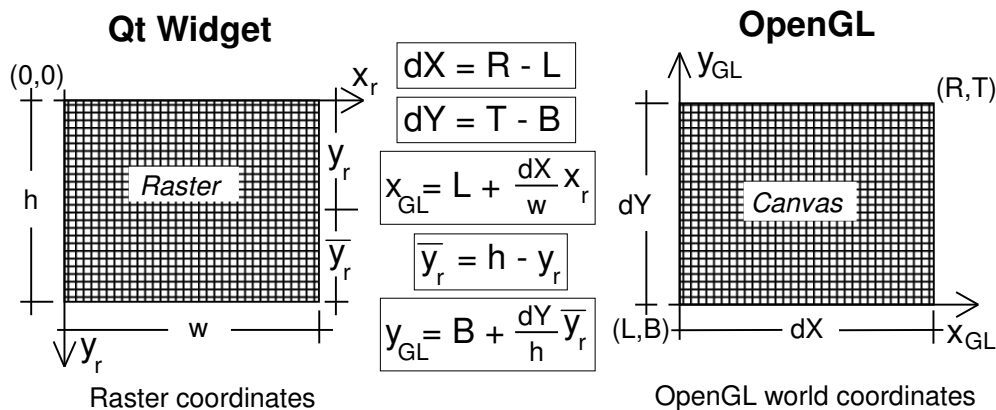


# Introduction to Computer Graphics for Engineering

Simple program to understand mouse events on OpenGL canvas using Qt: [http://www.tecgraf.puc-rio.br/ftp\\_pub/lfm/LW6\\_CanvasMouseEvent.zip](http://www.tecgraf.puc-rio.br/ftp_pub/lfm/LW6_CanvasMouseEvent.zip)



## gpanel.h

```
#ifndef GLPANEL_H
#define GLPANEL_H

#include <QMouseEvent>
#include <QtOpenGL/QGLWidget>

class GLPanel : public QGLWidget
{
    Q_OBJECT // must include this if you use Qt Signals & Slots

public:
    GLPanel(QWidget *parent = 0);
    ~GLPanel();

protected:
    // Canvas predefined slots
    void initializeGL();
    void resizeGL(int _width, int _height);
    void paintGL();

protected:
    int m_w; // width: GL canvas horizontal size
    int m_h; // height: GL canvas vertical size
    GLdouble m_left; // left limit of object space window
    GLdouble m_right; // right limit of object space window
    GLdouble m_bottom; // bottom limit of object space window
    GLdouble m_top; // top limit of object space window

    // Mouse point properties
    bool m_buttonPressed; // if true, mouse button is pressed
    // QPoint is a Qt class that defines a point in a plane
    // i.e. the position of the mouse on the canvas.
    QPoint m_pt0; // mouse position at button press event
    QPoint m_pt1; // current mouse position

    // QPointF is a Qt class that defines a point in floating
    // point coordinates.
    QPointF convertPtCoordsToUniverse(QPoint _pt);

public slots:
    // Mouse events slots
    void mousePressEvent(QMouseEvent* event);
    void mouseMoveEvent(QMouseEvent* event);
    void mouseReleaseEvent(QMouseEvent *event);
};
#endif // GLPANEL_H
```

## gpanel.cpp

```
#include "gpanel.h"

//-----
GLPanel::GLPanel(QWidget *parent)
: QGLWidget(parent)
{
    m_pt0.setX(0);
    m_pt0.setY(0);
    m_pt1.setX(0);
    m_pt1.setY(0);
    m_buttonPressed = false;
}
//-----

//-----
GLPanel::~GLPanel()
{
}
//-----

//-----
void
GLPanel::initializeGL()
{
    // set white as background color and clear window
    glClearColor(1.0, 1.0, 1.0, 1.0);
    glClear(GL_COLOR_BUFFER_BIT);

    // enable smooth line display
    glEnable(GL_LINE_SMOOTH);
}
//-----

//-----
void
GLPanel::resizeGL(int _width,
                  int _height)
{
    // store GL canvas sizes in object properties
    m_w = _width;
    m_h = _height;

    // setup the viewport to canvas dimensions
    glViewport(0, 0, (GLint)m_w, (GLint)m_h);

    // setup world limit coordinates based on canvas sizes
    m_left = 0.0;
    m_right = (double)m_w/10.0;
    m_bottom = 0.0;
    m_top = (double)m_h/10.0;

    // reset the coordinate system
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();

    // establish the clipping volume by setting up an
    // orthographic projection
    glOrtho(m_left, m_right, m_bottom, m_top, -1.0, 1.0);

    // setup display in model coordinates
    glMatrixMode(GL_MODELVIEW);
    glLoadIdentity();
}
//-----

//-----
void
GLPanel::paintGL()
{
    // clear the buffer with the current clear color
    glClear(GL_COLOR_BUFFER_BIT);
}
```

```

// draw a yellow line from button press point to current point
glColor3f(1.0, 0.0, 0.0); // red
QPointF pt0_U = convertPtCoordsToUniverse(m_pt0);
QPointF pt1_U = convertPtCoordsToUniverse(m_pt1);
glBegin(GL_LINE_STRIP);
glVertex2f(pt0_U.x(), pt0_U.y());
glVertex2f(pt1_U.x(), pt1_U.y());
glEnd();
}
//-----

//-----
QPointF
GLPanel::convertPtCoordsToUniverse(QPoint _pt)
{
    double dX = m_right - m_left; // universe window horizontal size
    double dY = m_top - m_bottom; // universe window vertical size

    // Origin of canvas raster coordinates is at the left-top corner,
    // while origin of GL canvas floating point coordinates is at
    // left-bottom corner.
    // mX is the distance of point to left universe window limit
    // mY is the distance of point to bottom universe window limit
    /** COMPLETE HERE 01 **/
    double mX = (double)_pt.x()*dX/(double)m_w;
    double mY = (double)(m_h - _pt.y())*dY/(double)m_h;
    double x = m_left + mX;
    double y = m_bottom + mY;
    /** COMPLETE HERE 01 **/
    return QPointF(x,y);
}
//-----

//-----
// PUBLIC SLOTS
//-----

//-----
void
GLPanel::mousePressEvent(QMouseEvent* event)
{
    /** COMPLETE HERE 02 **/
    m_buttonPressed = true;
    m_pt0 = event->pos();
    /** COMPLETE HERE 02 **/
}

//-----
void
GLPanel::mouseMoveEvent(QMouseEvent* event)
{
    /** COMPLETE HERE 03 **/
    if(!m_buttonPressed)
        return;
    m_pt1 = event->pos();
    /** COMPLETE HERE 03 **/
    update();
}
//-----

//-----
void
GLPanel::mouseReleaseEvent(QMouseEvent *event)
{
    /** COMPLETE HERE 04 **/
    m_buttonPressed = false;
    m_pt1 = event->pos();
    /** COMPLETE HERE 04 **/
    update();
}
//-----

```