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Introduction

The GestureTek Illuminate® Multi-Touch Tracker is used for collecting data from a surface such as a table. It determines where the surface is being touched, and relays this information. The information may be received through the TUIO protocol, via Windows 7 Touch output or over a LocalConnection using ActionScript Message Format (AMF).

This guide provides information and links to other resources about receiving data through through TUIO and Windows 7 Touch Output.

Included in the API are sample applications for TUIO and AMF using the Illuminate Tracker. These should give a general idea of how to use the Tracker data.

Detailed information about developing C++ applications to receive AMF data is provided in the Data Transfer AMF Guide, available from GestureTek.

2 Licenses

The ActionScript 3 TUIO library and the FLOSC server found in this package are licensed under the MIT License, which can be found at http://www.opensource.org/licenses/mit-license.php.

3 Methods

The Illuminate Tracker can output data via the following methods: Windows 7 Touch output, Dazzler, TUIO or via a LocalConnection using AMF.

3.1 Windows 7

New hardware and API elements in the Windows 7 operating system provide applications the ability to receive input from multiple points of contact. Two new types of messages are provided. **WM_TOUCH** reports the action (up, down, move), position and an identifier for touch points. **WM_GESTURE** is sent to the appropriate application window when user input is recognized as a gesture. **WM_GESTURE** messages are received by default.

Click here for information about how to receive and interpret Windows Touch Input.

Click here for information about how to add Windows Touch gesture support to applications.

Click here for Windows Touch Samples.
3.2 **Dazzler**

Dazzler is a rich media player that allows the user to show images, video, audio and flash content that can interact with a number of different GestureTek trackers. It can be used to run a large library of GestureTek games and effects.

3.3 **TUIO**

TUIO is a standard protocol for interaction between applications and a table-top tangible user interface, such as the Illuminate Tracker. The protocol specification can be found at [http://www.tuio.org/?tuio11](http://www.tuio.org/?tuio11). Several libraries exist for implementing TUIO in applications; a Flash library for this purpose can be found at [http://code.google.com/p/tuio-as3-lib/](http://code.google.com/p/tuio-as3-lib/). This specific library makes use of the FLOSC server, which can be found at [http://code.google.com/p/flosc/](http://code.google.com/p/flosc/). A TUIO simulator, which mimics a TUIO device for testing purposes, is available under the GPL at [http://reactable.iua.upf.edu/?software](http://reactable.iua.upf.edu/?software).

At present, the Illuminate Tracker only sends TUIO data representing 2D fingertip objects; support for other objects will become available at a later date.
3.4 AMF

ActionScript Message Format is a proprietary data format created by Macromedia (now Adobe) and used by different mediums. A LocalConnection class is built in to ActionScript 3. See http://www.adobe.com/support/flash/action_scripts/actionscript_dictionary/actionscript_dictionary437.html for more information.

The Tracker sends data to a connection, TrackerOutput and calls a function, ReceiveData(Object). The object received by this method will have properties as follows:

**Path name**

- Camera [object] An object containing information about the camera.

**Variables**

- Width [Number] The width of the camera image in pixels.
- Height [Number] The height of the camera image in pixels.
- VertMirror [Number] If the camera image is flipped vertically, this value will be 1; otherwise it will be 0.
- HorzMirror [Number] If the camera image is flipped horizontally, this value will be 1; otherwise it will be 0.
Path name

IRThreshold [Object]  An object with a single variable.

Variables

GridWarpSwapOutFingertipCoords [Array]  The elements of this array are objects representing touch data from the surface, with the following properties:

- x [Number]  The x co-ordinate of the touch, in the range [0,1] with 0 being the left edge of the screen and 1 being the right edge.
- y [Number]  The y co-ordinate of the touch, in the range [0,1] with 0 being the top edge of the screen and 1 being the bottom edge.
- z [Number]  An identifier for this specific touch, which allows a program to track the motion of a touch across the surface.

Note that the elements in this array are in no specific order, and are not guaranteed to maintain ordering across update calls.
3.4.1 Samples

A simple program which receives tracker input may be written as follows:

```
// Open a local connection to the tracker output
var lc:LocalConnection = new LocalConnection();
lc.connect("TrackerOutput");

// Function:
// ReceiveData
// Description:
// Called when tracker data is received
// Params:
// params
//   The tracker data
// Returns:
// void
// function ReceiveData(param):void
//   Get fingertip points from tracker
var points = param.IRThreshold.GridWarpSwapOutFingertipCoords;
if (undefined == points)
{
  return;
}
// Convert points to stage coordinates
for(var i:int = 0; i < points.length; i++)
{
  points[i].x = points[i].x * stage.stageWidth;
  points[i].y = points[i].y * stage.stageHeight;
  trace("(" , points[i].x , "," , points[i].y ")");
}
// TODO: Update application here
lc.client = this;
```

The following code uses mouse input to fake tracker data:

```
onMouseDown = function()
{
  // Create simulated tracker data with finger at mouse position
  var param = Object();
  param.IRThreshold = Object();
  param.IRThreshold.GridWarpSwapOutFingertipCoords = Array(1);
  param.IRThreshold.GridWarpSwapOutFingertipCoords[0] = Object();
  param.IRThreshold.GridWarpSwapOutFingertipCoords[0].x = Number(_xmouse) / Number(Stage.width);
  param.IRThreshold.GridWarpSwapOutFingertipCoords[0].y = Number(_ymouse) / Number(Stage.height);
  param.IRThreshold.GridWarpSwapOutFingertipCoords[0].z = 1;
  // Handle tracker data as normal
  lc.ReceiveData(param);
};
```
4 Demos

Running the Demos

Before running the demos, make sure that the Illuminate tracker (or your input simulator) is already running.

The TUIO demos use a FLOSC server to send TUIO data from the Tracker to the Flash applications. To launch the server, use the `run.bat` script found in the FLOSC directory. The FLOSC server must be running before the TUIO demos are started. The FLOSC data is received in ActionScript 3.0 using the OSCConnector and tuio-as3-lib open source libraries. In order for Flash to access the TUIO data, it must have the proper security privileges. You can change your Flash Security Settings at http://www.macromedia.com/support/documentation/en/flashplayer/help/settings_manager04.html. Make sure that the .swf file of the demo is trusted.

SampleDemo

SampleAMFDemo.fla and SampleTUIODemo.fla are programs which watch for touch data and draw circles which follow fingers along the otherwise black surface. See Figure 1.

![Figure 1: SampleDemo](image-url)
ScaleRotateDragDemo

TUIOScaleRotateDragDemo.fla and AMFScaleRotateDragDemo.fla are programs which place an image (a stylized asperand) on the surface and allow the user to drag, rotate and stretch it. See Figure 2.

Figure 2: ScaleRotateDragDemo
5  GestureTek Contact Information

GestureTek Website:  http://www.gesturetek.com


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