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A SOFTWARE METHOD TO SOLVE WAVY LINE EFFECT WHILE DRAWING SLASH LINE ON TOUCH SCREEN

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A software method to solve wavy line effect while drawing slash line on touch screen

Abstract

When we draw slash line on touch screen slowly for example 1inch/second, we will not able to get a straight line on the screen like drawing in the direction of vertical or horizontal. From experiment, it is a common defect of touch controller in the market. We can both find the defect in products as well as the other laptop. Though that, feedback from IHV is it is the limitation of their algorithm of their ASIC. Here we introduce a method to improve the quality by a software module and algorithm.

Method

Analyzing the root cause of the issue is when we draw vertical or horizontal line on the touch screen. On the condition, the ASIC will locate on the same TX or RX channel and it's no need to consider other side capacitance offset. On the contrary. The slash line needs to consider TX and RX capacitance offset.
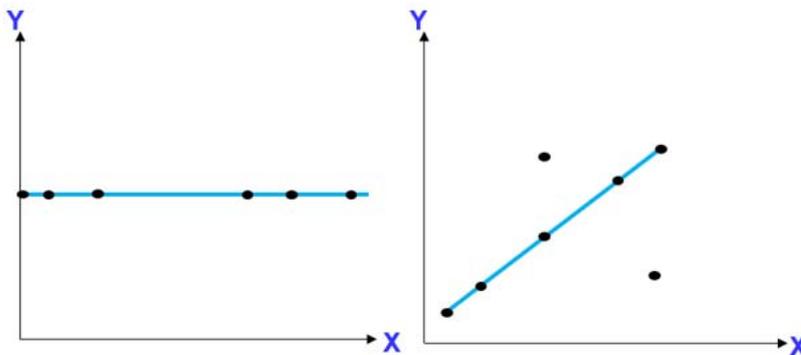
The root causes for our investigation for why the defect is happen only on fast drawing are:

- While fast drawing, touch device just reports few points, that is the reason why those points easily links as a straight line.
- While slow drawing, device reports much more packages, the wavy line is easy

to be discovered.

Since touch controller is a control ASIC which is difficult to update its algorithm, here we introduce a method to improve the quality by a software module and algorithm.

We solve the issue which claim a limitation form IHV by inject a filter driver on the lower layer of the HID mini port driver stack. By analyzing the behavior, it only happen when you draw a slash line on the screen with low moving speed. From the Raw data package, we can find the different between high speed and low speed while drawing slash line is : the data report from touch controller is duplicate on one time stamp with different location which will impact the algorithm of windows touch. So our filter driver will accord algorithm (1) to trim the duplicate data and report it as the high speed data package to make the slash line straight. The algorithm is:

Capture the first 5 data package to calculate the slop of the slop between the first one and the fifth one, if the degree of slop meets the following requirement:

- When the 60>slop > 30 degree ,it is defined the user would like to draw a slash line.
- Calculate the distance of each x ,y to line (x1,y1;x5,y5) if it is bigger than 1 mm ,trim this one.

Here is the function block of the filter driver ,red marked is our slash filter driver.
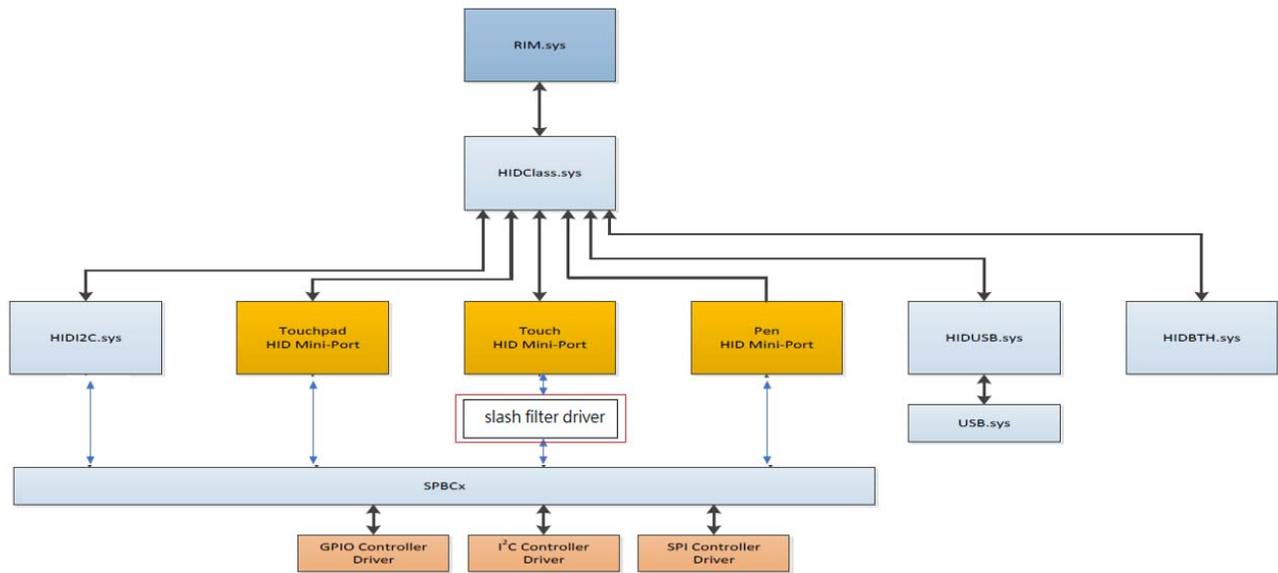
We use two thread to implement the algorithm, one is to get raw package into a queue and the other is the main algorithm of the slash filter driver:

Cyclic Char Package*

Thread1()

{

Package Input (datain);

memcpy(package queue,datain);

package++;

}

Package Input process

{

Retrive 5 packages from package queue;

SLOP1=(Y5-Y1)/(X5-X1)

If(SLOP1>10)

```
{
  Slash line;
  For each X,Y
 If (distance of each x,y  to line (x1,y1;x5,y5) > 1 mm)
{
  Remove the point;
}


}
```

Disclosed by David Ke, HP Inc.