LPC82x Touch/Gesture Solution FAQs

Revision history

Rev	Date	Description
1.0	20150521	Initial version

Q1: How do I get started with the LPC82x Touch Solution?

A1:
1. Buy the LPC82x Touch Solution Kit (OM13081)
2. Download the Touch GUI from: http://www.lpcware.com/LPC82x_Touch_Solution
3. Connect the OM13081 Kit to PC/Laptop with USB cable
4. Launch the Touch GUI (.exe), select proper COM port, Baud rate (9600 or 115200) and Open Com Port
5. Start touching the Touchpad & you will see the touch status/position displayed
6. Refer Quick Start Guide (AN11622) for more details
   http://www.nxp.com/documents/application_note/AN11622.pdf

Q2: Where can I order the LPC82x Touch Solution Kit (OM13081)?

A2: The OM13081 Kit can be ordered with your local NXP distributors or check the following link
http://www.nxp.com/demoboard/OM13081.html#ordering

Q3: How can I get the Touch GUI working?

A3: Follow the steps in order.
1. Connect the OM13081 Kit to PC/Laptop with Micro USB cable.
2. If you are using mbed board for the first time, you need to download and install the mbed windows serial port driver from http://developer.mbed.org/handbook/Windows-serial-configuration.
3. Launch the Touch GUI (.exe).
4. Select proper COM port, Baud rate (9600 or 115200) and click on "Open Com Port". The radio button next to Baud rate should turn "Green".
5. Start touching the Touchpad & you will see the touch status/position displayed.

Q4: Why is my hardware (OM13081 board) less responsive/sensitive to touch?

A4: The hardware board needs an adjusted sensitivity (System gain) parameter to improve the sensor's responsiveness. For the same, you can simply re-flash the updated firmware (AN11620_binary_V02) binary available at
http://www.lpcware.com/LPC82x_Touch_Solution
Refer to question below or Quick Start Guide (AN11622) for firmware programming.

Q5:   Can I have thicker (1mm/2mm) overlay on this touchpad/sensor shield?

A5:   No, this sensor shield is designed for 0.5mm thicker overlay.
        For using thicker overlay, you need to re-design the touchpad/sensors following the
        Hardware Design Guide (AN11623). You can as well use the NXP Touchpad
        Calculator.xls to avoid manual calculations.

Q6:   How can I load new firmware into the OM13081 Kit?

A6:   As soon as you connect the kit to PC/Laptop with USB cable, it will appear as a mass
        storage device at the host PC/Laptop (for example MBED D/:). Then you can simply
        Copy Paste or Drag Drop the binary file to this mass storage device and wait few
        seconds until the programming is finished. Finally, reset the board!

Q7:   Where can I find the Touch Solution Library, Firmware, Schematics or board layout?

A7:   All these details can be found at: http://www.lpcware.com/LPC82x_Touch_Solution

Q8:   Where can I find the Quick Start Guide, Library User Guide, Hardware Design Guide
        and Application Notes?

A8:   All these documents can be found on LPC82x Touch Solution homepage
        http://www.nxp.com/demoboard/OM13081.html#documentation

Q9:   How can I change the overall sensitivity of touchpad (touch sensors)?

A9:   It's very easy and convenient to increase/decrease the overall sensitivity of the touch
        pad (touch sensors) using the Touch GUI. Simply change (increase/decrease) the
        "System gain" in "Parameter settings" and save changes to the target, by clicking
        "Write parameters to target" and that's it! Refer to the LPC82x Touch Solution
        Application Note (AN11620) for more details.
        http://www.nxp.com/documents/application_note/AN11620.pdf

Q10:   What's the resolution of touch position (touchpad)?

A10:   The touch position is indicated as X-Y coordinates from 00 to 255 (8-bit resolution).

Q11:   Can I increase the number of sensors in my design?

A11:   The existing solution (Touch Library-V0100) supports a maximum of 9 sensors (3 x 3
        matrix).

Q12:   How can I design my own sensors?

A12:   Refer the Hardware Design Guide (AN11623) available at
        http://www.nxp.com/demoboard/OM13081.html#documentation
        You can also use the NXP Touchpad Calculator for calculating the sensor dimensions.
        http://www.lpcware.com/LPC82x_Touch_Solution

Q13: What are the types of sensors I can realize with this solution?

A13: One can implement all typical sensors such as Keys/buttons, Slider, wheel, Touchpad/Trackpad, etc. And since the touch position is indicated as X-Y coordinates from 00 to 255 (with 8-bit resolution), realization of any other complex sensor is also possible.

Q14: How can I interface my own sensors to the LPC82x Xpresso board?

A14: You can make your own Arduino compatible sensor shield (board) as like the one in OM13081 kit. Refer the schematics for X/Y line connections between the LPC82x Xpresso board and the Sensor shield.

Q15: Does this Touch Solution supports multi-touch functionality?

A15: No, this solution in its current form supports only single (finger) touch applications.

Q16: What is the Gesture Recognition and where it can find its applications?

A16: The Gesture Recognition is a unique feature of NXP's LPC82x Touch Solution. With this feature, one can provide a training to the touch solution with specific gestures/numbers/characters/patterns/handwritings, and then it can recognize those back when redrawn. The gesture recognition allows the biometric (behaviometric) identification of the user. As every user has his/her own style of writing different characters/numbers, it's quite challenging for any other person to reproduce them. Hence, this solution can find it's applications in the areas of security, access control, authentication, etc.

Q17: What are the pre-requisites to enable Gesture Recognition feature in my Application?

A17: The Gesture Recognition feature is supported with a separate library besides the Touch Library. So, you need to include the Gesture Recognition Library in your running touch application project. Refer to the Gesture Recognition Library User Guide (UM10897) and Application Note (AN11666) for further details.

Q18: What's the memory requirement for Gesture Recognition?

A18: The current Gesture Recognition library memory footprint of flash is just over 1.3 kb and SRAM usage is around 600 bytes. In addition, you need the memory for storing the training set depending on the number of gestures/patterns to be stored. Every recorded Gesture inside the training set takes 256 bytes, namely: 64 samples x 4 bytes (Xmin, Xmax, Ymin and Ymax).

Q19: How many maximum characters are supported in a training set?

A19: The current Gesture Recognition training set can have up to maximum of 10 (0-9) Gestures/Patterns/Characters.

Q20: How can I create and upload/store the training set to the target hardware?

A20: The easiest way to create a training set is using the Touch Solution GUI. Windows based Touch Solution GUI supports the creation and uploading/storing of a training set to the target hardware (using USB - UART communication).

Q21: Where's the Gesture Recognition training set stored?

A21: As such the training set can be stored in SRAM, flash or EEPROM based on the target memory availability. The user must initialize/configure sufficient memory area accordingly in the application code. The current solution (application) stores it in the internal Flash memory of microcontroller.

Q22: What's the memory size required for Gesture Recognition training set?

A22: Every recorded Gesture in the training set takes 256 bytes (64 samples x 4 bytes: Xmin, Xmax, Ymin and Ymax). So, for example a training set that contains 8 gestures would require 8 x 256 bytes = 2048 bytes of memory.

Q23: Does the character/pattern to be trained have to resemble with the Gesture number?

A23: A drawing pattern for a gesture (or a character) can be arbitrary and doesn't need to match the gesture number in size or shape.

Q24: What's the significance of number of trainings per Gesture?

A24: For each gesture, the series of touch positions are recorded multiple times (user configurable up to 99) and the reference pattern considering deviations (within predetermined tolerance range) of each iteration is calculated. Multiple iterations while training a specific gesture helps in taking into consideration all user variations or dynamics (speed, size etc). Thus for every gesture, a kind of reference map is created.

Q25: While creating a training set, the uniqueness check fails?

A25: When the creation of a training set is ended, a uniqueness (distinctive gestures) check is performed. It checks if the two gestures are too similar (i.e. '1' & 'l'). The test uses a Monte Carlo algorithm (=random points inside a gesture limit, which are compared to all other gestures for distinctiveness). One should clear all the previous gestures in memory before starting the new training, otherwise the uniqueness check might fail.

Q26: What does quality indicator indicates while creating a training set?

A26: The quality indicator indicates the best compromise between FAR (False Acceptance Rate) and FRR (False Rejection rate). It is a relation between gesture area and full area of ~10%. If you are below that number, then your limits are very close together and it is hard to repeat the exact gesture, resulting in a higher FRR. If the error limits are too wide, nearly every drawing will be recognized as gesture.

Q27:   How much time is spent in Touch sensing and Gesture Recognition together?

A27:   It takes 3.6msec for sensing all 9 sensors and calculating the touch position. The gesture recognition timings depends on the training set. Assuming the training set contains 10 gestures, then running the complete gesture recognition algorithm to find a match / no match takes approximately 42 milliseconds.

Q28:   I have a question not covered in this FAQ, who should I contact?

A28:   For more information or further questions, please open a technical support case at http://www.nxp.com/get-support