CS6650 – Akshat, Shamjid, Vedaant

Smart Sensing for IoT / IR Touch detection (smIRtouch)

Presentation and Demo

CS19B052 / EE21Z042 / CS19B046

The Quest

Sensing touch on a 1ft x 1ft to 2ft x 2ft surface, using Infrared based active sensing.

Packaging the solution as a bluetooth device.

Illustrations by Pixeltrue on icons8

The Path

(variants)

1. Single Bar (single line)
2. Double Bar (2 lines)
3. Double Bar (4 lines)

4. Creating a script that digitizes the sensed values

some useful properties

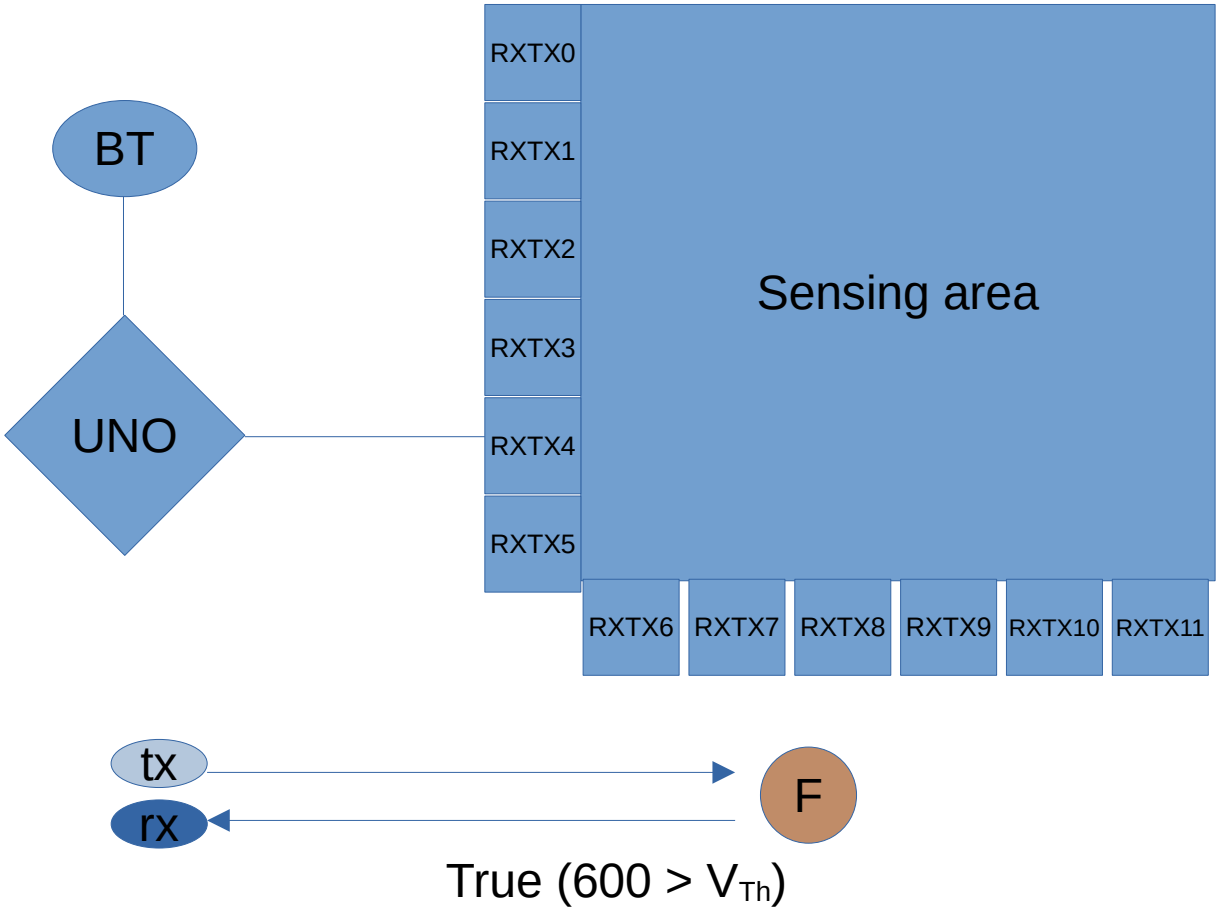
- IR LEDs are highly directional.

- IR phototransistors have been used extensively in industry, for measuring high frequency IR pulses in remote applications and IR based touch technology has been used in Smart Class solutions

- Using IR based technology implies less dependence on kind of surface, and rugged build

- The intensity variation for distances of 1ft for our 3mm LEDs was fair, and enough for application as a touch screen.

the double bar approach



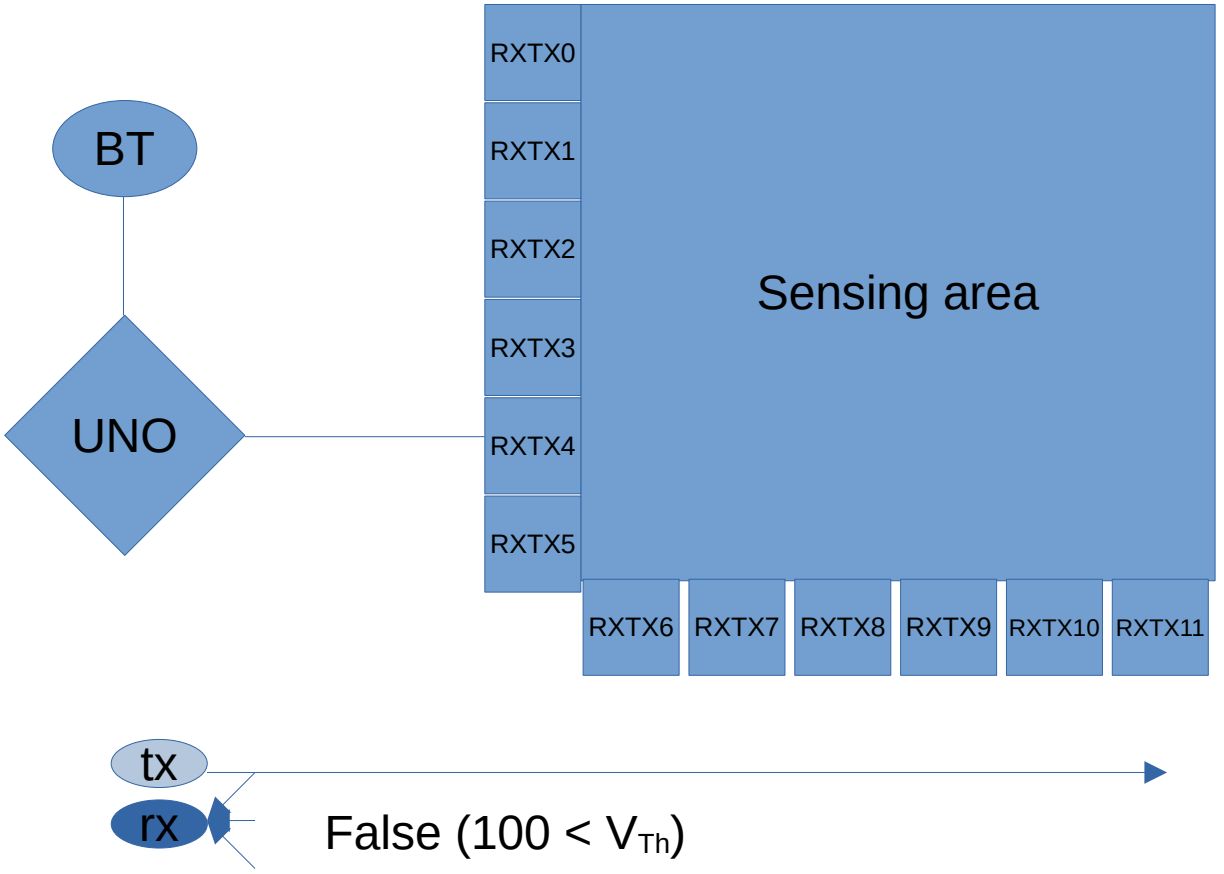
RX: IR phototransistor
(reads amount of IR falling on it)
TX: IR LED
(highly directional source of IR)

TX sends.
If Finger obstructs path of TX,
IR bounces off it and goes to
RX. We get a high analog read.

We scan for each horizontal
And vertical line.

Due to UNO limitations we
Use a Mux (12-1 and 12-3).

the double bar approach



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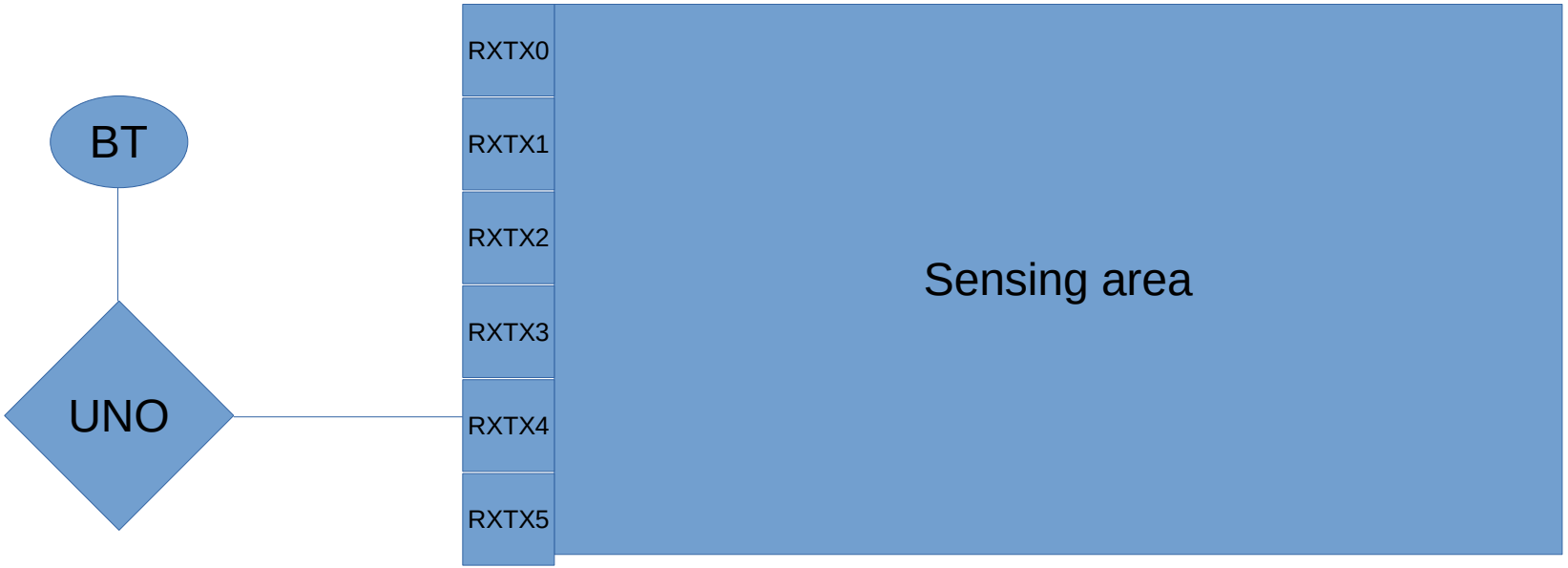
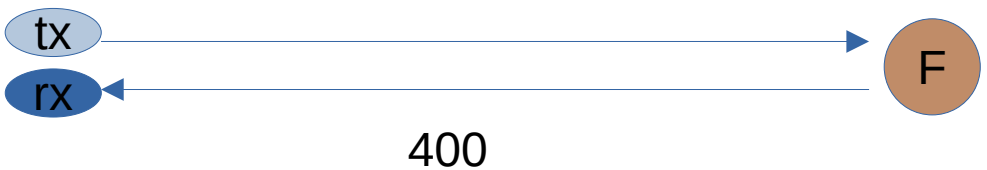


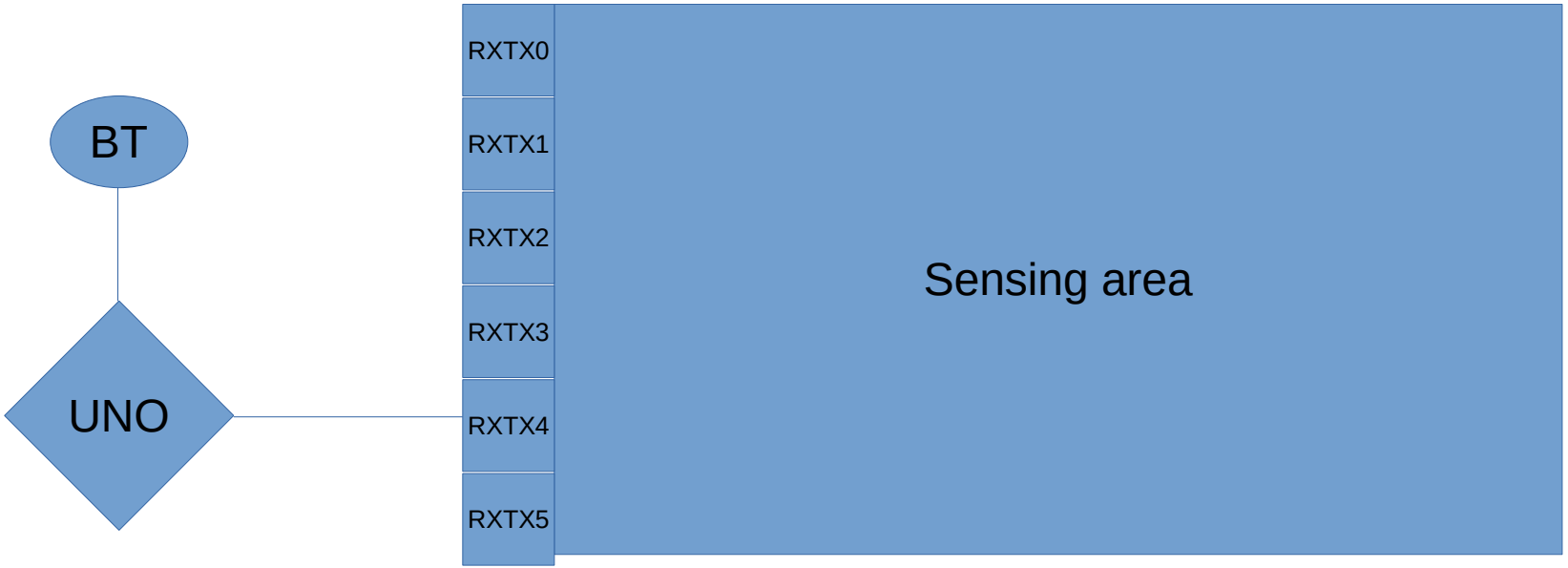


Rx: IR phototransistor

Tx: IR LED

BT: HC-05 Bluetooth Shield

the single bar approach



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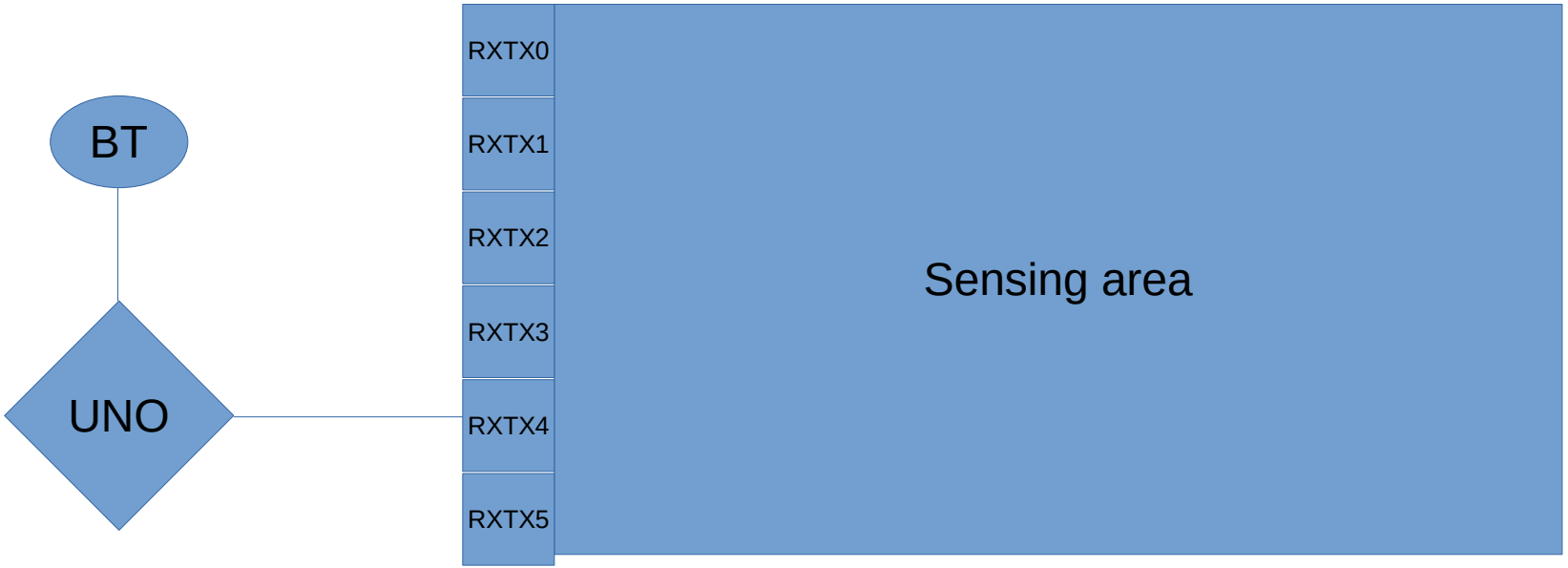

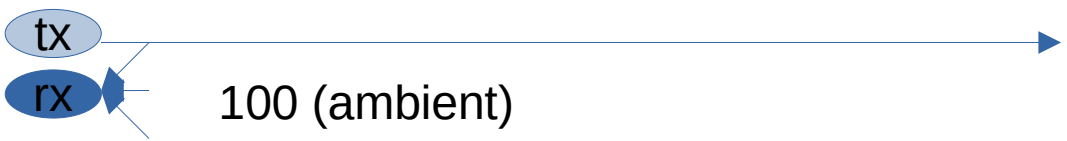

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digitizing

In the double bar models, we get a discrete output, if we have H x V RXTX pairs, we get the same resolution of H x V.

In the single bar model, for vertical axis, we get discrete output for the N units present. For the horizontal axis, we split the range into N discrete intervals (during calibration we find out the range of sensing for the distance). In our tests, interpolation seemed to give good values (i.e. resolution of 2N x 2N for N sensors).

calibration

We need to remove the ambient IR component for the readings, and know the minimum and maximum values for a distance. For these, we perform calibration before we begin sensing.

We get the base value (default when sensing nothing), and any displaced values (extremes of values when touched).