About the channel switcher

-- Status and what I have tested in March

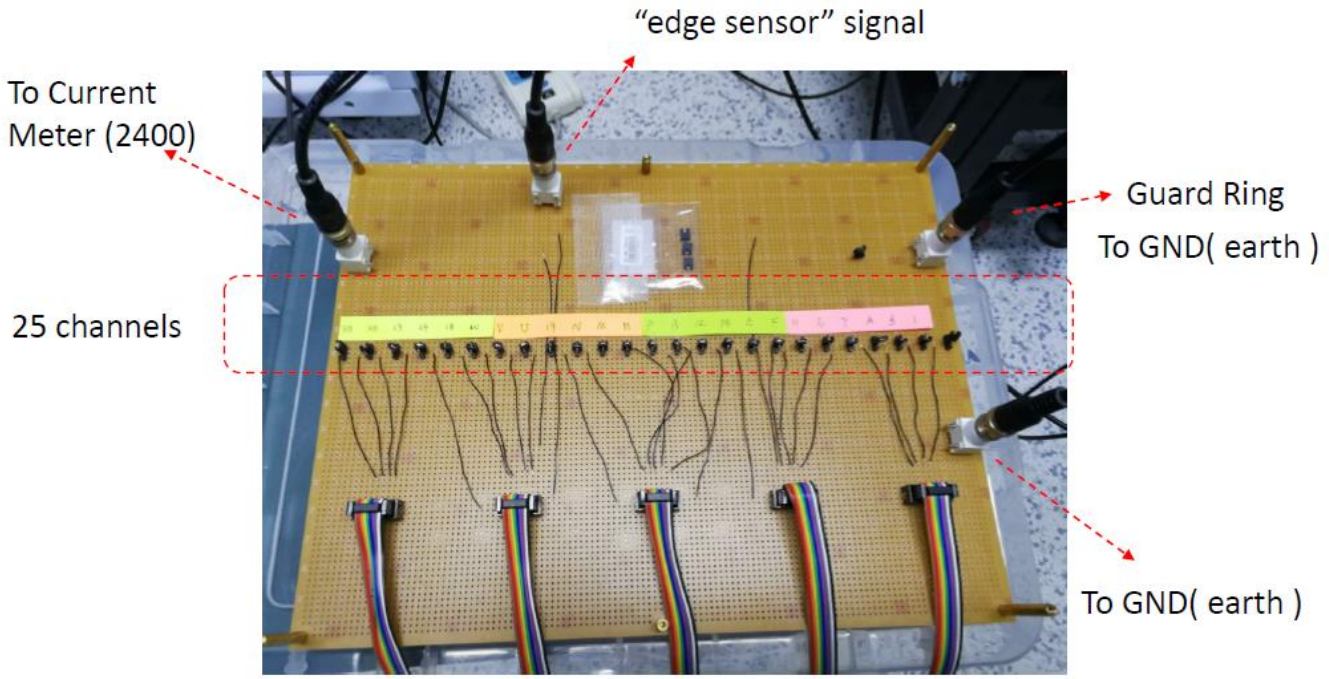
04/11/2019

Channel Switcher

Now we have to switch each channel by manual

Not only the procedure is not effective at all, but also it is difficult to adopt this way for 15x15 array

Switching channels -- manually



from past slide

Requirement

-- Can be controlled “remotely” (<---> so far “manual” switch)

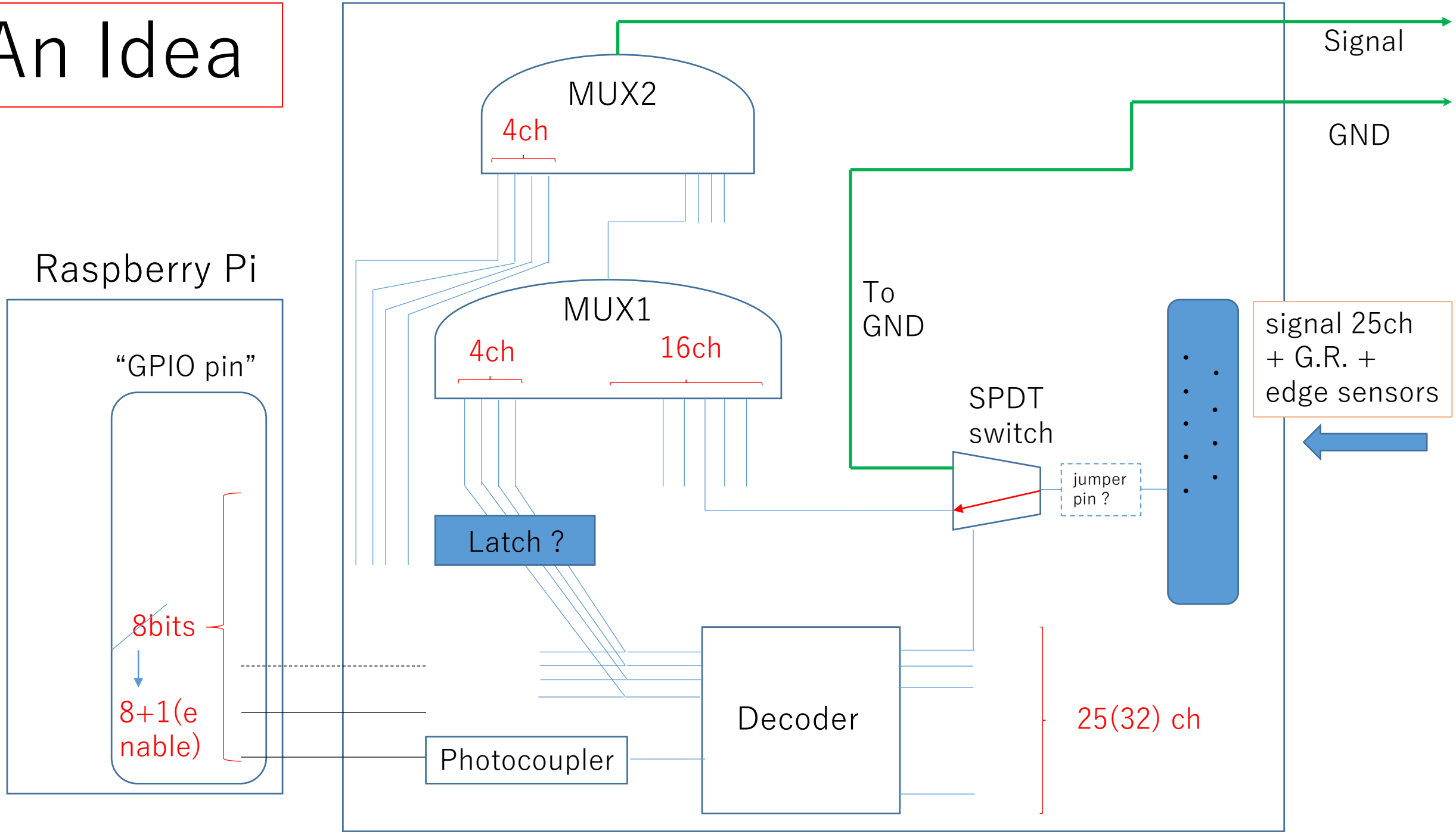
-- “Raspberry Pi” is selected for this purpose. SCIPP groups selects “Arduino”

-- Number of channels to be switched is 25 (=5x5 pads).
(Possible upgrade would be 225 (=15x15).)

-- Current precision should be kept lower than 0.1nA.
At worst case, 1nA, in this case we can only measure the break down voltage.

-- It is desired to be made that the rest of un-selected channels (25 - 1 = 24 channels) + G.R. could be connected to the ground or be kept floating, == make it selectable.

An Idea


Signal
GND
MUX2
4ch
MUX1
4ch
16ch
To
GND
SPDT
switch
jumper
pin ?
signal 25ch
+ G.R. +
edge sensors
Raspberry Pi
“GPIO pin”
Latch ?
8bits
8+1(e
nable)
Photocoupler
Decoder
25(32) ch

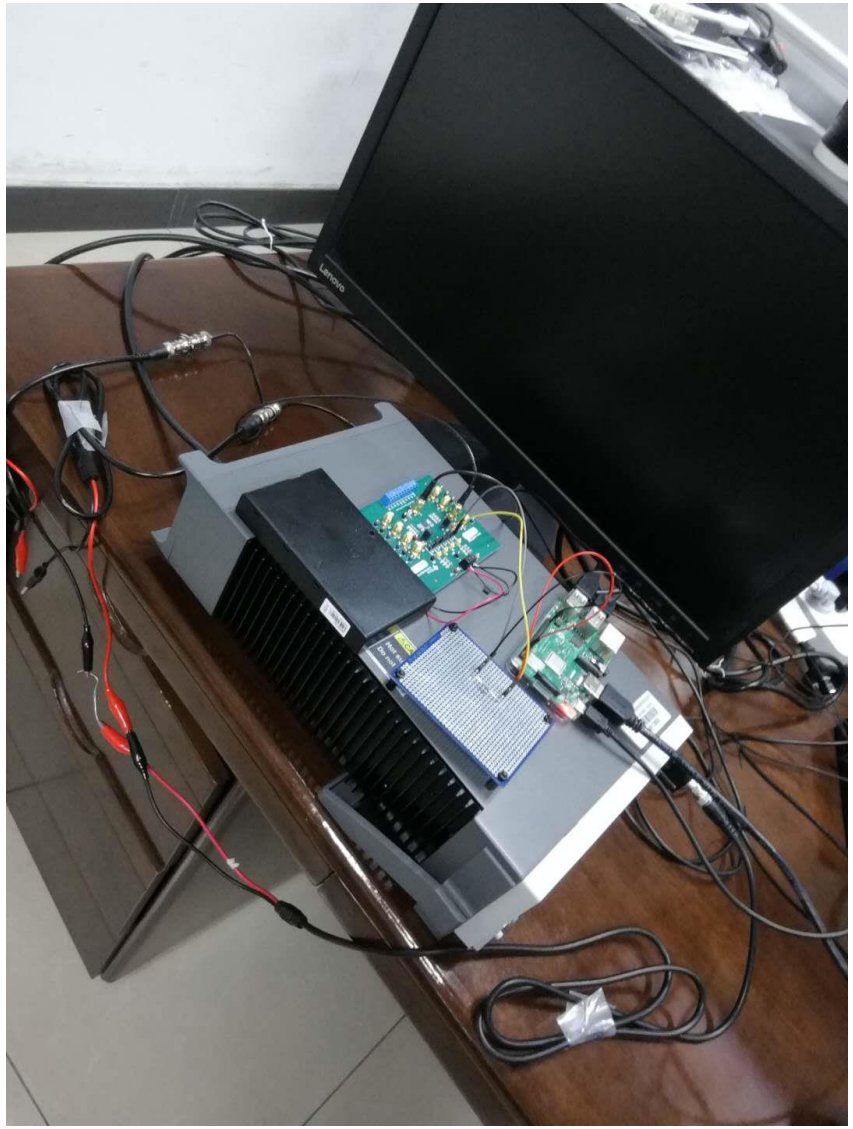
First step

- Raspberry PI (3B+)

  -- OS : “Raspbian” (for test)
  -- Using GPIO pins to send address to the multiplxer
  -- Since the output of GPIO is fixed at 3.3V with maximum current of 16mA, a resistor is temporally inserted (seen on the blue universal circuit board)

- Evaluation board of a multiplexer

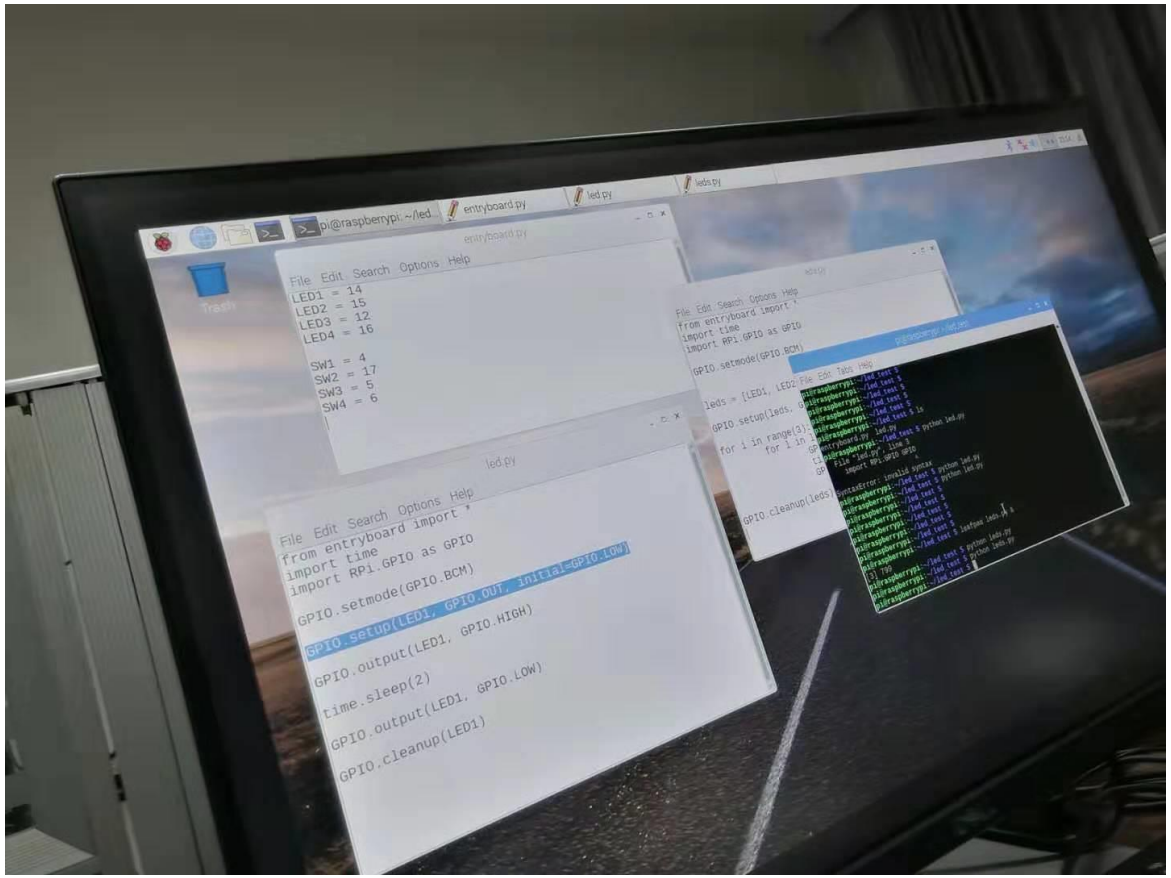
  -- TI, MUX36S08EVM-PDK
  to evaluate multiplexer “MUX36S08”
  -- Batteries (+12V) was used at the test to eliminate any noise from P.S.



Status

-- Current fluctuation level was O(several*10)pA as seen in the photo.
==> this level is acceptable for test with the probe card.

Fig : Since a resistor of 1MΩ is inserted, 1V/1MΩ = 0.01 μA is the nominal current.



Raspberian Desktop

Next step

If we continue this path, , ,

-- Draw a prototype (of prototype) board design
(5x5 is better but would be fine such as 8 channel)

-- Test the functionality with I-V measurement.

-- If above test pass the requirements, then proto of 5x5 switcher
  -- Connection to the “edge” connector card would be also considered this stage.

Or consider alternative way , , ,