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FOSDEM'21

# Content

- The 1<sup>st</sup> year summary of openwifi online
- Some highlights
- Community engagement
- Low cost hardware
- New feature planned

# Explanations – code name of the release

- V1.0.0 Ghent -- Xianjun Jiao
- V1.1.0 Taiyuan -- Wei Liu

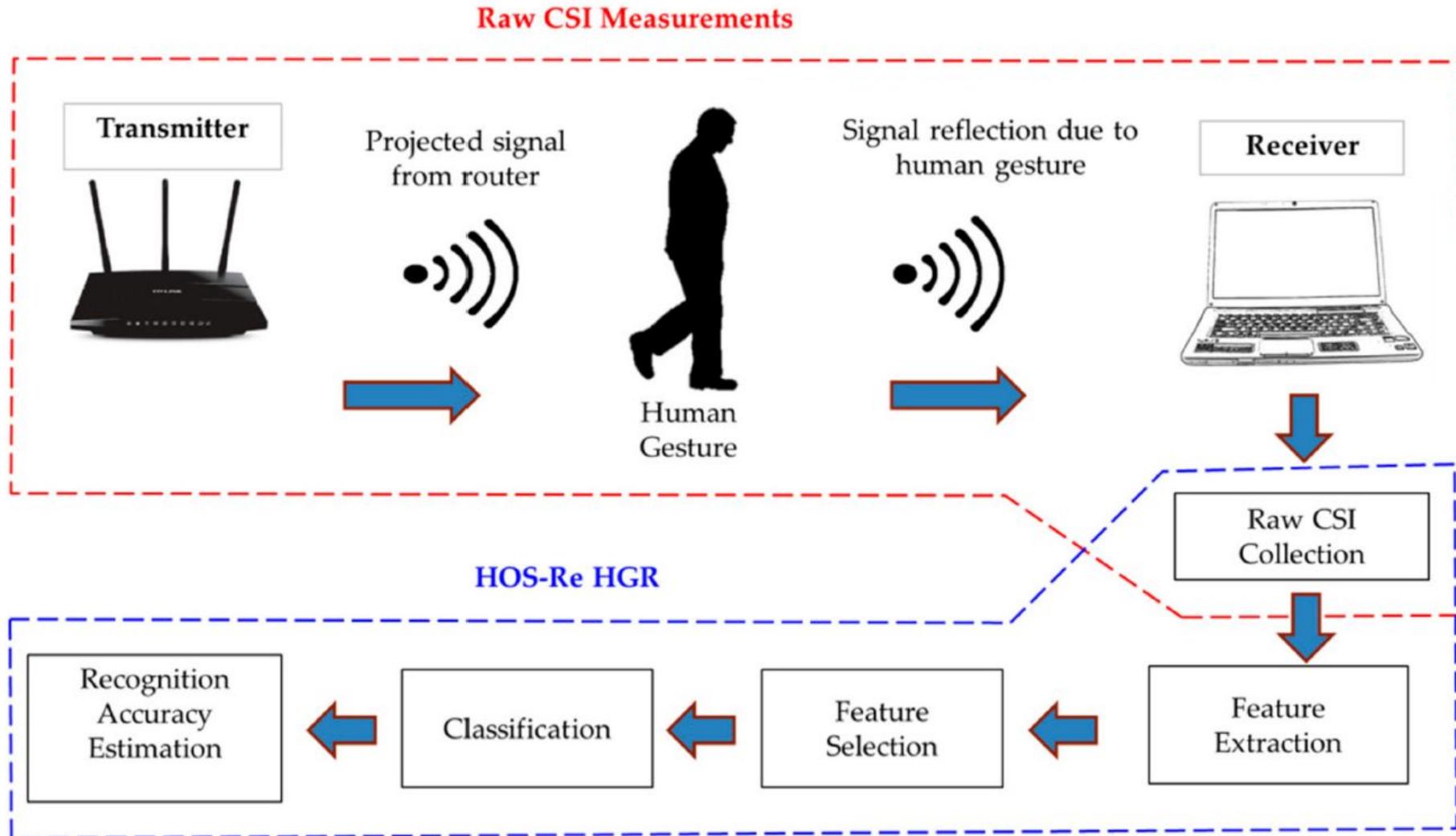


- V1.2.0 Leuven -- Michael Mehari



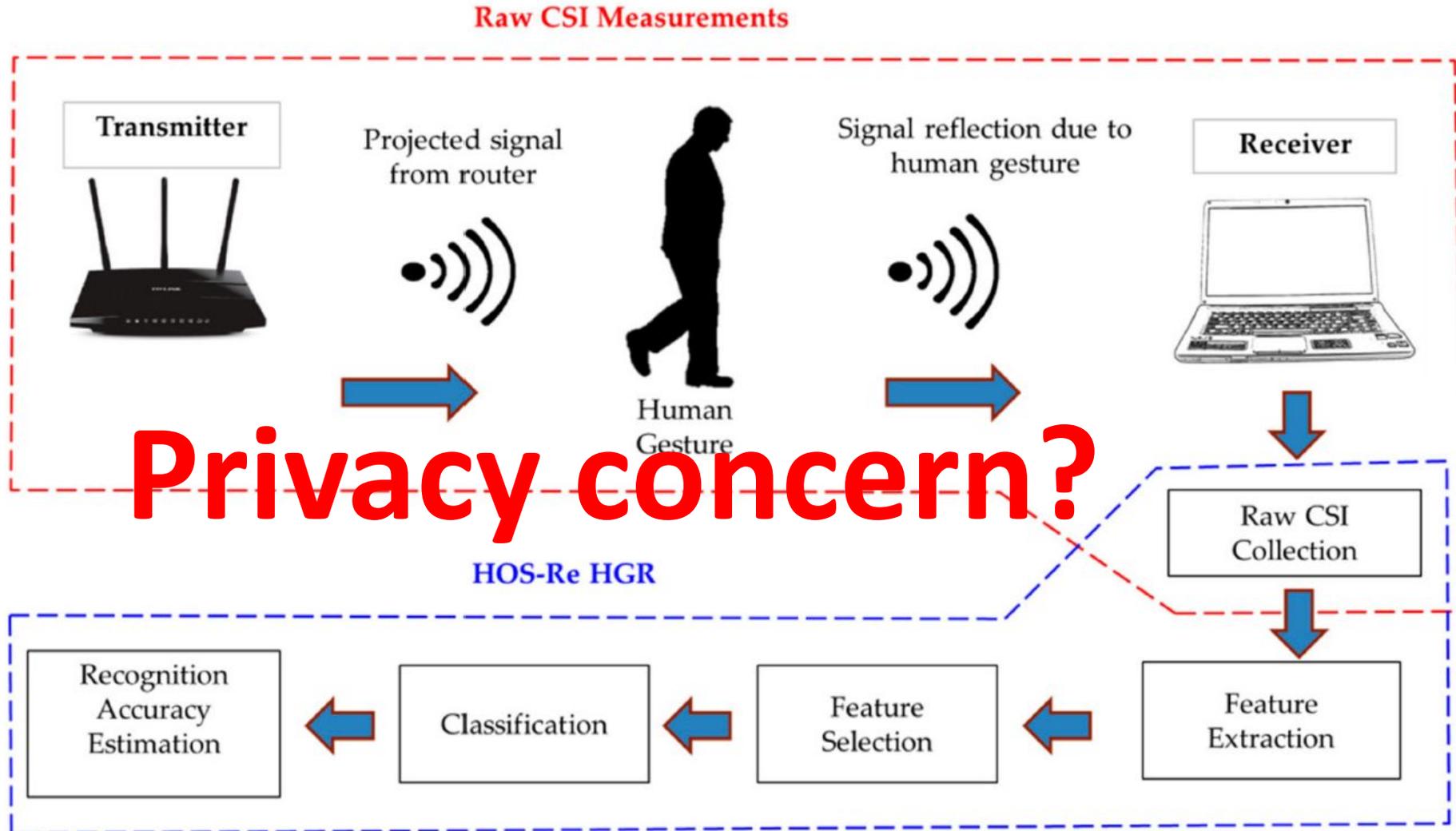
# Highlight -- CSI

- CSI – Channel State Information – Available in the chip (more than CSI)



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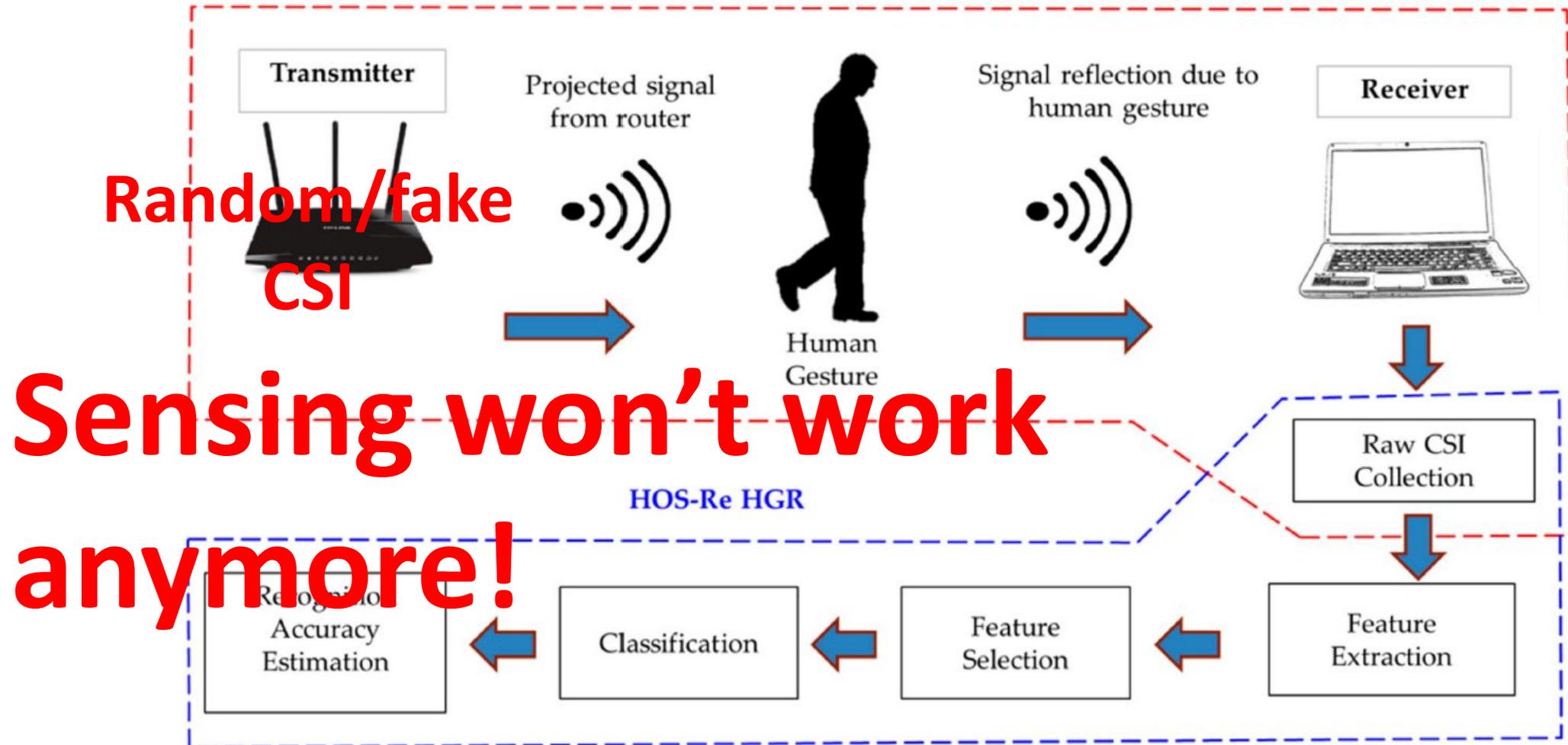
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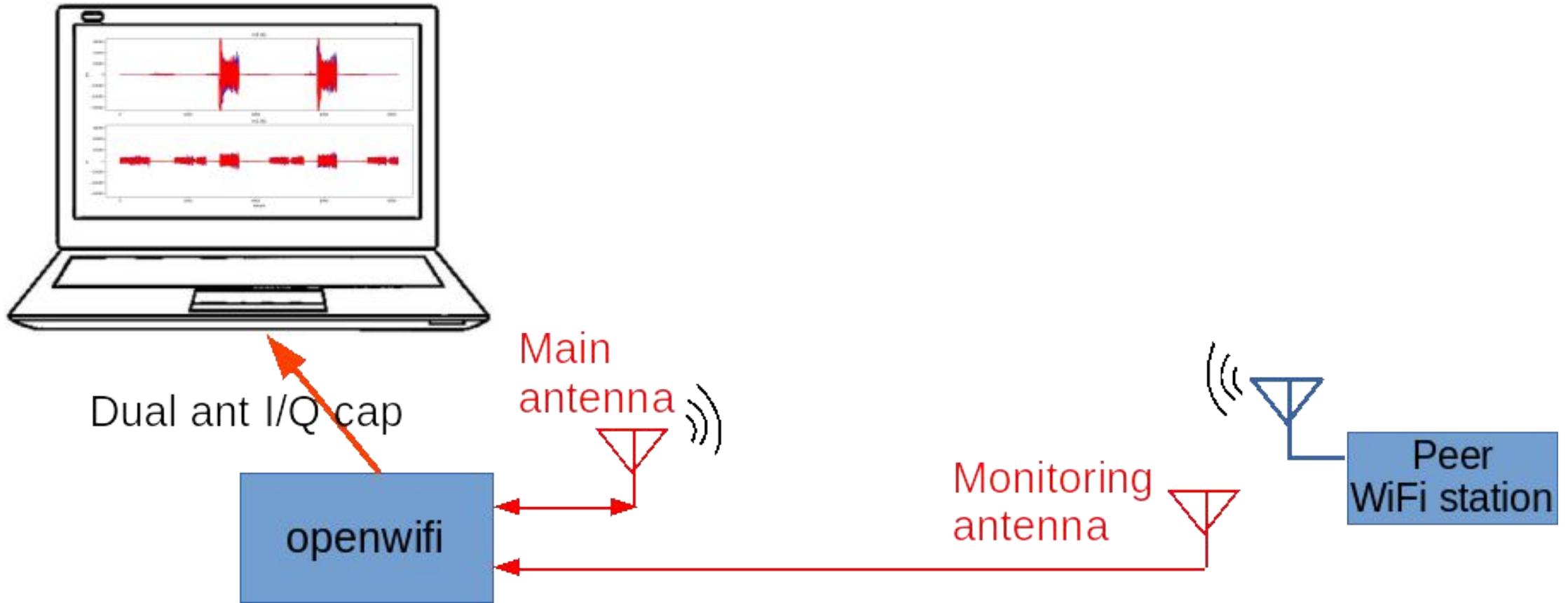
# Highlight -- CSI

- CSI – MURDER <https://ans.unibs.it/projects/csi-murder/>

Raw CSI Measurements



# Highlight – IQ sample



- Collision capture
- Debug your receiver
- Prepare for MIMO development

# Highlight – App notes

## Learn from IC company (and srsLTE)

[https://github.com/open-sdr/openwifi/tree/master/doc/app\\_notes](https://github.com/open-sdr/openwifi/tree/master/doc/app_notes)

Application notes collect many small topics about using openwifi in different scenarios/modes.

- Use openwifi on the w-iLab.t testbed remotely
- Communication between two SDR boards under AP and client mode
- Communication between two SDR boards under ad-hoc mode
- From CSI (Channel State Information) to CSI (Chip State Information)
- Capture IQ sample, AGC gain, RSSI with many types of trigger condition
- Capture dual antenna IQ for multi-purpose (capture collision)
- IEEE 802.11n (Wi-Fi 4)
- 802.11 packet injection

# Highlight – essential update

- FPGA-ARM interface -> streamlined
- Scattered IP -> grouped
- Channel estimation -> more accurate
- Build SD card -> use script
- Low MAC -> improved
- Driver panic -> fixed
- Debug Verilog -> use macro
- QoS -> supported
- Beacon -> higher priority
- Different boards -> single SD card
- Build -> more easy
- Different boards -> different code
- Side channel -> built
- Frequency offset -> bug fixed
- Collision -> less happen
- PHY TX -> less clock
- Vivado 2017.4.1 -> 2018.3
- Ref design 2018 R1 -> 2019 R1
- FPGA queue 2 -> 4
- Linux 4.9.0 -> 4.14.0
- Back off -> more compliant
- Task -> use script

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## Which are really important!

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Build -> more easy  
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# Community engagement

## Openwifi: 1st year after online github

1.6K stars

210 forks

91 watch

37 issues closed

5 issues still open

3 internal developers

3 external contributors (not merge yet)

## Rocket-chip (RISC-V): 2 years; tape out

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680 forks

192 watch

524 issues closed

189 issues still open

24 contributors ( adding > 500 lines )

- People are so satisfied with the COTS WiFi card to play with?
- Lacking killer application/feature?
- Linux driver and FPGA are too difficult for many developers?
- Hardware is too expensive (900~3600USD VS 0.5USD)?

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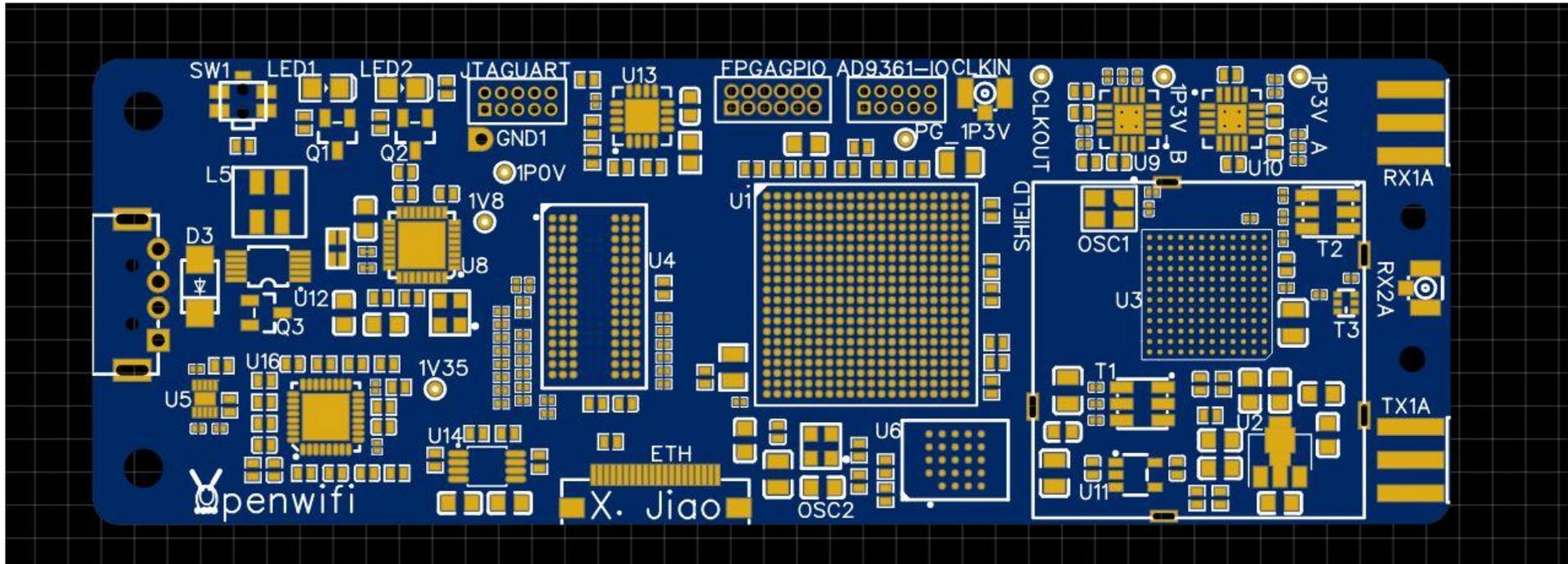
**DO COME**

**AND**

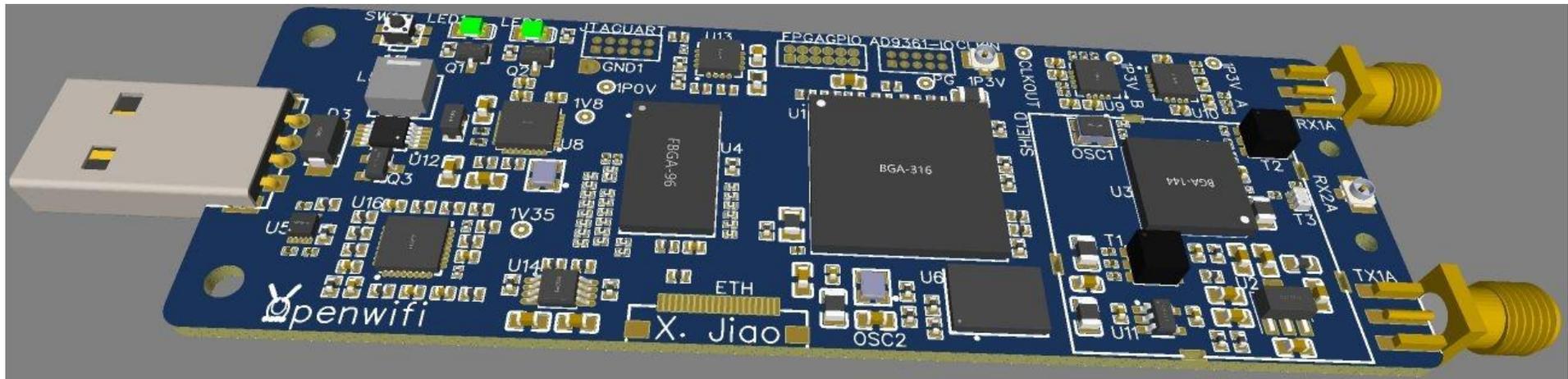
**TELL US!**

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- Lacking killer application/feature?
- Linux driver and IPG, are too difficult for many developers?
- Hardware is too expensive (900~3600USD VS 0.5USD)?

# Low cost hardware



The hardware price could be at level of +/- 200 USD



# New features planned

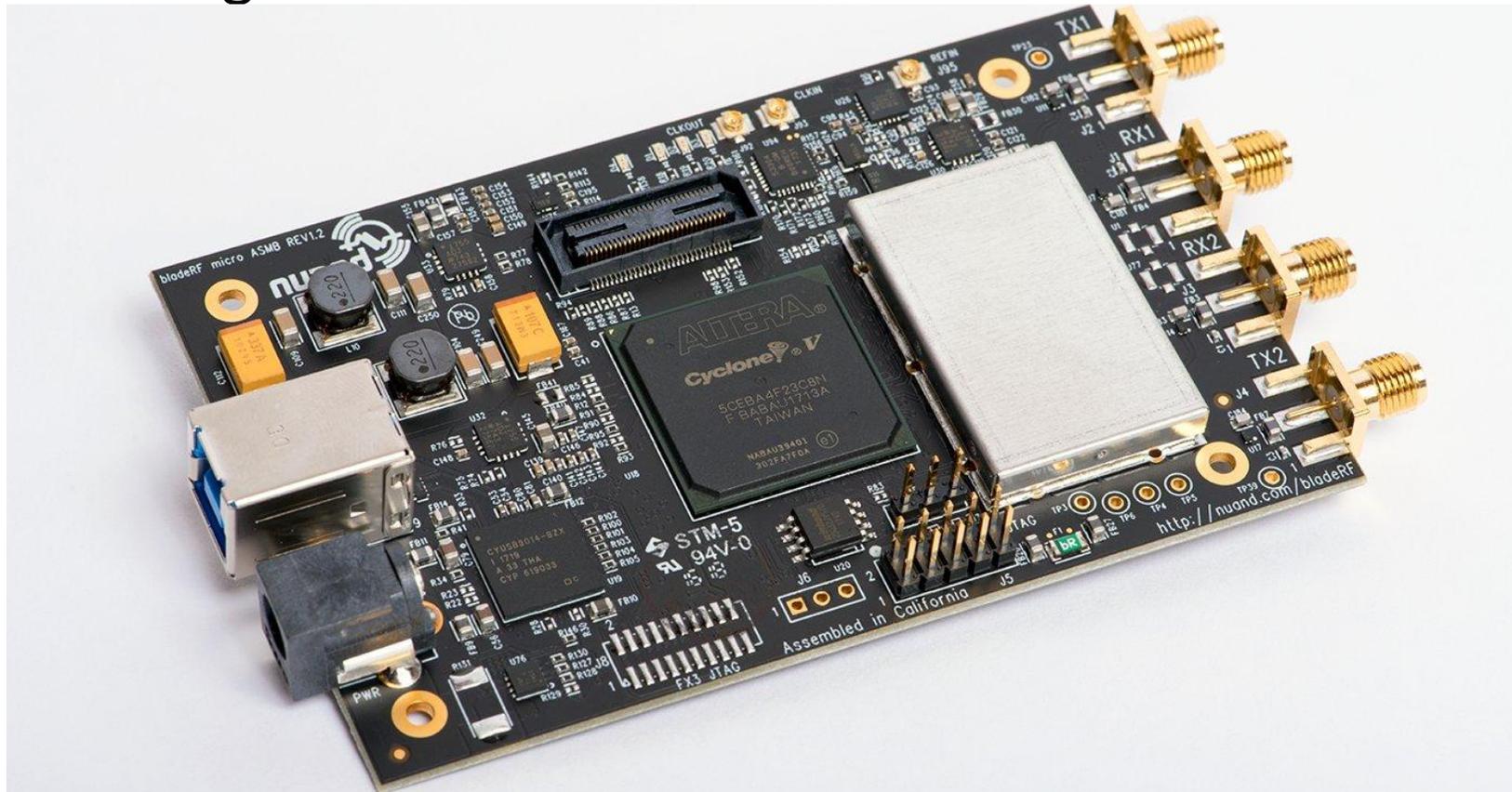
- 802.11ax/WiFi6 (Basic PHY TRX in 2021)
- MIMO (STBC/CDD TX, Combined RX)

# Breaking news!

Another FPGA WiFi just online at the beginning of 2021

<https://github.com/Nuand/bladeRF-wiphy>

Running on 720USD **bladeRF 2.0 micro xA9**



# Recap

- Openwifi made lots of progress in the 1st year online
- Will push further for the advanced features
  - Can not be done in one night
- Will try harder to grow the community. (Please help!)
- Glad to see bladeRF delivered another FPGA WiFi
  - means: there is a need!

**Thanks!**

**Questions?**