

Resume

General Info

- Yonggang (first name), Liu (last name)
- Year of Birth: 1976
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- Demo site: <https://liuyonggang1.github.io>

Introduction

My working experience is in telecom industry in my career life so far. The purpose of this resume is for seeking the opportunity not limited in telecom area. The experience on telecom area is described concisely in general. I highlight several my personal projects in the last section to show my competence on software area. Thanks for your reading in advance.

Main skill

- Python, Web, C++

Working History

Nokia

- 2020.1 – : 5G gNB system simulation developer
- 2015.6 – 2019.12: LTE system design and architect, lead/contribute eNB feature design and requirement
 - filed patent: "DEVICE, METHOD, APPARATUS AND COMPUTER READABLE MEDIUM FOR INTER-MASTER NODE HANDOVER " filed on 27 Sep 2019 with application number PCT/CN2019/108418
 - Dominant on control plane area: CatM, NB-IoT, System Info, Random Access, Paging, Handover, EN-DC
- 2013.1 – 2015.6: LTE eNB system simulation development
 - Load balance, handover parameter self of optimization
- 2011.4 – 2012.12: GSM customer interface team, technical helper for PdM and Marketing Solution team

Motorola (acquired by Nokia)

- 2008.8 – 2011.4 : GSM system engineer, lead/contribute feature design and requirement
- 2006.6 – 2008.8: Mobile phone tester/test lead
- 2002.10 – 2006.8: GSM RAN tester/test lead (automation test, plan/report/risk assessment/release notes)

ZTE

- 2001.7 – 2002.10 : CDMA RAN developer

Education

- 1998.9-2001.7 MS CS, Beijing University of Technology (Oracle DBA experience)
- 1994.9-1998.7 BS CS, Inner Mongolia University

Personal projects

In these projects from start to finish, the requirement, the design, coding and testing are all done by me alone. This experience has trained me to develop into a full stack engineer

During 2013-2015

Project 1: develop an LTE simulator to evaluate base station load balance algorithm

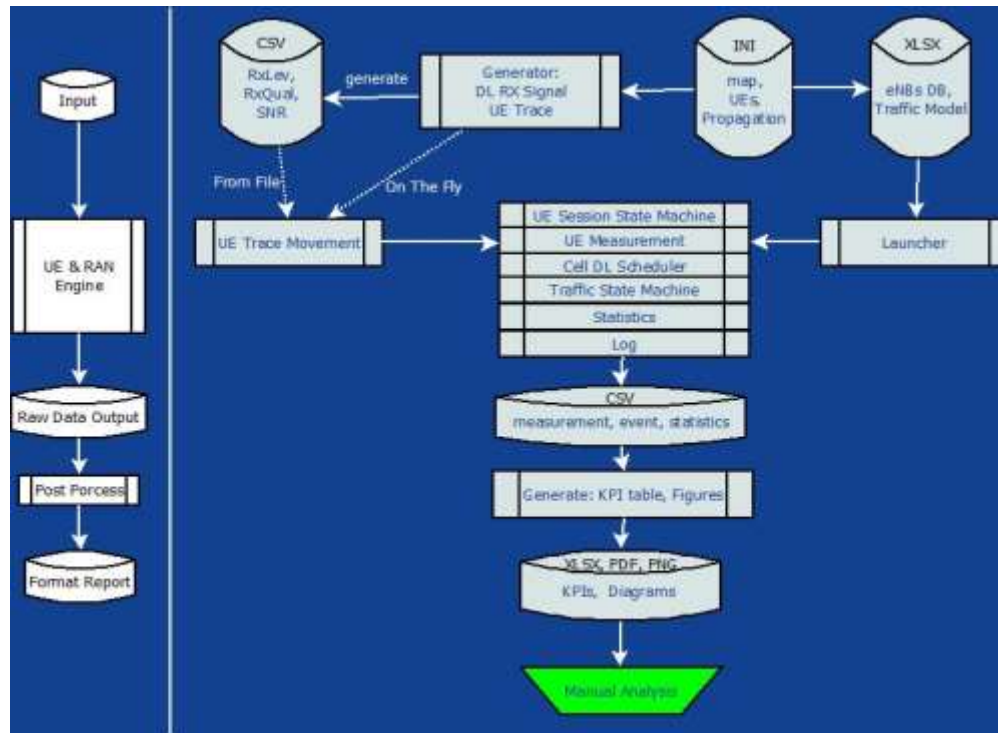
Project 2: develop an LTE simulator to evaluate self-optimization algorithm for handover between 3G and 4G

Background: Part of my group's work is to perform simulations and to evaluate results using a simulator software developed by another group. Later the simulator was end of life. I wanted to continue the simulation work and got the initial idea by reading the main function source code of the simulator. It would be difficult to continue the work on the legacy simulator without document and support. I finally chosen to develop a new simulator from start of scratch by python to catch the schedule of product feature request.

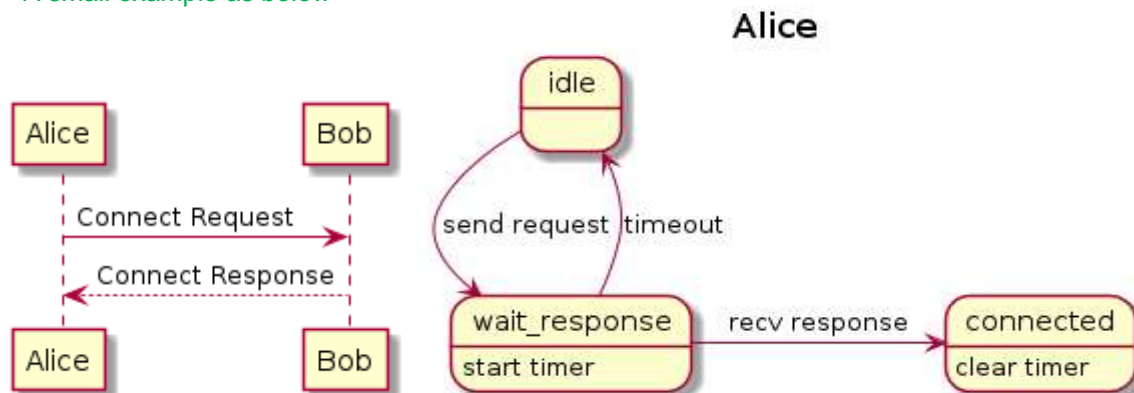
```
# the principle of the simulator
for time in range(total_time):
    for each ue doAction() # ue is mobile phone
    for each bs doAction() # bs is base station
```

Design:

- overall picture



- Figure out the state transition of base station and mobile phone
Here is my method, and I think it could be extent to the areas not limited to telecom.
 1. Determine the relation of the involved participants with message sequent chart.
 2. Figure out state machine for each participant.
 3. code level design: class and data structure.
 A small example as below



- Simplify base station resource allocation algorithm according to product specification
Here the resource could be taken as a grid with dimension of time and frequency. To some extent, it is similar as a railway ticket. For example, if a ticket for from station A to C is sold out, then ticket from A to B and B to C will be not available.
- Environmental modeling includes map layout, random mobile phone movements, calculation of the strength of signals and signal-to-noise ratio, data traffic model, stats and KPI.

During 2016-2019

The following tools 1, 2, 3 were all developed outside of my general responsibility. My intention is to improve the day-to-day productivity.

Tool 1: a friendly viewer for 4G/5G signal message

Telecom specification is the most important reference material for system engineer to design feature. An example

message: https://www.etsi.org/deliver/etsi_ts/136300_136399/136331/16.03.00_60/ts_136331v160300p.pdf (page 432-437 is ASN1 definition, page 437 to 442 is description).

View in my tool: <https://liuyonggang1.github.io/3GPP/asn1/36331.html#SystemInformationBlockType1>

The tool is composed of backend and frontend.

- Backend is developed by python
 - Input is specification in MS word format
 - Convert to plain text, retrieve the ASN1 part
 - ASN1 lexical analyzer (finite automata) and syntax analyzer
 - ASN1 specification is ITU-T X.691 https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-X.691-202102-I!!PDF-E&type=items. A tough reading. Fortunately, the tool requires just a subset
 - Associate description with ASN1 field
 - First sniff plain text
 - Then sniff the word table by python comtypes module
 - Generate json for frontend
- Frontend is the page in the website
 - Originally it was developed by javascript. Now it is developed by brython (python in browser).
 - Not use any framework except to use xlsx.js to export xlsx.
 - I grasp HTML, JS, CSS with developing the tool.
 - highlights:
 - tree prefix generation
 - tree node is loaded after click "+", this brings the good performance to load page

Tool 2: <https://liuyonggang1.github.io/3GPP/msc/msc.html>

Tool for drawing message sequence chart with combination of 4G/5G message. Click "demo" and "demo2". Not use any framework, both brython and javascript are used.

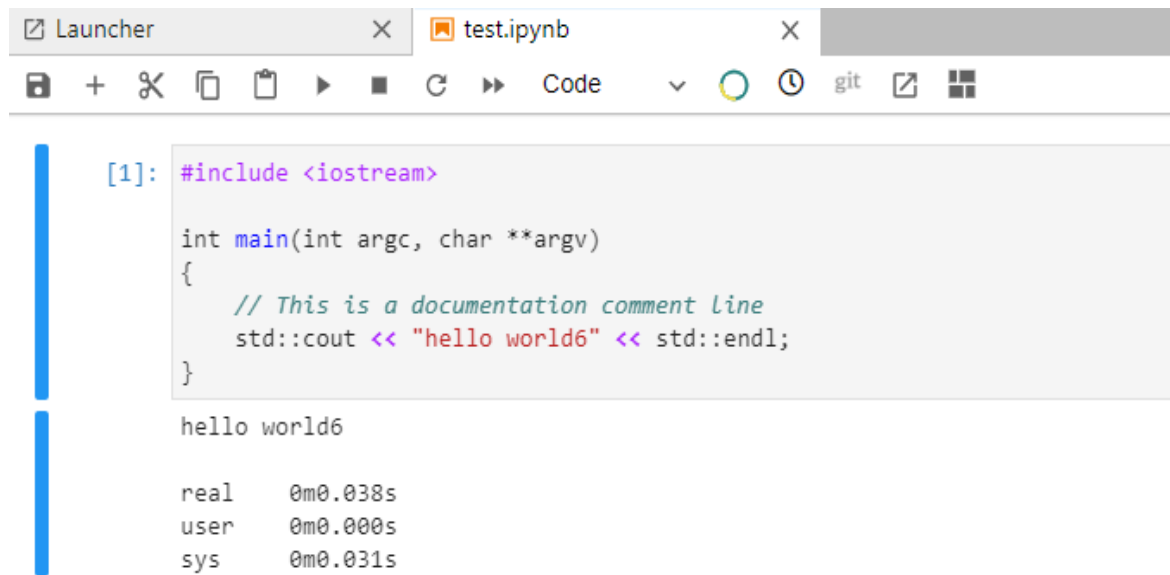
Tool 3: <https://liuyonggang1.github.io/resgrid/nr/csirs1/csirs1.html>

I developed a series of this kind of tools to visualize 4G/5G knowledge. Here I would like to highlight input table that is generated by a few codes like below. The work behind it is done by a small framework developed with brython by me.

```
t = Parameter('row')
t.range = range(1, 19)
t.spec = "38.211 table 7.4.1.5.3-1"
t = Sep()
...
```

From 2020 onwards, I joined 5G simulation team. Beside the normal development work with C++, I developed several tools to improve the daily workflow:

- tool to draw class inheritance and collaboration diagrams for 5G simulator source code
- A browser addon to enhance the internal requirement website
- a small jupyter C++ kernel for validating, sharing and reviewing the code snippets. (syntax highlight is automatically performed by jupyter not by me 😊)
- simulation report semi auto-generation



The image shows a Jupyter Notebook window with two tabs: 'Launcher' and 'test.ipynb'. The 'test.ipynb' tab is active. The notebook contains a single code cell with the following C++ code:

```
[1]: #include <iostream>

int main(int argc, char **argv)
{
    // This is a documentation comment line
    std::cout << "hello world6" << std::endl;
}
```

The output of the code cell is:

```
hello world6

real    0m0.038s
user    0m0.000s
sys     0m0.031s
```

Finally, I am a continuous learner, respect for geek spirit, love software development.