

5G Convergence: Some Initiatives

IoT Week 2018. Bilbao. June 4th 2018.

Sergio Takeo Kofuji

kofuji@usp.br









Quantifying the Internet of Things Market Read more at: <u>https://www.idteche</u> <u>x.com/journal/print-</u> <u>articles.asp?articleids</u> <u>=6624</u>.



Global industrial internet of things (IIoT) market expected to reach approximately USD 232.15 Billion by 2023, growing at a CAGR of around 8.06% between 2018 and 2023. The IoT alludes to the system or systems encompassing the utilization of standard Internet Protocol (IP) technologies to connect people, processes, and things to empower new cyber-physical systems. from: Zion Market Research. Industrial Internet of Things. https://www.zionmarketresearch.com/report/industrial-internet-of-things-market



Connectivity Infrastructure and other pillars?



ARE YOU LOST IN TRANSLATION? WHAT IS 5G? WHAT'S IN 5G FOR ME?



The Convergence of key ICT Trends for Digitalization | 2018 | Page 21

From: The Convergence of 5G, AI and IoT. Manoel Lorenzo, Iván Rejón. Ericsson.

Network Slicing Systems



https://wade4wireless.com/2017/01/09/5g-network-slicing/







5G-RANGE: Remote Area Access Network for the 5th Generation

Prof. Luciano Mendes - Inatel



5G-RANGE receives funding from the European Union Horizon 2020 Programme (H2020/2017-2019) under grant agreement n° 777137 and from the Ministry of Science, Technology and Innovation of Brazil through Rede Nacional de Ensino e Pesquisa (RNP) under the 4th EU-BR Coordinated Call Information and Communication Technologies.





Connections per sector > 100k



Applications for the Future Long Range Network

Prof. Dr. Luciano Mendes

May 16th-17th 2018

Possible Applications for Long Range Networks



- Environment Monitoring
- E-Health
- □ Maritime communication infrastructure
- Broadband access
- □ Smart farm
- □ Energy control and monitoring
- Wireless backhaul



5G-RANGE: Data connectivity

- □ Provide communication infrastructure for:
 - Internet access;
 - Voice communication;
 - Field data collection;
 - Equipment monitoring.



Inatel

5G-RANGE: Wireless Backhaul



□ Providing backhaul for several use cases.







https://5ginfire.eu/it-av-automotive-testbed/



Blade IBM eServer •180 cores •10 TB HD •544 GB RAM •62 lps •1/10 Gbps



São Paulo City Smart Cities / Cam

USP and Huawei Partnership

Project Scenario

Emergency Services



Public Safety Concerns



People complain all the city problems, for better life in city, all the problems should be improved. In all these cases, **the video analysis** is the first tool to push the decision team start to work or prevent.

Non-intrusive facial recognition

What

High criminal rate in the world, just in 2012 alone, almost 65,000 people were killed in the country. Everyday, there are robberies, murders happen in Brazil, how to arrest the criminal is the biggest problem.



Why

Event there is a lot of cameras in the streets, but the current face recognition rate is too low to find out the criminal.

The most popular way to manage the public safety in Brazil depends too much on human eyes. Rise up face recognition is the key to solve the problems.



How

There are many kinds of cameras and sensors in Brazil, need some kind of equipment can **control all of them, and then using big data and develop new algorithm to rise the recognition rate**.





Big Data Solution Improves the Predicting Actions in the City

There are 207 Million Population in Brazil, it is very difficult to find out the criminals only by humen eyes.





First Step: using smart sensors/cameras to record all persons face and behavior (Huge data) Second Step: get crinimals pictures



Third Step: Compare with big data, find out where the criminal usualy appears, who he contact, track his behavior, etc.

Big data can store huge data of people behavior, and can easily find out similar images and datas, it is helpful for tracking criminal behavior, so it can predict actions in the city.

Project Scenario

Steps when work

- Use SDN to control all sensors and all cameras.
- Cameras and sensors collect people daily behavior;
- All data store in high-end storage;
- Gathering crime scene pictures;
- Big Data Analytics to find out similar pictures and behaviors.
- According the result, help to find the criminals.



Contact

kofuji@usp.br