Instituto Politécnico Nacional
Centro de Investigación en Computación
Laboratorio de Ciberseguridad

Research Projects and Masters Thesis Proposals 2020-A

Dr. Ponciano Jorge Escamilla-Ambrosio
Centro de Investigación en Computación
Instituto Politécnico Nacional
Tel. 57-29-60-00 Ext. 56646
pescamilla@cic.ipn.mx, pjorgeea@gmail.com
http://www.cic.ipn.mx/~pescamilla/
SNI Nivel 1
Senior Member IEEE

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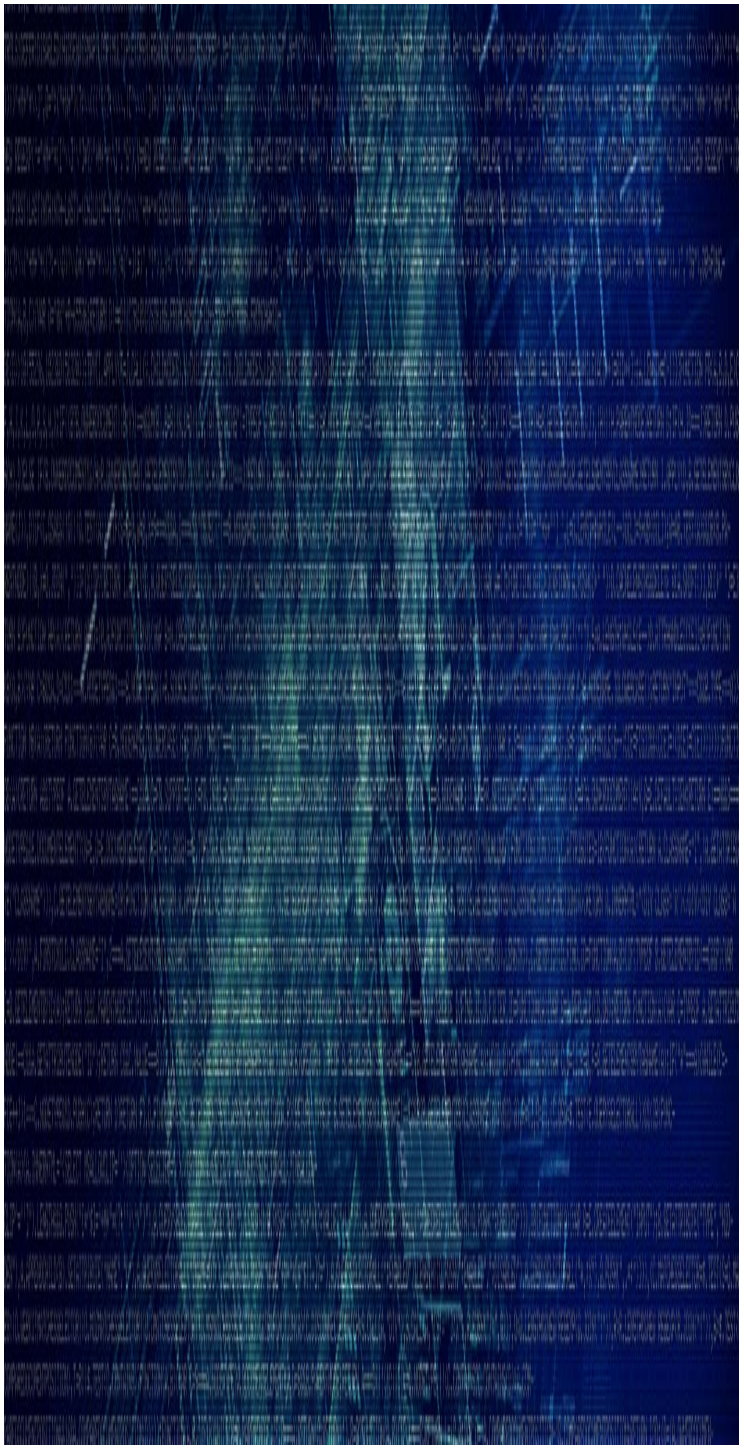
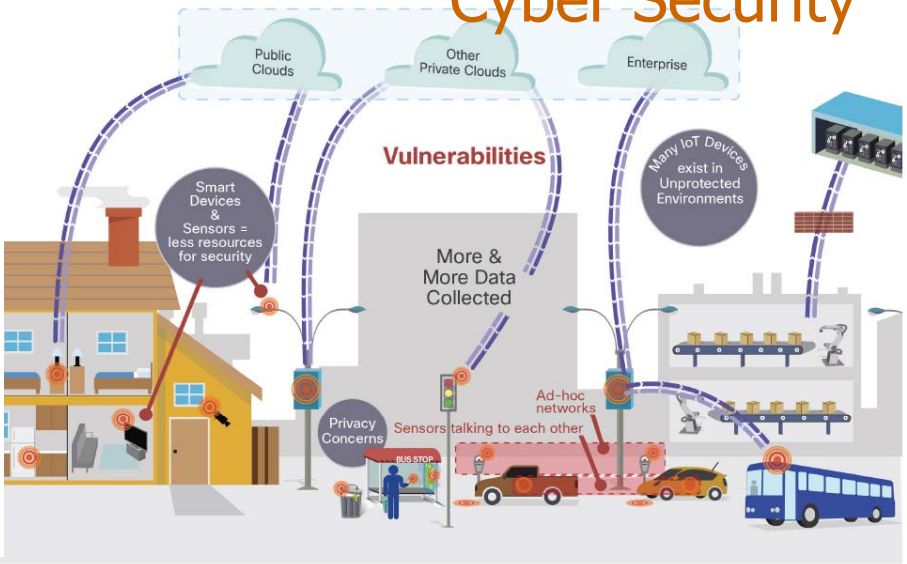


Research Interests

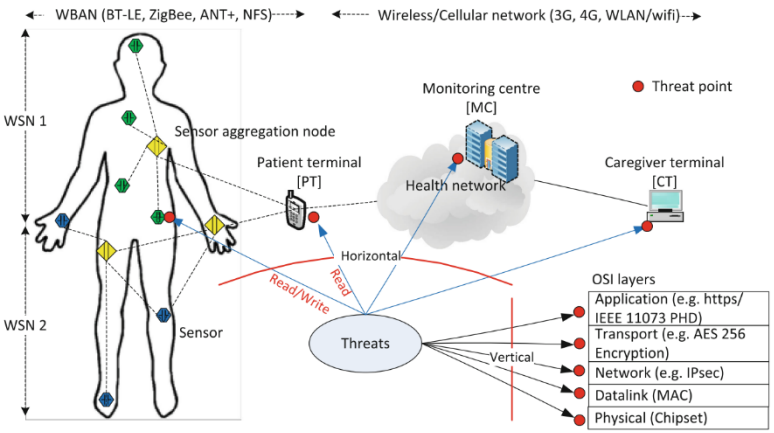
SSS: Smart Sensing for Sustainability: Energy, Air and Water

Internet of Things Cyber Security

Smart Cities Cyber Security



Cyber Security WBAN WSN



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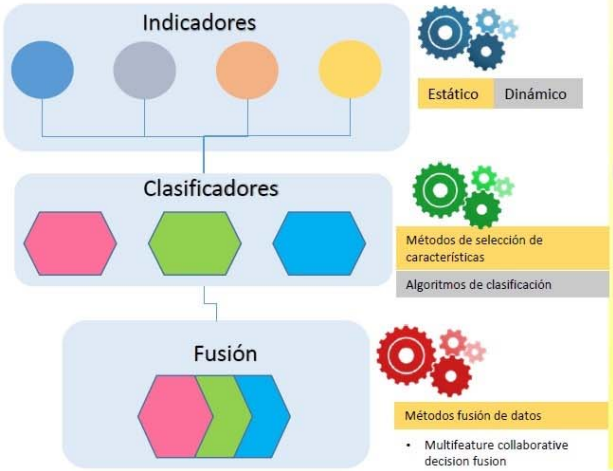
Research Interests

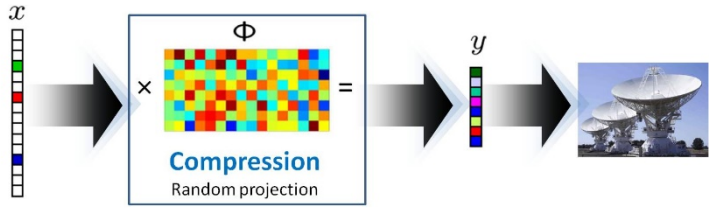
Mobile Cyber Security

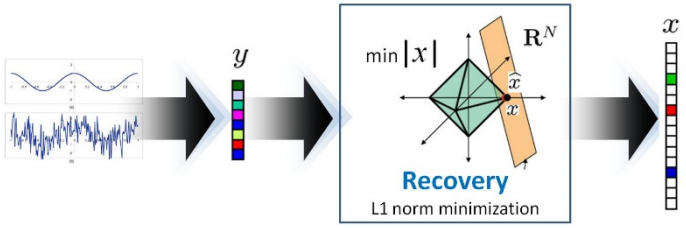
GARMDROID

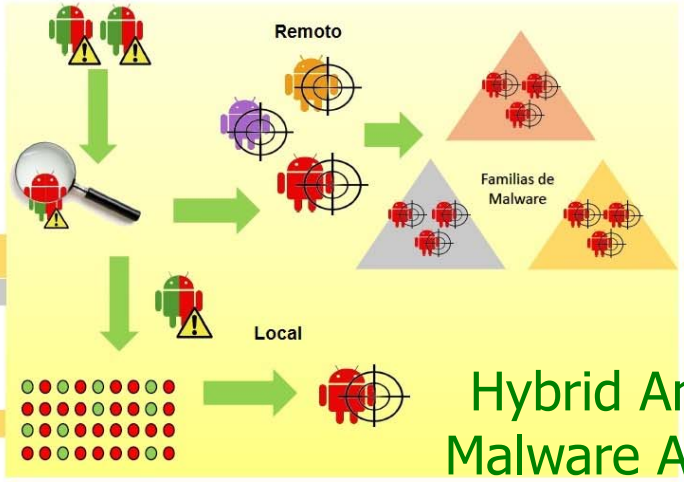
www.garmdroid.org



Compressive sensing







Hybrid Android Malware Analysis and Detection

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Proyect 1: Developing co-created smart city solutions for adaptation and monitoring hydro-meteorological climate change risk in Mexico, CONACYT 0296528

Research question:

(ii) How could co-created smart-technology help communities to monitor and adapt to climate change risks?

OBJECTIVE 2:

To develop and test co-created, state-of-the-art technological tools to communicate, monitor and mitigate flooding risk in vulnerable communities. This technology will include flooding modelling and monitoring based on the analysis of satellite images and of high technology sensors, as well as community knowledge of climate change-related risks.

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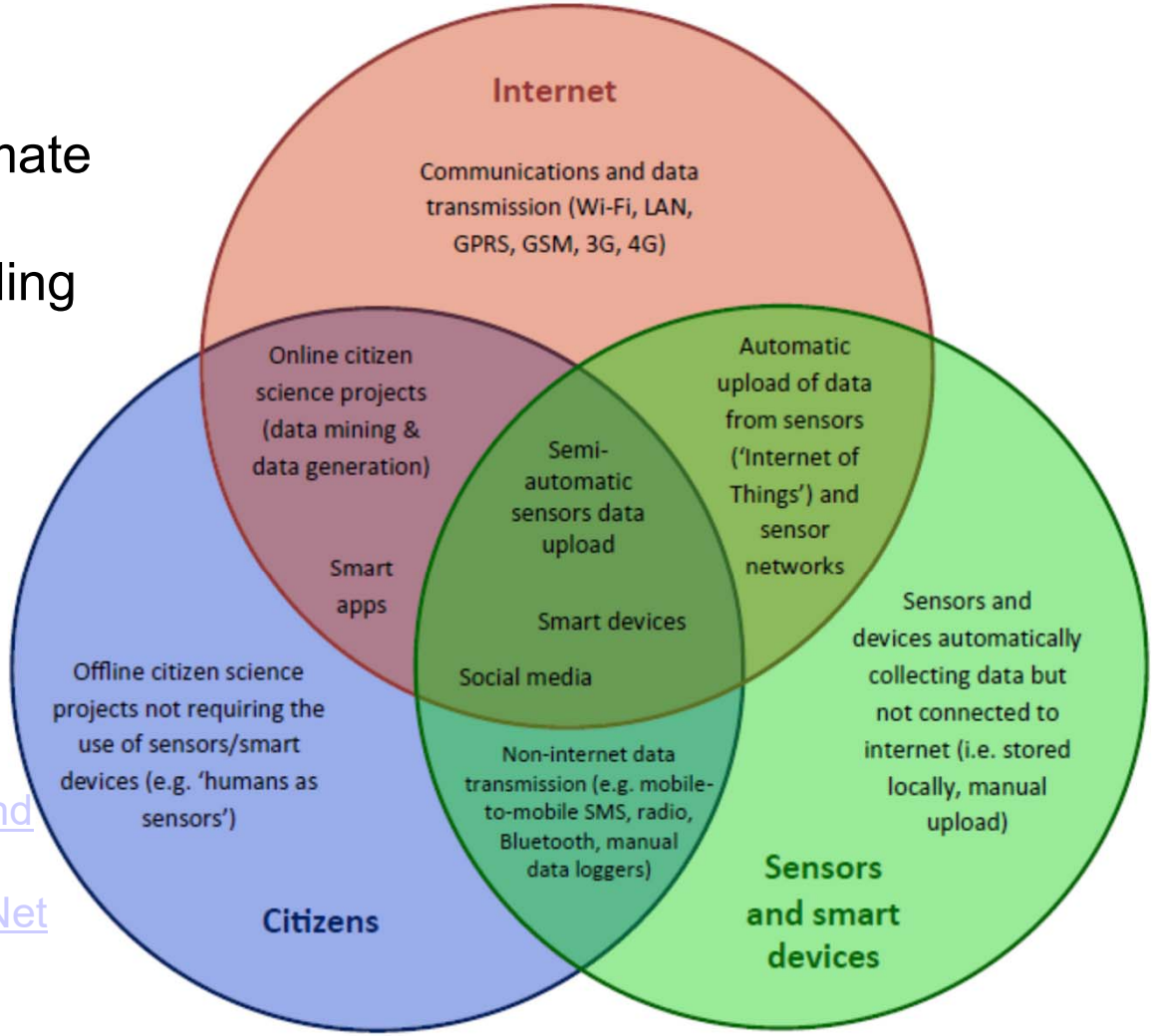
Proyect 1: Developing co-created smart city solutions for adaptation and monitoring hydro-meteorological climate change risk in Mexico

Animate and inanimate crowdsourcing components, including active and passive techniques.



Connecting Human to Cyber-World: **Security** and Privacy Issues in Mobile **Crowdsourcing** Net works

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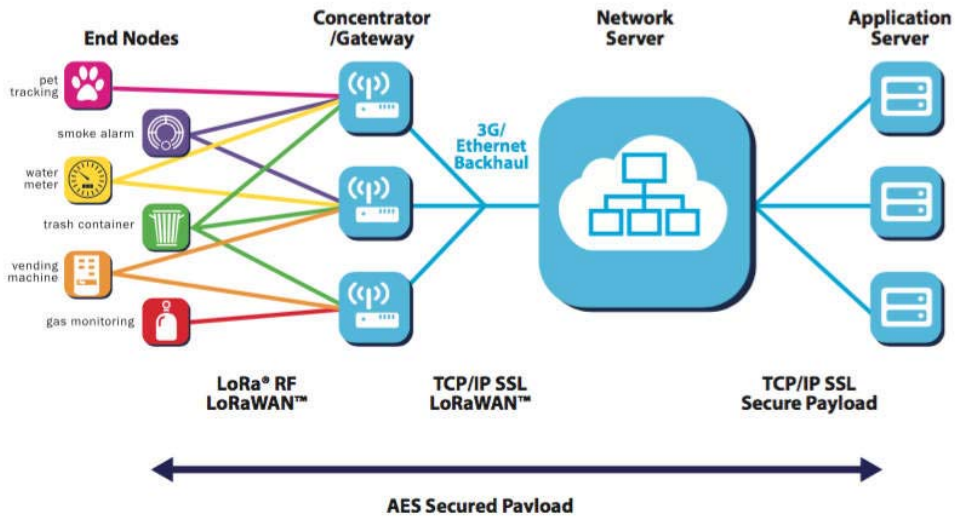
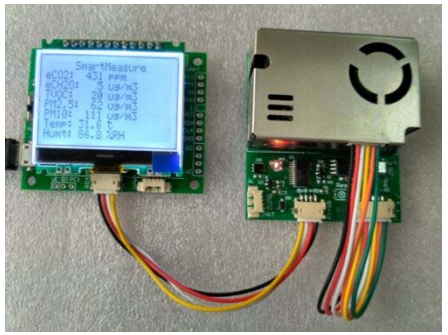
Muller, C. L., Chapman, L., Johnston, S., Kidd, C., Illingworth, S., Foody, G., ... & Leigh, R. R. (2015). Crowdsourcing for climate and atmospheric sciences: current status and future potential. *International Journal of Climatology*, *35*(11), 3185-3203.

Proyect 2: Sistema de Internet de las cosas para el monitoreo y análisis inteligente de parámetros ambientales que inciden en el cambio climático, SIP-1999

Módulo 20200480

Arquitectura segura del Internet de las cosas para el monitoreo de parámetros ambientales





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ESIME

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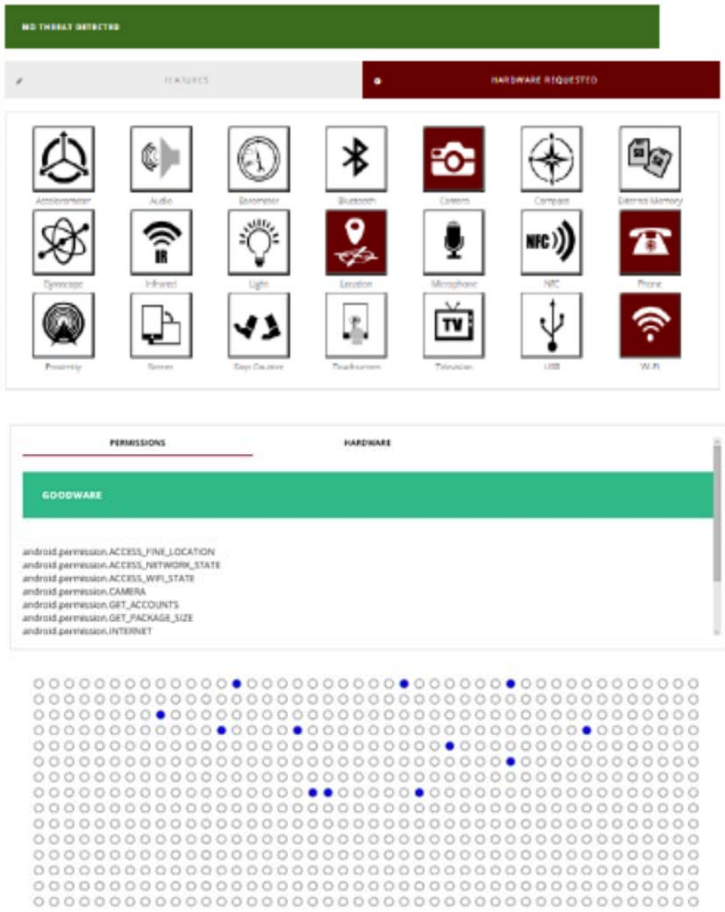
Thesis 1: Dynamic Analysis of Ransomware in Android OS



GARMDROID

www.garmdroid.org

MOBSF

- Use tools developed at CIC-IPN to characterise and detect ransomware in Android OS
- Perform characteristics extraction using static and dynamic analysis
- Monitoring using hoking techniques
- Analysis in virtual and real environments
- **¿Is it possible to detect ransomware and limit or stop its malicious action?**
- We have a sample of 2288 ransomware
- Possible collaboration with City University of London, university of Bristol or Royal Hallowey University of London

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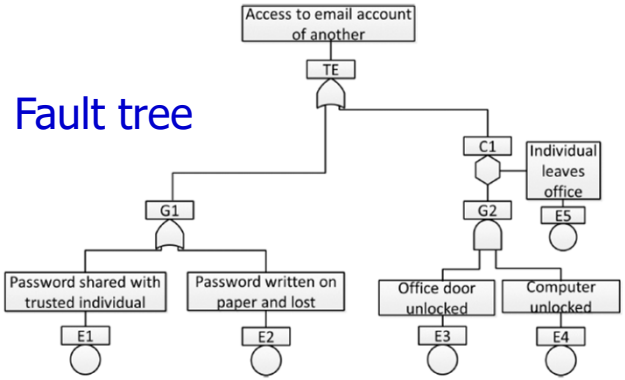
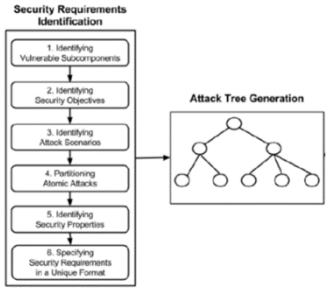
Chen, J., Wang, C., Zhao, Z., Chen, K., Du, R., & Ahn, G. J. (2018). Uncovering the Face of Android Ransomware: Characterization and Real-Time Detection. *IEEE Transactions on Information Forensics and Security*, *13*(5), 1286-1300.

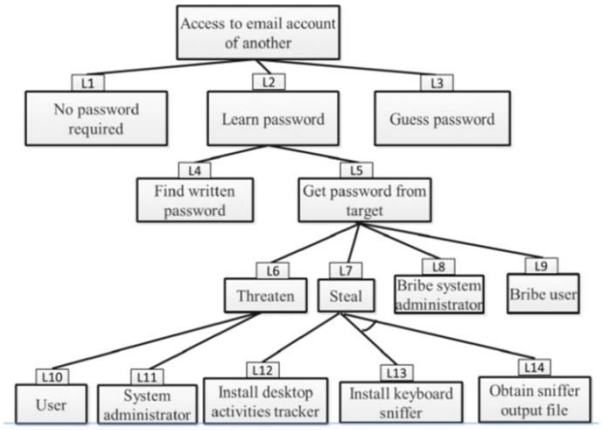
Thesis 2: Combining attack and fault trees for the analysis of risks and cyber security of cyber physical and IoT systems

Fault tree





Attack tree



- ¿Is not an attack, it is a fault?
- ¿Is not a fault, it is an attack?
- ¿Is an attack tree an input to a fault tree? ¿And vice versa?

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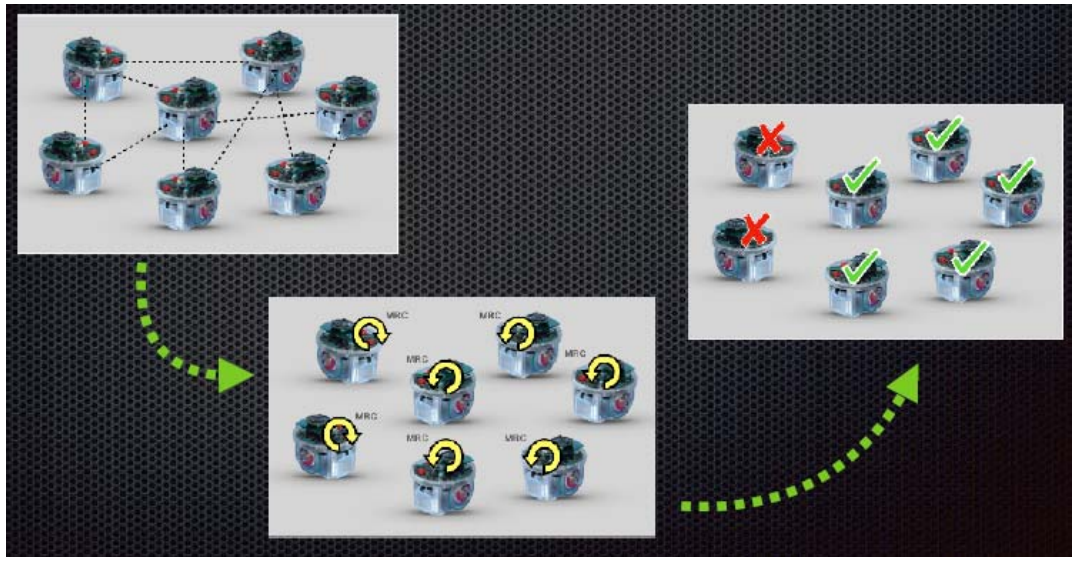
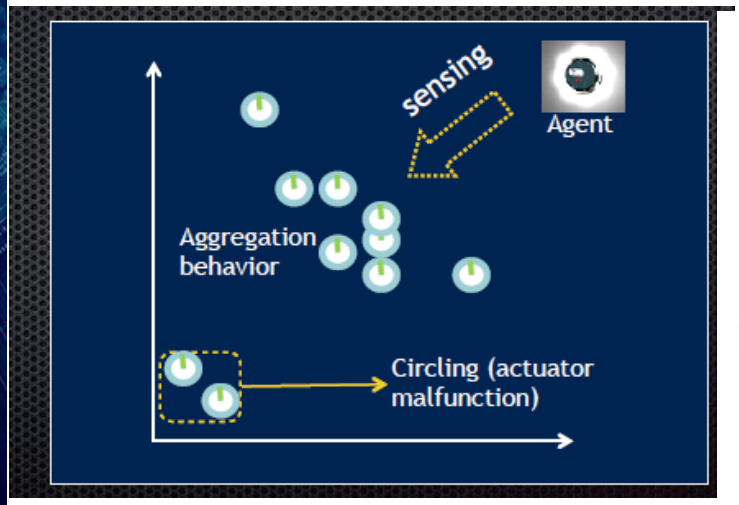
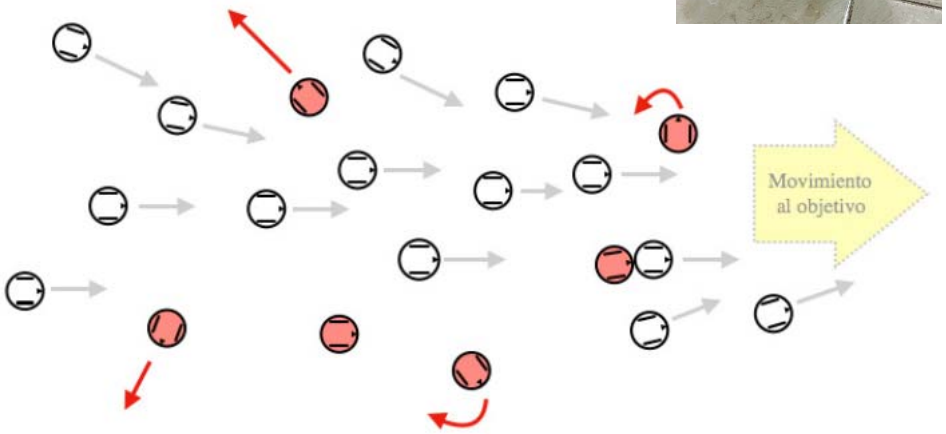
Fovino, I. N., Masera, M., & De Cian, A. (2009). Integrating cyber attacks within fault trees. *Reliability Engineering & System Safety*, *94*(9), 1394-1402.

Thesis 3: Cybersecurity in swarm of robots

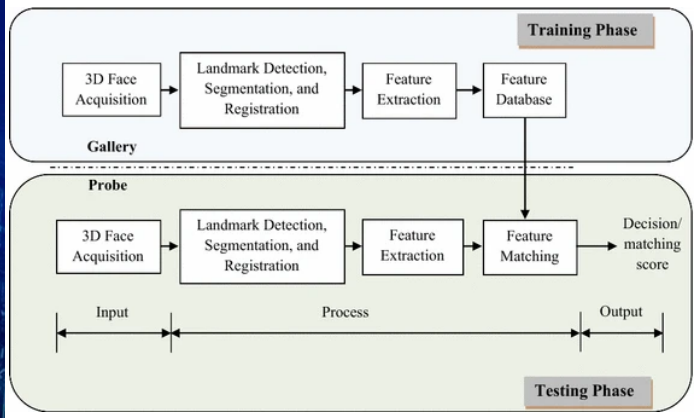


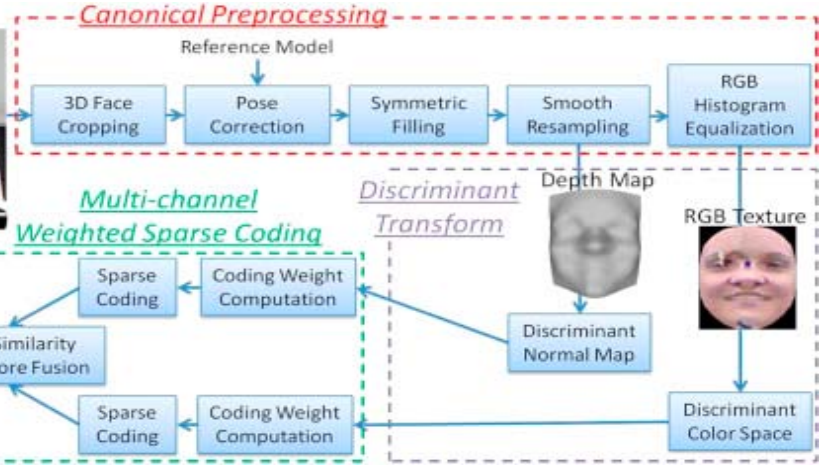


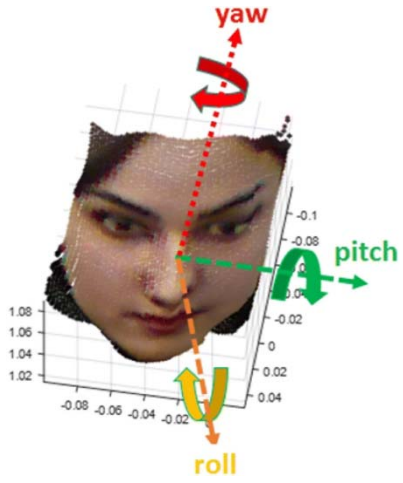


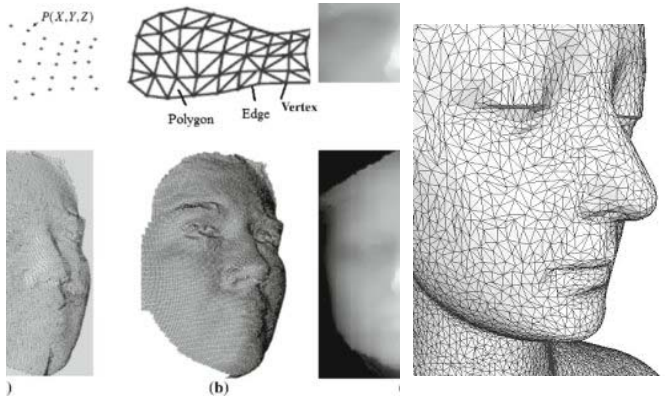
Hernández-Herrera, A., Rubio-Espino, E., Escamilla-Ambrosio, P.J., (2018). A Bio-Inspired Cybersecurity Scheme to Protect a Swarm of Robots, en Advances in Computational Intelligence, Lecture Notes in Artificial Intelligence, Vol. 11289, Springer International Publishing, pp. 1-14. ISBN: 978-3-030-04496-1DOI: 10.1007/978-3-030-04497-8_26.

Thesis 4: RGBD Face recognition









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Li, B. Y., Xue, M., Mian, A., Liu, W., & Krishna, A. (2016). Robust RGB-D face recognition using Kinect sensor. Neurocomputing, 214, 93-108.

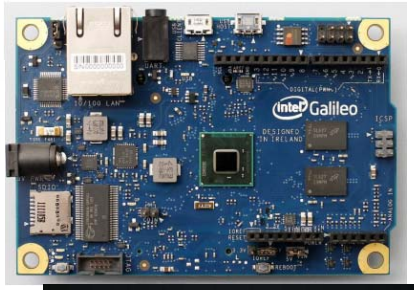
Patil, H., Kothari, A., & Bhurchandi, K. (2015). 3-D face recognition: features, databases, algorithms and challenges. Artificial Intelligence Review, 44(3), 393-441.

Resources

NVIDIA Jetson Nano

JetBot

IoT Development kits



DragonBoard 810

Zolertia wireless sensor network platform

TI EZ430-RF2500 Wireless sensors

Nexus 6

Galaxy S6

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Links

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The University Of Sheffield.

CITY UNIVERSITY OF LONDON EST 1894

ROBERT GORDON UNIVERSITY ABERDEEN

THE UNIVERSITY of EDINBURGH

ROYAL HOLLOWAY UNIVERSITY OF LONDON

UNIVERSITY OF OXFORD

BRITISH COUNCIL

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More Information

For more information visit:

- http://www.ciseg.cic.ipn.mx/
- http://www.cic.ipn.mx/~pescamilla/

Or contact:

Dr. Ponciano Jorge Escamilla-Ambrosio
Centro de Investigación en Computación
Laboratorio de Ciberseguridad
Instituto Politécnico Nacional
Tel. 57-29-60-00 Ext. 56646
pescamilla@cic.ipn.mx, pjorgeea@gmail.com
http://www.cic.ipn.mx/~pescamilla/