Overview of a First Year

- José Miguel Blanco

- **A Time-Sensitive Model for Data Tampering Detection for the Advanced Metering Infrastructure**
  - Goal: To define a model able to detect data tampering from the energy consumption as registered by a Smart Meter.
  - Methodology: A theoretical approach to the question is used to create different proof of concepts.
  - Results: The model is able to track the energy conssumption based on a maximum and minimum established from physical components. The model was tested using data from the UMass Smart* Dataset and it showed that it worked as intended.
  - Outcome: The paper has been accepted and presented at FedCSIS2021 (Core Rank: B) along with its publication in the correspondent proceedings.

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- **A Comparison of Smart Grids Domain Ontologies**
  - Goal: To compare the performance of different ontologies for Smart Grids.
  - Methodology: The ontologies were tested using Protégé and analyzing their memory and CPU usage.
  - Results: Despite the lack of readily available ontologies, it was possible to appreciate certain patterns regarding the structure of ontologies and their computational complexity. A further study could possibly outline the best way to obtain a very light-weight ontology that would enable reasoning on a resource-constraint device such as a Smart Meter.
  - Outcome: The paper has been accepted for WEBIST2021 (Core Rank: C) and will be presented on 26-28 of October, along with its corresponding publication on the proceedings.

- **Modeling Inconsistent Data for Reasoners in Web of Things**
    - Goal: To define a fomal model able to deal with inconsistent data in WoT when the inconsistencies come from multiple sources at once.
    - Methodology: An oversimplification of Shramko-Wansing Trilattice produced an applicable model that was tested with real world data in multiple poofs of concept.
    - Results: The model is able to deal with multiple inconsistencies from multiple devices, being able to preserver the integrity of the network as well as feeding a Semantic Web Reasoner with structured data to obtain acceptable outcomes.
    - Outcome: The paper has been accepted and presented in KES2021 (Core Rank: B), along with its corresponding publication on the proceedings.

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- **Recommendation Recovery with Adaptive Filter for Recommender Systems**
    - Goal: To define a fomal model for a recommender system able to learn from a failed recommendation and proposed a more beneficial item.
    - Methodology: Using concepts from set theory, the model implements an adaptive filter that lefts out all similar items to the one disliked.
    - Results: The model is able to deal with the failure of a recommender system and takes out any other subpar recommendation that could possibly be disliked too. The main difference with other approaches is that it prevents the same results to appear time after time altogether.
    - Outcome: The paper has been accepted for WEBIST2021 (Core Rank: C) and will be presented on 26-28 of October, along with its corresponding publication on the proceedings.

- **EF4, EF4-M and EF4-Ł - A companion to BN4 and two modal four-valued systems without strong Łukasiewicz-type modal paradoxes**
  - Goal: To show that the logical system EF4 is sound and complete in a strong sense w.r.t. its inherente algebraic semantics and also Belnap-Dunn's semantics. The same goes for its modal extensions EF4-M and EF4-Ł.
  - Methodology: The work done was based on the usual Henkin-style compleness proofs for Hilber-style systems.
  - Results: All three systems were proven to actually be sound and complete in a strong sense w.r.t. their semantcis. Also it is shown that the modal extensions lack the modal paradoxes that are part of Łukasiewicz system modal system Ł.
  - Outcome: The paper has been published in Logic and Logical Philopsophy (SJR: Q1, JCR: Q4).

- **A temporalization of relevance logics - the case of the weak system t(B_{E4})**

  - Goal: To temporalize the relevance logic system B_{E4}, an extension of Routley-Meyer's basic logic B.

  - Methodology: The work done was based on the style that Finger and Gabbay used to add a temporal dimension to any logical system. The fact that B_{E4} is an extension requires to show that it is sound and complete in a strong sense as well as decidable.

  - Results: The proofs for soundness and completeness for B_{E4} were given. The decidability of B_{E4} was shown as an extension of said result from B. Finally, after adding the temporal operators that represent the temporal dimension, it was shown that they are a conservative extension and all the results from B_{E4} also apply to t(B_{E4})

  - Outcome: The paper has been sumitted for review to CSL2022 (Core Rank: B).

- **Ontology Technologies for IoT Domain (WIP)**
  - Goal: To produce a survey with all the tools oriented for the IoT domain.
  - Methodology: A mapping study is being carried out to be able to obtain all the related papers and obtain a classification of the tools according to their application, architecture and usage.
  - Current Stage: Defining the query to be used in all the repositories considered.
  - Outcome: The paper will be submited to SAC2022 (Core Rank: B).

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- **Pre-processing of data for Complex Event Processing (WIP)**
  - Goal: To produce a model for preprocessing data before being inputted into a Complex Event Processor.
  - Methodology: A model is defined theoretically using different concepts from different fields such as relevance logics. The obtained model should be able to differentiate natural language from gibberish.
  - Current Stage: Defining the algorithm for determining if a statement is part of natural language or not.
  - Outcome: The paper will be submitted to Core Ranking Conference.

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Articles

- **Equivalence of General Reduced Routely-Meyer models and 2 Set-Up Routley-Meyer models (WIP)**
  - Goal: To prove the fact that the General Reduced Routley-Meyer models and 2 Set-Up Routley-Meyer models are equivalent.
  - Methodology: The models were previously defined in the literature, but their semantic equivalence still remains unproven.
  - Current Stage: Defining the limits of the semantic proof and the minimal system to base it upon.
  - Outcome: The paper will be submitted to JCR Journal.

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Some other things

- Included in a Spanish excellence research project.
- Reviewed papers for Journal of Applied Logic and Bulletin of the Section of Logic among others.
- Established connections with people at the Healthcare system.
- Began the co-supervision of a PhD thesis.