1. Protecting Smart Homes from Unintended Application Actions.
   1. PSA practical framework to identify safety intent violations in a smart home.
   2. Uses parameterized timed automata (PTA) as an expressive abstraction to model smart apps.
   3. Comparing PSA against two state-of-the-art baselines and find
      1. 19 new intent violations
      2. 35% fewer false positives than baselines
   4. Samsung SmartThings IFTTT (smart home platform) allows user to controls devices using apps.
      1. Apps can cause safety violations when interacted directly
      2. Can be incorrectly configures by users
      3. There have been recent work attempts to detect such violations in IoT ecosystems either statically or dynamically, however with these efforts the following features of modern smart apps and IoT ecosystems are not captured:
         1. Timing
         2. User Inputs
         3. State
         4. Environment Interaction
      4. PSA overcome the limitations of prior work.
         1. Uses model-checking to verify a smart home deployment for safety violations
2. Exploring the Performance of Deep Neural Networks on Embedded Many-Core Processors
   1. Explores and evaluates the potential of deep neural network (DNN)-based machine learning algorithms on embedded many-core processors in CPS, such as self-driving systems.
   2. Evaluates DNN models
      1. You Only Look Once (YOLO)-based
      2. Single Shot MuliBox Detector (SSD) based on MPPA3-80
   3. Evaluation examines the frame rate and power consumption in relation to the size of the input image, the computational accuracy, and the number of clusters
   4. Implementing DNN-based applications in embedded systems poses technical challenges:
      1. The need for a platform that can reduce power consumption while achieving high accuracy and real-time performance.
   5. Embedded systems == Automated vehicles
      1. Detect hazards based on images input from cameras and provide warnings for life-threatening events, like collisions.
      2. For use in an embedded system, a power saving and compact platform is also required (high computational power and low power consumption)
   6. Embedded Graphics Processing Units (GPUs) such as Jetson AGX Xavier
      1. An approach using GPUs has been proposed for object detection (DNN based application in embedded systems.
   7. Object detection is a multi task process that detects the position of a set of objects and recognizes the category of those objects.
      1. Performing this process, DNN-based models (a two stage detector R-CNN “Regional-based Convolutional Neural Network”, and one stage detector “YOLO”, “Single Shot MultiBox Detector SSD” and RetinaNet have been proposed.
      2. It is necessary running these DNN models on embedded GPUs and validating their real-time performance.
      3. But embedded GPUs cannot execute multiple applications in parallel
   8. Platform that can execute multiple applications in parallel is useful for embedded systems such as self-driving systems.
      1. Cannot be realized using only DNN-based applications.
      2. Clustered many-core processors allow multiple applications to coexist such as MPPA3-80, and also achieves high performance and low power consumption by integrating multiple arithmetic elements that operate at lower frequencies.
   9. KaNN Kalray Neural Network code generator converts trained networks written in popular frameworks such as Caffe and TensorFlow, into code that can run efficiently on a cluster.
   10. In this paper, DNN models are implemented on MPPA3-80 platform, using DNN models such as SSD and YOLO to determine MPPA3-80 can correctly infer the DNN models we use the KITTI dataset.
   11. This paper evaluates the performance of the latest DNN models on MPPA3-80. The performance is defined as the inference time and the power consumption of MPPA3-80
   12. This paper compares the performance of MPPA3-80 with that of conventional embedded GPUs using recent DNN models.
   13. This paper discusses the current status of DNN application in embedded many-core systems.
3. Offline Policy Evaluation for Learning based Deep Brain Stimulation (DBS) Controllers
   1. Focuses on improving the safety and effectiveness of Deep Brain Stimulation (DBS) controllers using reinforcement learning techniques (RL).
   2. DBS is a treatment for neurological disorders like Parkinson’s disease, where electrical pulses are delivered to the basal ganglia region of the brain.
   3. Traditional DBS devices use fixed stimulation parameters, which can be inefficient and may cause side effects.
   4. The authors propose a model-based Offline Policy Evaluation (OPE) methodology to estimate the performance of RL-based DBS controllers without deploying them directly on patients.
   5. Key Contributions of paper
      1. Modeling the basal ganglia as a Markov Decision Process (MDP) and using variational inference to learn a Deep Latent MDP (DL-MDP) model from historical data.
      2. Evaluating the performance of RL controllers on the DL-MDP models to ensure safety and improve control performance with limited training data.
      3. Demonstrating that their method outperforms existing OPE methods designed for general applications.
4. Infrastructure-free, Deep Learned Urban Noise Monitoring at ~100mW
   1. Presents a novel approach to monitoring urban noise pollution using a low-power infrastructure-free wireless sensor network (WSN) called the Sounds of New York City (SONYC) network.
   2. Development of MKII motes
      1. These are low-power acoustic sensors that user a real-time Convolutional Neural Network (CNN\_ based embedding model. This model is efficient, requiring significantly less training data and runtime resources compared to alternatives.
   3. Infrastructure-free deployment
      1. The MKII motes can be deployed far from based stations without relying on existing power or network infrastructure, making them suitable for various urban environments, including construction zones.
   4. Frequency agility
      1. The motes use a new method to dynamically choose good frequencies, tolerating external interference and link fading in the urban environment.
5. Trust Me, I’m Lying: Enhancing Machine-to-Machine Trust
   1. Explores methods to improve trust in machine-to-machine (M2M) communications withing cyber-physical systems (CPS) and the Internet of Things (IoT)
   2. Distributed Ledger Technology (DLT): The authors propose using DLT to enhance the trustworthiness and transparency of information shared between machines.
   3. Scalability and Efficiency: Th paper addresses the scalability challenges of implementing DLT in large-scale CPS and IoT networks.
   4. Critical Infrastructure
      1. The research emphasizes the importance of secure and reliable M2M communications for critical infrastructure applications.
   5. The study aims to create a more secure and trustworthy environment for autonomous machine interactions, which is crucial for the future of smart cities and other advanced technological ecosystems.