



## CPS: Synergy: Distributed coordination of smart devices to mitigate intermittency of renewable generation for a smarter and sustainable power grid

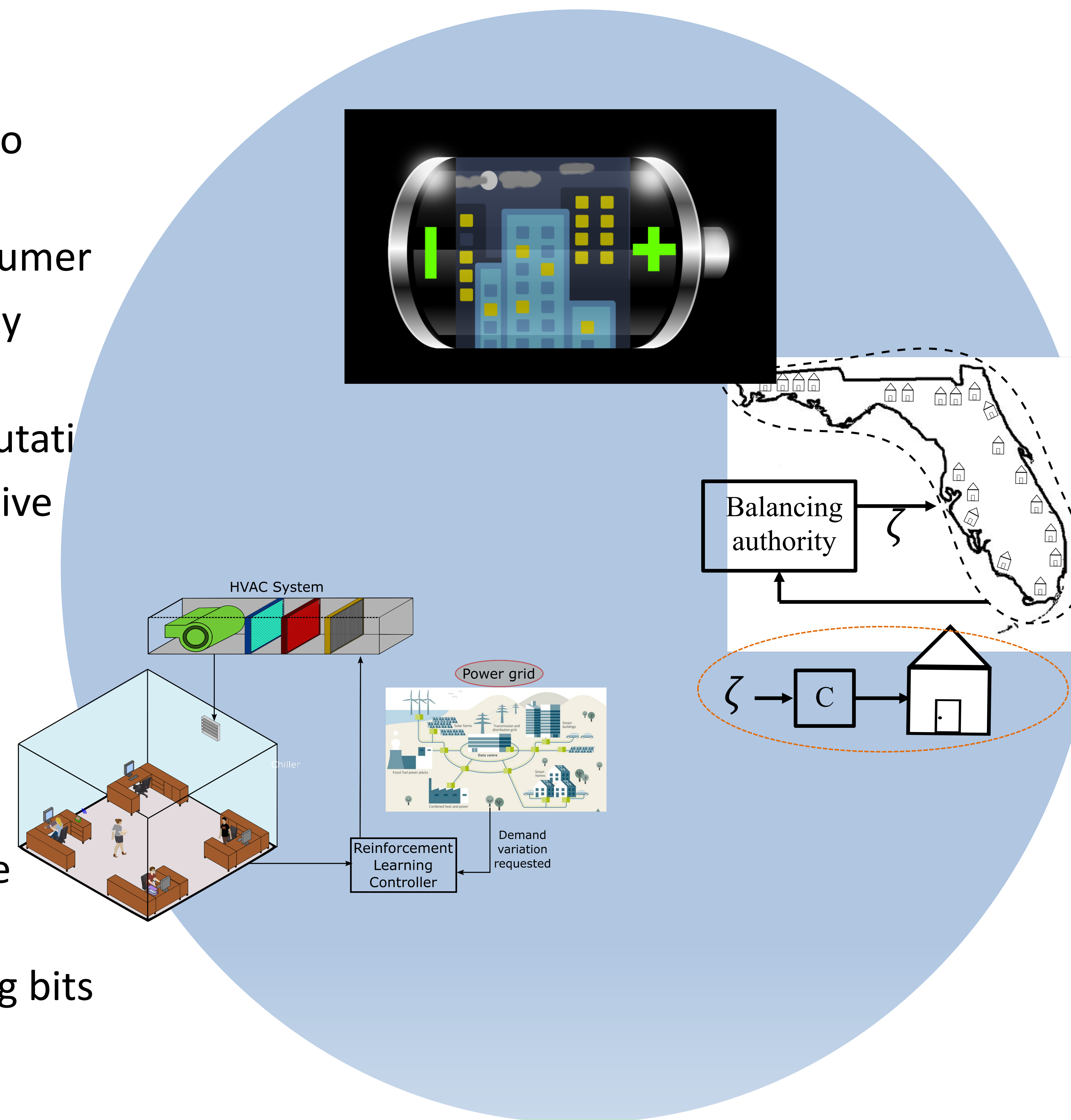
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### Challenge:

- Distributed coordination of large collection of heterogenous agents to create **virtual energy storage**
- Strict constraints at each load/consumer
- Large uncertainty and high reliability requirements
- Minimal communication and computation
- Need for both real power and reactive power support

### Solution:

- Randomization to control ensemble averages: breaks complexity
- Communication without exchanging bits



### Scientific Impact:

- Distributed optimal coordination methods for cyber physical systems
- Novel Reinforcement Learning method with fast convergence
- Characterization of virtual energy storage capacity of loads

### Broader Impact:

- Enable *reliable electricity supply* from *unreliable green sources*
- Interest from utilities home (FPL, GRU) and abroad (EDF, Paris) in demonstration projects
- Virtual energy storage *lot cheaper* than batteries
- 8 PhD students and 25 publications

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