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## Intelligent autonomous systems

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Intelligent autonomous systems (IAS) are highly cognitive, reflective, multitaskable, and effective in knowledge discovery. Examples of IAS include software that is capable of automatic reconfiguration, autonomous vehicles, network of sensors with reconfigurable sensory platforms, and an unmanned aerial vehicle respecting privacy by deciding to turn off its camera when pointing inside a private residence. Research is needed to build systems that can monitor their environment and interactions, learn their capability, and adapt to meet the mission objectives with limited or no human intervention. The systems should be fail-safe and should allow for graceful degradations while continuing to meet the mission objectives. This presentation will advance the science of autonomy in smart systems through enhancement in real-time control, auto-configurability, monitoring, adaptability, trust. The author will present research ideas in smart autonomy, multi-intelligence (MINT) enterprise analytics, and rapid autonomy prototype among others. The main objective is to realize a vision based on the following approaches: Employ machine learning techniques on sensor and provenance data to learn and understand the underlying patterns of interaction, conduct forensics to detect anomalies, and provide assistance in decision making by on-the-fly semantic and probabilistic reasoning; Apply advanced data analytics techniques to incomplete and hidden raw system data (provenance data, error logs, etc.) to discover new knowledge that contributes to the success of the IAS mission; Enhance the autonomous system's self-awareness, self-protection, self-healing, and self-optimization by learning from the knowledge discovered through data analytics and; Utilize block chain technology for storing provenance data for providing monitoring, trust, and verification, using the WaxedPrune system developed for Northrup Grumman.