Course Number : AR506
Course Name : Cognitive Robotics
Credit Distribution : 3-0-0-3
Intended for : UG, PG and PhD
Prerequisite : Consent of faculty advisor
Mutual Exclusion : None

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1. Preamble:

Students will be introduced to the main topics in artificial cognitive systems, including the different paradigms of cognitive science and cognitive architectures. These components form the foundation for the remainder of the course, involving a detailed study of the CRAM (Cognitive Robot Abstract Machine) cognitive architecture, building on ROS, and exploiting functional programming to reason about and execute under-determined tasks in everyday activities.

2. Course Modules with quantitative lecture hours:

Introduction: Introduction to Cognitive Robotics and Human-Robot Interaction, Smart Materials. **(6 hours)**

Brain physiology and neural signal transmission: Architecture of the Brain, Nerve cells, Synchronization Models, Electroencephalography. **(6 hours)**

Intelligence architecture: Theories of Intelligence, Kuramoto Model, Child-Robot Interaction. **(10 hours)**

Artificial cognitive systems: Cognitive architectures, The CRAM cognitive architecture. **(10 hours)**

Functional programming: Robot manipulation and task-level robot programming using ROS, The CRAM plan language. **(10 hours)**

3. Textbooks:

1. Cangelosi A. and Asada M., *Cognitive Robotics*, The MIT Press, 2022.
2. Samani H., *Cognitive Robotics*, CRC Press, 2015.

4. References:

1. Purves D., et al., *Neuroscience*, Sinauer Associates, 2004.
2. Pfeifer R. and Bongard J., *How the body shapes the way we think-A New View of Intelligence*, MIT Press.
3. Raol J. R., and Ayyagari R., *Control Systems: Classical, Modern, and AI-Based Approaches*, CRC Press.

5. Similarity with the existing courses:

(Similarity content is declared as per the number of lecture hours on similar topics)

S. No.		Course Code	Similarity Content	Approx. % of Content
1.		None	None	None

6. Justification of new course proposal if cumulative similarity content is >30%: None