

Modelling and Reasoning Smart Spaces using Context-aware Systems

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Abstract: We, human beings, are blessed with the ability of context-awareness. With this, we often exploit contexts (ideas/messages) in our daily lives. These are effectively exchanged based on current situations without explicitly knowing the contextual information. Several situations reflect- the very fact that the core notion of the context directly affects the human intelligent behavior. With the rapid inventions in today's modern world, computing devices are increasingly becoming more intelligent and smart. Context sensing is one of the basic features of context awareness. Due to the intelligent behavior of today's smart computing devices, context-awareness has simulated on the smart devices to reinforce their capability to acquire, exchange, process information, and adapt their behavior. Context awareness highlights the significance of contexts to be utilized to ease user's tasks and fulfill their needs. Context-aware systems provide computing devices the ability to detect and sense, interpret and respond to aspects of system users and their environments. These systems exhibit complex adaptive behaviors, run in highly decentralized environment and can naturally be implemented as agent-based systems. Usually context-aware systems run on tiny resource-bounded devices including smart phones and sensor nodes and hence face various challenges. With the advent of mobile devices such as smart phones, PDAs, GPS system, and wireless sensor nodes, context-aware systems are getting to be progressively prevalent nowadays. These devices operate under strict resource constraints, e.g., battery energy level, memory, processor, and quality of wireless connection. In the literature, various techniques have been proposed to develop context-aware systems, including rule based technique. In rule-based technique a context-aware system composed of a set of rule based agents, and firing of rules that infer new facts may determine context changes and representing overall behavior of the system. Therefore, for a given set of context-aware reasoning agents with some inferential abilities and computational (time and space) and communication resource bounds, it may not be clear whether a desired context can be inferred and if it can what computational and communication resources must be devoted by each agent. Furthermore, these reasoning (non-monotonic) agents are designated to resolve conflicting context information with the intention of acquiring new context information by replacing old information. This kind of reasoning is very close to human. A person often changes his mind and rejects his own decisions based on new evidence, even though, these decisions were justified by their own at some previous time.



Biography: Dr. Hafiz Mahfooz Ul Haque is an assistant professor in the department of Software Engineering at the University of Lahore, Pakistan. He is a member of Autonomous Agents Research Group (AARG) and he is an Approved Supervisor from Higher Education Commission (HEC), Pakistan. He has published various papers and book chapters in reputed journals (ISI indexed) and conferences that were published by Springer (lecture notes) and ACM-IEEE. He was awarded best paper award three times in different international conferences. He is a Technical Program Committee (TPC) member of various international conference and journals and has chaired conference sessions. Dr. Mahfooz received his PhD in Computer Science from University of Nottingham. His research areas revolve around modelling and reasoning smart spaces using context-aware systems. The focused research keywords are: context-aware computing, multi-context systems, semantic knowledge modelling, rule-based reasoning agents, smart environments, modelling and verification of resource bounded context-aware systems.