



AMBIENT INTELLIGENCE EXPERIENCE

Abstract

Ambient Intelligence (AMI) refers to a digital environment that proactively, but sensibly, supports people in their daily lives. It empowers everyday objects, surrounding environments to understand human needs, actions and emotions and respond accordingly. With AMI, technology is integrated into daily life in a seamless manner where it no longer remains a curiosity. AMI enhances human lives through its applications in widespread areas such as intelligent home, assistive healthcare, connected retail stores, smart workplaces etc. This point of view explains the Ambient Intelligence concept, its characteristics and applicability in various areas.

Have you ever noticed when you book a private room or area in a restaurant, the first thing that you check is the 'Ambience'? You check whether lighting is suitable as per your occasion, whether the right music is playing, whether the seating arrangements are proper and so on apart from the service and food. You select a restaurant with an 'Ambience' that is suited to your needs and likes.

Ambient intelligence (AMI) builds on this concept. Being ambient means being embedded, pervasive and aware of your surroundings and being intelligent means providing experiences that are intuitive and personalized to your needs and likes in the given context. Dr. Paolo Remagnino (author of more than 60 papers in the field of computer vision and artificial intelligence) has said that AMI is broadly measured in three areas viz. sense, understand and execute. We are living in the digital era of technology. Digital innovations are happening around us daily. According to a recent analyst report, 76% of leaders say that digital innovation is essential to meeting their long-term goals and metrics. With Internet of things (IoT) we are truly connected with devices around us. According to a research over 75 Billion connected devices will be added by 2025.

Characteristics of AMI

AMI encompasses AI, pervasive computing, Internet of Things (IoT) and Human Computer Interaction (HCI). Broadly AMI systems will have following key characteristics:

Intelligent: AMI systems are intelligent. They analyze data, understand current context, and provide proactive & intelligent suggestions. For example, an AMI system can analyze social media data to understand user preferences and know their favorite dish or favorite places that they like to visit.

Embedded: AMI is not just one single system, it is combination of several systems and sensors embedded into

the environment, like say a GPS sensor, temperature sensors and so on.

Unobstructive: AMI sensors & systems are hidden and work seamlessly in the background so that user will not be obstructed by their presence. An example would be playing the right type of music as per user's preference without exposing system nitty-gritties to user.

Adaptive: AMI systems are smart and adaptive. They know individual's requirements and preferences, and respond to current context based on them. User needs vary time to time, so an AMI music system would know which music to play according to the user's likes, his or her mood, or time of the day.

Personalized: AMI systems understand user behavior patterns and accordingly adjust themselves to provide a personalized user experience. For example, an AMI lighting system will set the lighting in the room as per occupants' preferences.

User Friendly: An AMI system is user friendly in a way that users can interact with the system easily. It further understands users and provides natural interfaces like natural conversational interfaces that recognizes gestures and motions.

AMI is applicable in multiple domains. AMI home provides an automated, intelligent and personalized home environment to family members. AMI stores enable customers to explore and interact with retail store's intelligent assistants. They can even virtually try outfits in front of a smart mirrors. AMI workplaces provide smart office or smart factories that offer intelligent and intuitive workplaces to users and workers. Use cases in AMI healthcare include AMI hospital environment and AMI assisted home, to help the elderly with doctors' appointments, give reminders etc. and use cases for AMI in public sector include AMI city, AMI parking and so on.

To understand AMI, let's consider a scenario in AMI home. Alice is travelling home from office in her driverless autonomous car.

The moment she starts her journey, her car sends instructions to her home system giving advance intimation so that system can prepare the home environment as per Alice's likes. System knows distance between office and home, so it calculates rough estimate of her arrival. Her home is equipped with all the latest tech gadgets. AMI Systems starts the air conditioning at right moment, so that she would find her home at the right temperature as she likes. When she reaches home, face recognition system activates and allows Alice to enter home easily. Simultaneously, system will turn off security alarm now that Alice is back. As Alice enters into the living room, her favorite music is played and room is illuminated with right lighting.



Possibilities of AMI are not limited to home scenario. AMI is relevant for several domains including retail, healthcare, manufacturing, smart cities and so on. Take for example the healthcare industry, majority of nations face challenges regarding quality and cost of various healthcare services. With aging population and different chronic diseases, demand for efficient and sustainable health care services is becoming a necessity. Recent advances in sensor networks research is enabling low cost patient monitoring systems within the home, living and clinical environments. AMI systems built using such sensor networks combined with AI and advances in Human Computer Interfacing (HCI) have great potential to make health care more affordable and efficient.

Let's take an example, Dr. John is checking a patient and suddenly another patient who is more critical needs immediate attention. With information in unstructured forms and in disparate disconnected systems, it is hard for Dr John to get to know about the need and provide the care to his critical patient efficiently. An AMI patient monitoring and clinical decision support system that understands the patient condition and Dr John's location can alert him at an appropriate time, read out the relevant critical parameters identified by an AI algorithm to Dr. John to help him decide quickly what needs to be done. This way it ensures that Dr John's critical patient gets the required medical attention fast and also save Dr John's time.

These scenarios are not very distant in the future. With innovations in IOT, HCI and AI all these are possible. AMI is expected to transform the way we shop, the way we live, the way healthcare services are delivered, the way we work and interact with our surroundings.



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