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AND APPLICATIONS

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Abstract

Title: Artificial Intelligence Applications Utilizing Carbon Dioxide

It has become widely recognized that carbon dioxide (CO₂) emissions contribute significantly to global warming. As a result, CO₂ is often perceived negatively. However, CO₂ is a natural substance emitted not only through human activity but also through the respiration of animals and plants, and it has long been utilized in practical applications such as dry ice for cooling. Meanwhile, chlorofluorocarbons (CFCs), once widely used as refrigerants, have been regulated due to their harmful impact on the ozone layer. This has led to a transition from alternative fluorocarbons toward the adoption of natural refrigerants, among which CO₂ is a key candidate. Our research focuses on the effective utilization of CO₂, and in this keynote, two applications are presented. First, in Japan, where the elderly population accounts for approximately 30% of the total population, there is a growing need for monitoring systems that respect individual privacy. We introduce a case study in which indoor CO₂ concentration levels are used as a non-intrusive means of monitoring elderly individuals, combined with artificial intelligence techniques to ensure both safety and privacy without relying on cameras. Next, we present the design of an AI-based model for a power generation system that utilizes CO₂ as a refrigerant in combination with water at ambient temperature. This approach highlights the potential of CO₂ not only as an environmentally friendly refrigerant but also as a key component in innovative energy systems.