

Interview With an AI Chat Bot

Unwittingly, AI has already permeated our lives. We may not realize it, but artificial intelligence drives tools we use for setting reminders, playing music, or controlling smart home devices. Most AI is implemented using ANI, that is, Artificial Narrow Intelligence, an approach that limits the AI capability and its learning to its programmed limits.

However, when most people think about or discuss AI, they think of ASI – artificial super-intelligence – which produces a tool more capable than humans. Take this to its fearful extreme, and AI is going to take over the world.

But. Any tool can be used for good or for bad. And as is true with all types of change, we can choose to ignore it's happening, or we can educate ourselves and figure out how to use it to our advantage.

How could AI help RWDs and cities in Kansas?

Imagine being able to predict where the next water main is going to burst...


For many systems, this is a luxury at best, a fantasy more likely. However, it is possible for those in the water industry and other industries to collect and analyze data to determine cause-and-effect relationships or other potential insights. But who has the time or the manpower for that?

Step in – Artificial Intelligence Solutions.

While ASI is still in its infancy, and a controversial one at that, the more realistic ANI solutions currently exist. Scraping historical data and analyzing it to generate insights is one of AI's most immediate, feasible applications.

So, with some curiosity and a bit of irony, I sat down with Chat GPT, one of the most popular generative AI tools, to ask questions about AI and the water industry in Kansas. Here is the edited transcript from that "conversation." (It's edited for length not content, because, frankly, AI-generated chats remind me of those padded essays you hand in for your high school English class!)

So, with some curiosity and a bit of irony, I sat down with Chat GPT, one of the most popular generative AI tools, to ask questions about AI and the water industry in Kansas.



"Hey Siri..."
"Hmmm?"
"Set a timer for 15 minutes."

What role could AI play in helping rural water districts in Kansas?

AI can play a significant role in helping rural water districts in Kansas address various challenges they face. Rural water districts often encounter water quality, distribution, maintenance, and resource management issues. Here are several ways AI can assist:

1. AI-powered sensors and data analytics can continuously **monitor water quality parameters** such as turbidity, pH, and contaminants, sending automated alerts to operators, and ensuring rapid response to potential issues.

2. AI algorithms can **predict equipment failures** in water treatment plants and distribution systems by analyzing historical data and sensor information to assist with scheduling maintenance proactively while reducing downtime and costs.

3. AI can **optimize the operation of pumps and valves in the distribution** to minimize energy consumption while ensuring adequate water pressure and supply.

4. Machine learning algorithms can analyze data from sensors placed in the distribution system to **identify leaks or abnormal water flow patterns**, helping to reduce water loss and associated costs.

5. AI can analyze historical water consumption data and factors like weather, population growth, and agricultural activities to forecast future water demand and aid in resource planning and infrastructure development.

6. AI can assist in **managing water resources** more efficiently by analyzing data from weather forecasts, river levels, and groundwater levels to support informed decisions about water allocation, emergency response planning, and conservation measures.

7. Chatbots and virtual assistants powered by AI can help rural water districts **interact with customers**, providing

information on water conservation, billing inquiries, and service requests, thus reducing the workload on customer service personnel.

8. AI systems can assist in monitoring and ensuring compliance with water quality regulations by continuously analyzing data and generating reports required by regulatory agencies.

What technology providers do this kind of thing?

Several technology providers and companies specialize in offering a range of products and services tailored to the specific needs of water utilities. Here are some notable technology providers in this space:

1. **IBM Watson IoT platform** (IoT is “Internet of Things”, that is, a network of physical objects) used to monitor and optimize water infrastructure, predict equipment failures, and improve water quality

2. **Siemens AI-powered analytics** for predictive maintenance and process optimization in water treatment plants and distribution networks

3. **ABB AI-based asset performance management and control systems** for water treatment and distribution

4. **Schneider Electric software** for optimizing water distribution and reducing energy consumption through AI and automation

5. **Xylem Sensus** for smart water metering and communication solutions to monitor water consumption, detect leaks, and manage distribution systems

6. **Trimble GIS** software and hardware that can be used for asset management and infrastructure planning

7. **Ayyeka AI-powered analytics** using remote sensing to help improve water quality, detect anomalies, and manage assets

8. **Xenius** for water quality monitoring, using sensor data and analytics to ensure water safety and compliance with regulatory standards

9. **Aquatic Informatics** data management and analytics solutions tailored to water quality and environmental monitoring for utilities and agencies

10. **Iota Communications** IoT-based solutions for water utilities, including smart meters and sensors that enable real-time data collection and analysis.

11. **AquaAerobic Systems** for wastewater treatment technologies using AI-driven control systems for optimization

12. **Plant An App’s Bazinga AI** is both a SaaS solution and an Enterprise AI platform where users and those without coding experience can build their own custom solutions for implementing applications for AI.

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When evaluating technology providers, it's essential for rural water districts to consider their specific needs, budget constraints, and the scalability of the solutions. Consulting with industry experts and contacting local government agencies or water associations can also help select the right technology partner for implementing AI and technology solutions in water management. Additionally, considering providers with a strong track record in serving rural water utilities may be beneficial, as they understand the unique challenges faced by these districts.

Have Kansas government agencies approved of using AI for the water industry?

As of my last knowledge update in September 2021, the state of Kansas had not made any specific statewide announcements or regulations related to the use of AI in the water industry. However, it's important to note that the adoption of AI and technology in the water industry is often

a matter of local jurisdiction and the discretion of individual water districts or utilities within the state.

State governments in the United States typically provide general guidelines and regulations related to water quality, safety, and environmental standards. The use of AI and technology to meet these standards and improve water management is often left to the discretion of the local authorities, including rural water districts and utilities.

To find the most up-to-date information on the use of AI in the water industry in Kansas, I recommend checking with the following sources:

1. Kansas Department of Health and Environment KDHE
2. Kansas Rural Water Association KRWA (*Hey, the Chat Bot mentioned us!*)
3. Local Water Districts and Utilities (*That's you!*)
4. State Legislation and News (*KRWA has you covered there, at krwa.net/legnews*)

What about smaller rural water districts that have tight budgets? How can they take advantage of the benefits of AI?

Smaller rural water districts with tight budgets can still take advantage of the benefits of AI, but they may need to approach the adoption of AI technology in a cost-effective and strategic manner. Here are some steps and considerations for smaller rural water districts to make the most of AI within budget constraints:

1. Start small and prioritize
2. Leverage existing infrastructure
3. Use cloud-based solutions
4. Explore collaboration and partnerships for ai solutions
5. Research state and federal grant opportunities and include budgeting for it in the long run
6. Utilize open-source ai tools for little to no cost
7. Start with pilot projects to test the feasibility
8. Consider the long-term costs of maintaining and supporting ai systems
9. Implement key performance indicators to monitor and assess the impact of ai solutions
10. Seek guidance from experts or consultants with experience in ai specifically for water management

How can a small rural water district in Kansas use AI for operational performance strategy?

A small rural water district in Kansas can use AI for operational performance strategy by implementing AI-driven solutions that help optimize various aspects of their water management operations. Here's a step-by-step guide on how to do it:

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1. Identify Specific Objectives:
 - Begin by identifying specific operational objectives and challenges your water district faces. Common goals might include reducing water losses, improving water quality, optimizing energy consumption, and enhancing overall operational efficiency.
2. Assess Data Availability:
 - Determine what data you currently collect and have access to. This includes data from sensors, meters, historical records, and other sources relevant to your operations.
3. Data Integration:
 - Ensure that data from various sources is integrated into a centralized data repository. AI relies on high-quality and well-organized data, so data integration is crucial.
4. Select Appropriate AI Tools and Technologies:
 - Choose AI tools and technologies that align with your specific objectives. Common AI applications for operational performance strategy include predictive analytics, machine learning, and data visualization tools.
5. Predictive Analytics for Maintenance:
 - Implement predictive maintenance using AI. This involves analyzing historical maintenance data and sensor data to predict equipment failures before they occur. This helps minimize downtime and reduce maintenance costs.
6. Real-time Monitoring:
 - Utilize real-time monitoring and anomaly detection. AI algorithms can continuously analyze data from sensors to identify anomalies in water quality, flow rates, or system behavior. When anomalies are detected, alerts can be sent to operators for immediate action.
7. Demand Forecasting:
 - Implement AI-driven demand forecasting. By analyzing historical consumption data and external factors (e.g., weather, population trends), you can predict future water demand more accurately, helping with resource allocation and infrastructure planning.

8. Energy Optimization:
 - Use AI to optimize energy consumption. AI algorithms can adjust the operation of pumps and valves in your distribution network to minimize energy usage while maintaining adequate water pressure.
9. Water Quality Control:
 - Employ AI for water quality control. AI can help optimize chemical dosing in water treatment processes to maintain water quality within regulatory standards while minimizing costs.
10. Leak Detection:
 - Implement AI-based leak detection systems that analyze data from sensors and meters to identify and locate leaks in your distribution system, reducing water losses.
11. Data Visualization and Reporting:
 - Use data visualization tools to create dashboards and reports that provide real-time insights into your operations. This helps operators make informed decisions.
12. Continuous Improvement:
 - Continuously monitor and evaluate the performance of your AI systems. Adjust algorithms and strategies as needed to optimize results over time.




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13. Staff Training and Capacity Building:

- Invest in training and building the capacity of your staff to understand and work with AI technology. This ensures that your team can effectively use and maintain AI systems.

14. Budget Planning:

- Incorporate AI-related expenses into your budget planning. While there may be upfront costs, consider the long-term cost savings and operational improvements AI can bring.

15. Compliance and Reporting:

- Ensure that your AI systems are compliant with relevant regulations and reporting requirements. This is particularly important in the water industry, where water quality and safety standards must be maintained.

16. Collaboration and Knowledge Sharing:

- Collaborate with other water districts, industry associations, and government agencies to share knowledge and best practices in using AI for operational performance.

By following these steps and taking a systematic approach, a small rural water district in Kansas can leverage AI to

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enhance operational performance, reduce costs, improve water quality, and ensure efficient water management. Start with pilot projects and gradually expand your AI initiatives as you gain experience and see positive results.

What kind of input data would be needed for RWDs to effectively use AI for operational performance strategies?

The quality and availability of this data are crucial for the success of AI-driven initiatives. Here are the types of input data typically required:

- sensor data (i.e. water, flow, pressure, temperature, water level)
- meter data
- historical data (i.e. water quality, consumption, maintenance activities, and past incidents)
- weather data
- geospatial data (i.e. GIS data on the layout of the distribution network, including pipes, valves, pumps, and reservoirs)
- customer data (i.e., location, water usage patterns, historical consumption, complaints, inquiries, service requests)
- maintenance schedules and records (i.e., past repairs and equipment replacements)
- regulatory data:
- external factors data (i.e., population growth, agricultural activities, and industrial processes)
- energy usage data
- alarm and event logs

What are possible drawbacks of using AI for small rural water districts in Kansas?

While AI can offer numerous benefits to small rural water districts in Kansas, there are also potential drawbacks and challenges to consider when implementing AI technology.

These drawbacks include:

- costs and budget constraints
- data quality and availability
- staffing and expertise
- integration complexity
- resistance to change/community perception

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- maintenance and update costs
- dependency on technology providers

Despite these potential drawbacks, many small rural water districts can overcome these challenges with careful planning, partnerships, and a strategic approach to AI adoption. Addressing each of these concerns early in the planning and implementation process is critical to maximizing the benefits of AI while minimizing its drawbacks.

How would a small rural Kansas water district start using AI? What are the practical first steps?

Getting started with AI for a small rural water district in Kansas involves taking practical steps to build a foundation for AI adoption. Here are some initial steps:

1. Clearly define your objectives. For example, you might aim to reduce water losses, optimize energy consumption, improve maintenance efficiency, or enhance water quality.
2. Assess data availability. AI quality is only as good as the quality of your data.
3. Budget planning. Consider both initial costs for technology and ongoing expenses for maintenance and training.

Except for the fact that conversations normally aren't in numbered lists, my chat with this AI bot felt like talking to someone in the know.

4. Identify low-hanging fruit. (Yes, AI called it this!) Start with small-scale AI projects or pilot projects that have clear benefits and low implementation complexity, such as real-time monitoring of water quality at a critical point.

5. Select AI tools and partners. Research both the tools and vendors with experience in the water industry that align with your objectives and budget, for example, cloud-based

6. Collaboration and knowledge sharing. Work with neighboring water districts, industry associations, and government agencies to share knowledge and best practices.

7. Communication with customers. Share your AI initiatives and their benefits for transparency and engagement to help build support.

8. Long-Term planning. Integrate AI adoption into your long-term strategic planning and budgeting roadmaps.

Except for the fact that conversations normally aren't in numbered lists, my chat with this AI bot felt like talking to someone in the know. Even still, seeking out companies experienced with AI, such as those exhibiting at the KRWA Conference, is a great first step to taking advantage of this emerging tool. Conversation-based AI may not reach the level of expertise a human can provide ... yet.

Since 1997, Jen Sharp (JenSharp.com) has served business and government across Kansas and the US and even internationally, specializing in Web development, design & programming including e-Learning, ecommerce, content management systems, and other small business solutions.



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