

## Control is just better using SERLE by smartR AI

To solve complex real-world problems and optimize decision-making smartR AI uses SERLE, its intelligence-based automation engine.

A control problem is where you need to “turn knobs” to achieve the desired result. SERLE solves complex control processes and issues, especially within automation, connecting and bringing the internet of things to life.

At smartR AI, we invent tomorrow’s products today by breaking free from pre-programmed rules.

### A smartR AI platform on the edge

SERLE, our proprietary engine, solves real-world problems, learns quickly, has a small footprint with numerous applications, and can be deployed at the edge of a network. It connects individuals to numerous platforms, including phones, sensors, the IoT, and interconnections.

The engine ensures optimal efficiency and performance, improves quality, has production-ready code, and reduces human error by using reinforcement learning to solve problems based on the rewards you give it. This makes it ideal to use in embedded devices.

### Understanding, interpreting, predicting, and responding

SERLE’s ability to solve the most chaotic and complex real-world situations and problems is due to it being a non-linear engine and its use of AI algorithms and models. This ensures faster learning while leveraging existing knowledge, through reinforcement learning. The engine’s reward functions are optimized depending on needs and can be subjective, sparse, and non-restrictive. Data efficiency functionality ensures the engine doesn’t wear out devices while learning and can be re-tuned periodically.



Additionally, SERLE can:

- Understand time relationships: it learns time delays, anticipates future actions/events, and looks at history to make decisions.
- Handle discontinuities: it learns when events happen, predicts outcomes, and models discontinuous systems.
- Interpret historical data: it models hysteresis, anticipates backlash, and predicts cracking / reseal pressure.
- Handle multiple inputs and outputs.

## Automating your development

By having a small footprint, SERLE can be on the edge. SERLE separates policy from the reinforcement engine so that policies are small and testable. And, so you can get going immediately, smartR AI has fully testable policies available.

SERLE can run the policy on a small MCU: it can be embedded into low-cost devices which don’t need to be connected to the internet, thus reducing overall costs.

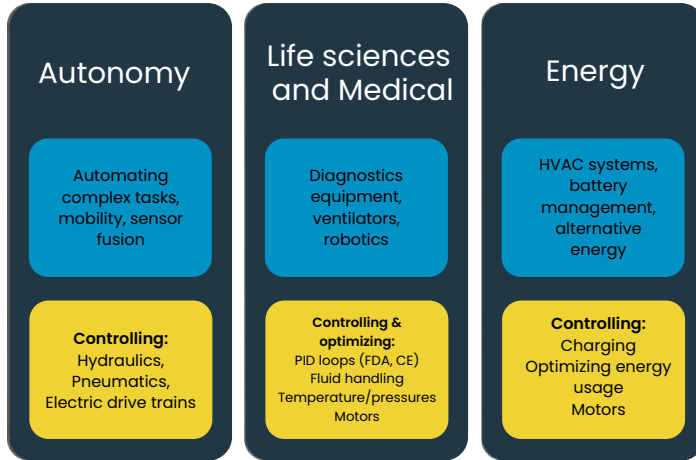
The SERLE engine learns faster, leverages existing and historical knowledge, provides data efficiency, and allows connectivity.



Figure 1: SERLE can run the policy on a small MCU diagram

## Control things better with SERLE

Due to the engine's flexibility, industry applications for SERLE are numerous, and include:



The SERLE engine is the ideal platform for imaging and video prediction applications. We work on the control aspects for these applications with a variety of clients as a part of ongoing, all-encompassing projects.

Good examples of where SERLE uses control in these applications are:

- Pneumatics for microfluid chips

For chips needing to draw liquids into small channels the potential for leaks is high. A vacuum is required to do this, requiring extreme levels of control of the inlet pressure to ensure high-quality microfluid chips. By using SERLE for this process, the client gains a high-quality end-product through:

- The ability to detect if a leak has got out of control speedily
- Consistent pressure throughout the process

- Optical systems

By tagging nucleotides, SERLE can control the light source, ensuring and maintaining consistency and accuracy of the output.

## Why choose and use?

SERLE - The AI automation engine to solve complex problems and control processes.

| SERLE Features   | Benefits   |
|--|--|
| Non-linear system: handles real world situations (non-linear, chaotic)           | Solves real world problems, learning quickly and having production ready code.   |
| Leverages knowledge  | Algorithms and models for faster learning, leveraging existing knowledge and tackling large problems.  |
| Works with the IoT   | Connectivity   |
| Data efficient   | Less data to collect, doesn't wear out devices while learning, can re-tune periodically  |
| Handles noisy data   | Models noise, learns to filter and find the true system state  |
| Reward functions   | Optimized depending on needs (subjective, sparse and non-restrictive)  |
| Looks at history to make decisions   | Time relationships: learns time delays, anticipates future actions/events.<br>Discontinuities: learns when events happen, predicts outcomes, models discontinuous system, models hysteresis, anticipates backlash, predicts cracking / reseal pressure |
| Separates policy from engine   | Policies that can be fully tested. Useful / important in certain industries  |
| Policy runs on a small MCU with fully testable policies available                | Can embed into low-cost devices which don't need to be connected to internet, reducing costs.  |
| The business operates more efficiently and optimizes its performance using SERLE | Improved speed of business   |
| Applications are numerous  | Flexibility  |
| Can handle multiple inputs and outputs   | Adaptable to quantity requirements   |
| Reinforcement learning without Deep Learning                                     | Preferable for solving complex problems.   |

## Looking ahead

SERLE is in version 1.0 currently, with functionality for automation, control, and sensor fusion. smartR AI has a full development plan for the engine to enable it to work with and solve highly complex tasks and provide super human automation. The development process will work hand-in-hand with market development and client requirements.



Figure 2: SERLE development plan

## About smartR AI

smartR AI™ is committed to developing life-changing artificial intelligence applications based on the evolution of interactions, behavior changes, and emotion detection.

Focusing on behavioral intelligence and interconnections with IoT, we use AI applications to understand, interpret, predict, and respond to complex scenarios. As intelligence moves to the edge of the network, smartR AI is all about doing things the smartest way.


To solve complex real-world problems and optimize decision-making, smartR AI uses its intelligence-based proprietary engines, SERLE and alertR™. These engines ensure optimal efficiency and performance, improve quality, and reduce human error. They learn faster, leverage existing and historical knowledge, provide data efficiency, and allow for connectivity, to name just a few of their attributes.

The team builds products with the latest AI techniques and knows how to help you integrate AI into your product, and our expertise and diversity of knowledge ensure clients benefit from high levels of adaptability. We listen to your ideas and turn them into reality.



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Improving lives intelligently