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Sustainable Design and Systems Medicine Laboratory

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RowanUniversity
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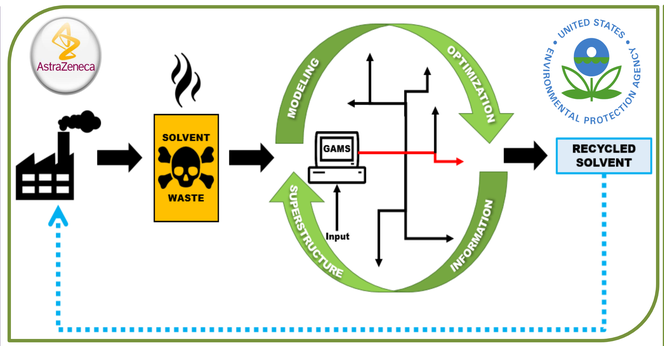
Research Methods & Projects

Wastewater Treatment & Asset Management

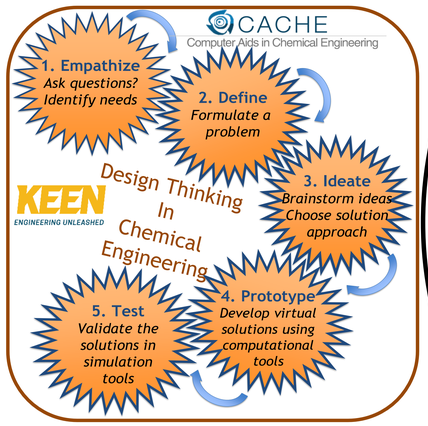
We use representative case studies for municipal, pharma, and industry wastewater streams and model them as optimization problems for finding the best treatment route.

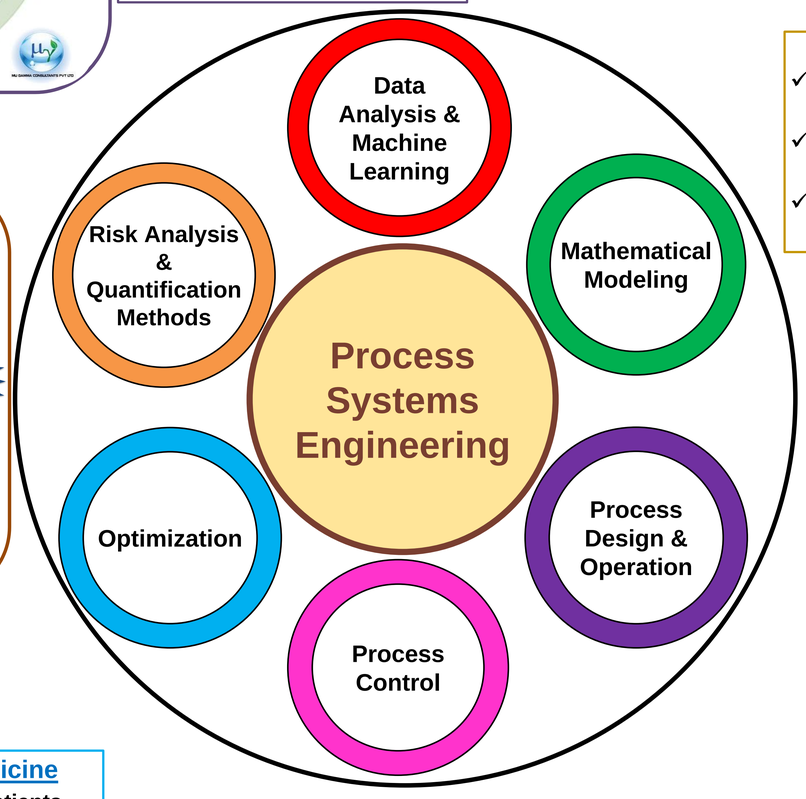
In the next step, we use the P-graph approach for solving the same problems as it can provide insights into non-intuitive solutions, that guarantee global optimality.



Roadmap for Solvent Recovery in Industrial Manufacturing

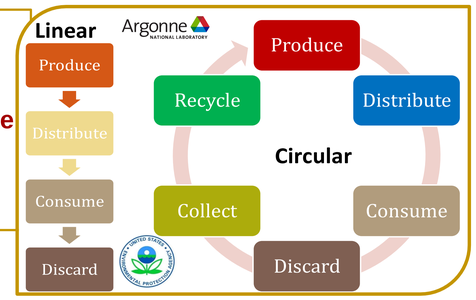
As an alternative to conventional solvent disposal, solvent recovery can improve the greenness and overall sustainability of pharmaceutical and fine chemical industries. A superstructure approach is applied to develop the roadmap, which begins with material (waste stream) input, followed by process technologies for separation, reaction, or mixing. This systematic framework can be applied to existing and future chemical processes to minimize solvent waste





Other Projects Include:

- ✓ Plastics Recycling, & Reuse
- ✓ Optimizing Ion-Exchange Systems
- ✓ Management of Irritable Bowel Syndrome



Optimization of Pipeline Flushing Operations

Lube oil blending plants process 1000+ unique products. One single pipeline is used for packaging multiple different products. These pipes have to be flushed by finished product to clear the previous lube oil before packaging. This generates mixed oils with low economic value making the flushing operation highly cost-intensive. Thus, goal of this study is to minimize the amount of mixed oil generated during flushing.

ExxonMobil
Paulsboro Lubricants Oil Blending Plant

Optimization of Pipeline Flushing Operations

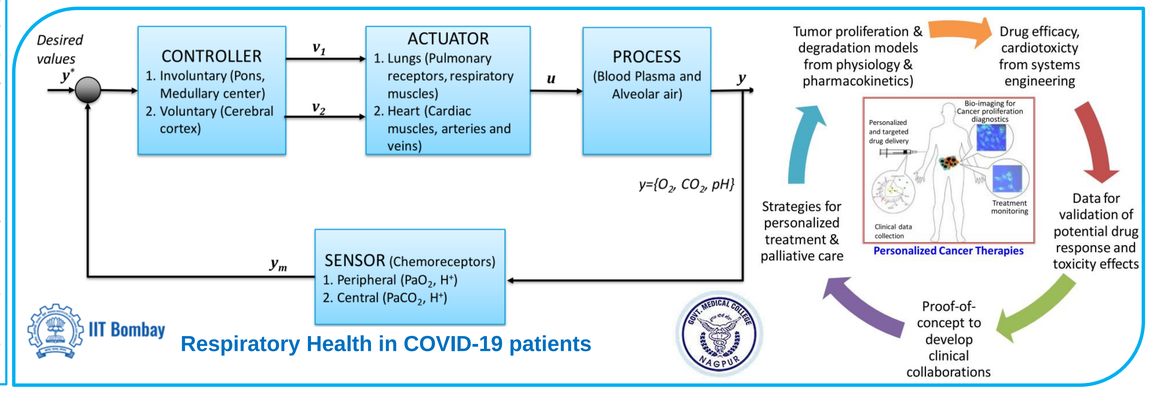
Applications of Systems Medicine

- **Breathing Regulation in COVID-19 Patients**

The respiratory system failure from Acute Respiratory Distress Syndrome is the leading cause of mortality for COVID-19. This project incorporates deep physiological models, machine learning algorithms, and control of the respiratory system for accurate assessment, minimized testing and potential treatment

- **Cancer Diagnostics & Therapeutics**

We intend to develop customized treatment schedules for cancer patients using modeling, optimization and machine learning tools. Neural networks, decision trees, support vector machines were used to determine biological markers linked to Leukemia-subtype identification. This enables effective diagnosis and treatment schedules



Laboratory Resources

Programming Platforms & Tools

GAMS python MATLAB Visual Basic R

scikit learn P-GRAPH aspentech ORIGIN ANSYS FLUENT

Sustainability Assessment Tools

SimaPro SPI

Argonne GREET LIFE-CYCLE MODEL

Emergy

Where Our Alumni Work

- Pfizer
- Johnson Matthey
- DuPont
- Merck
- BioAir Solutions LLC
- Environmental Resources Management
- Air Liquide
- Corning Incorporated
- Ingredion Incorporated
- Materion Corp.
- Edmund Optics
- Haines Fire & Risk Consulting Corp.

Faculty & Students

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