



# WORKSHOP 4: DESIGNING NOVEL ROBOTIC SYSTEMS

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- Introduction
- Summary of topics covered
- Novel methodologies



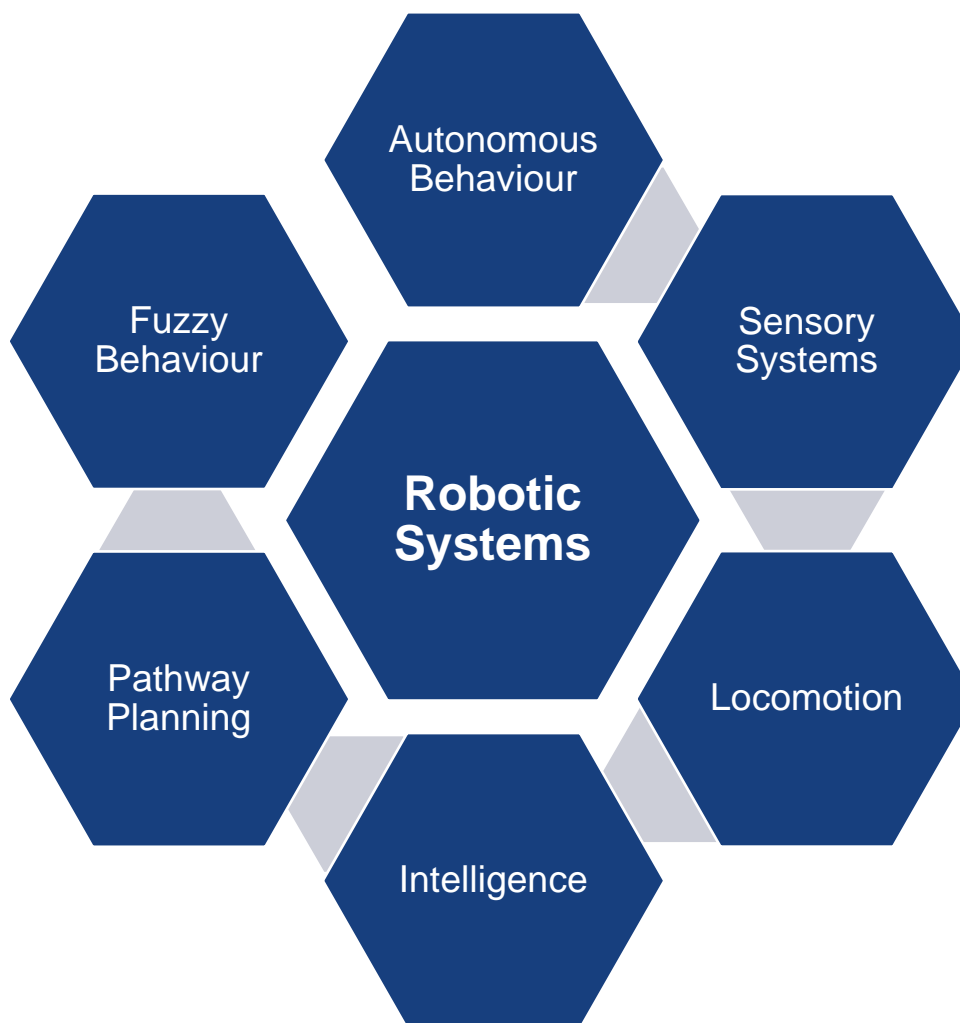
# Introduction



- This workshop is to train and teach participants to implement and design robotic systems for real world applications
- RBS professionals need to identify proper pain points to tackle to ensure success



# Summary of Topics Covered





# Novel methodologies



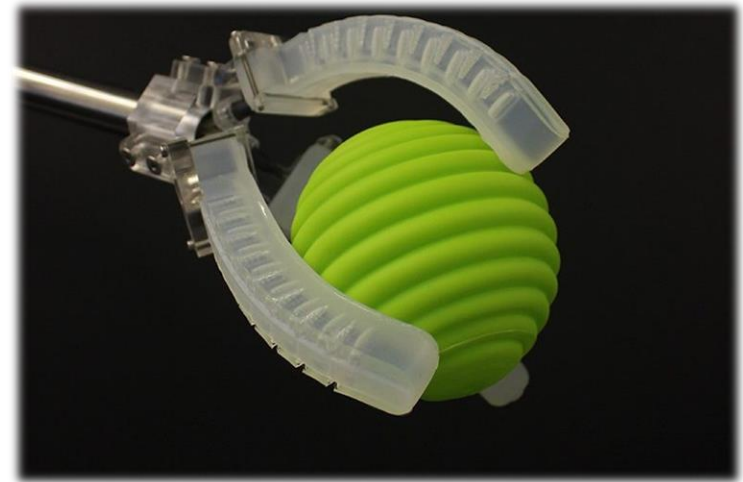
## Soft Robotics

- To achieve **high compliance and nature-like movement**
- Use of **pneumatics, electric field, thermal, inflatables, elastic materials**
- Applications: Medical, Massage, Assistive device, Space exploration

### Video Link:

<https://www.youtube.com/watch?v=X0XGu-re7mak>

<https://www.youtube.com/watch?v=N28bttqLoZE>



<https://www.therobotreport.com/97810-2/>



# Novel methodologies



## Soft Robotics Example 1:



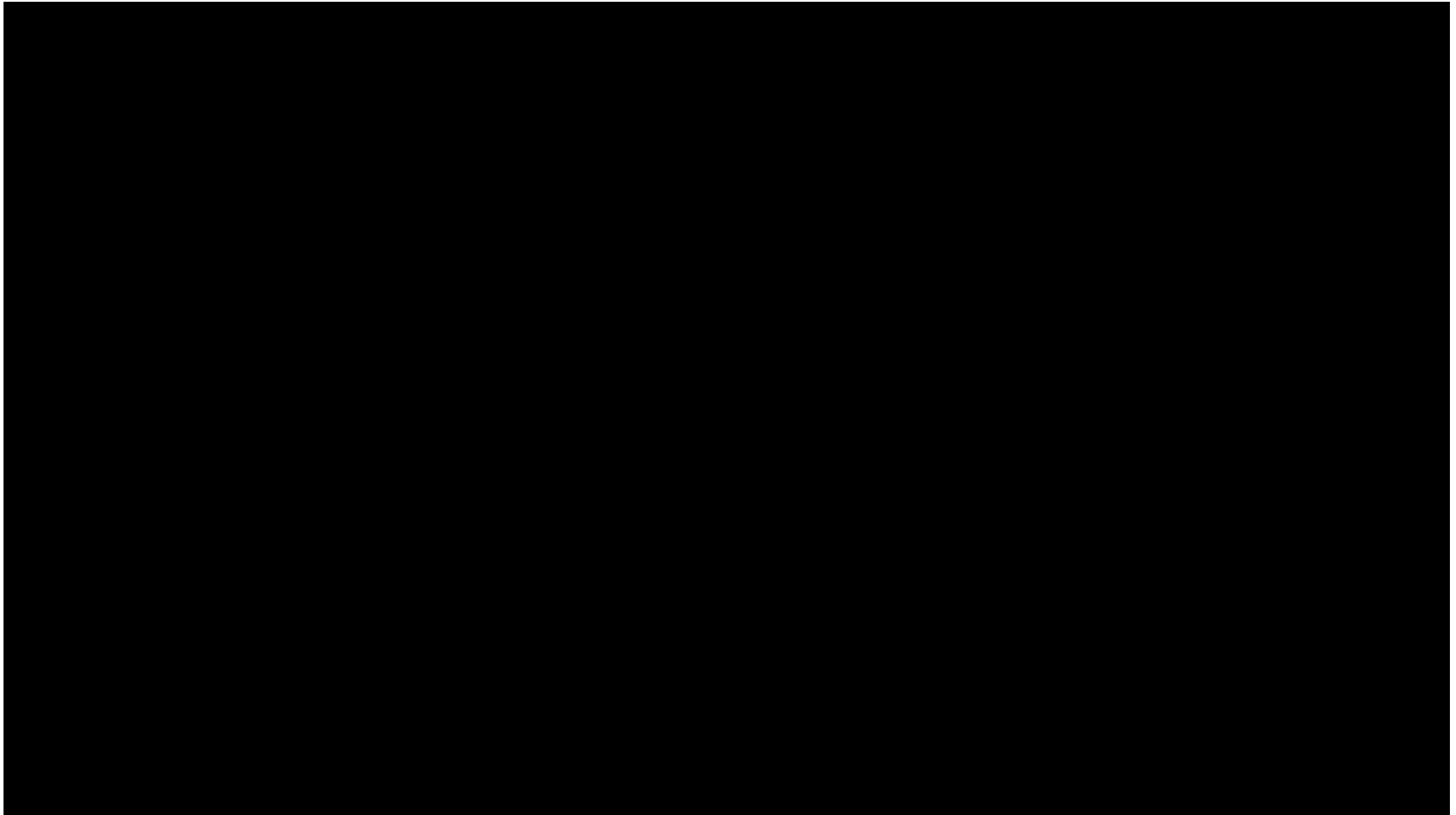
<https://www.youtube.com/watch?v=X0XGure7mak>



# Novel methodologies



## Soft Robotics Example 2:



<https://www.youtube.com/watch?v=N28bttqLoZE>

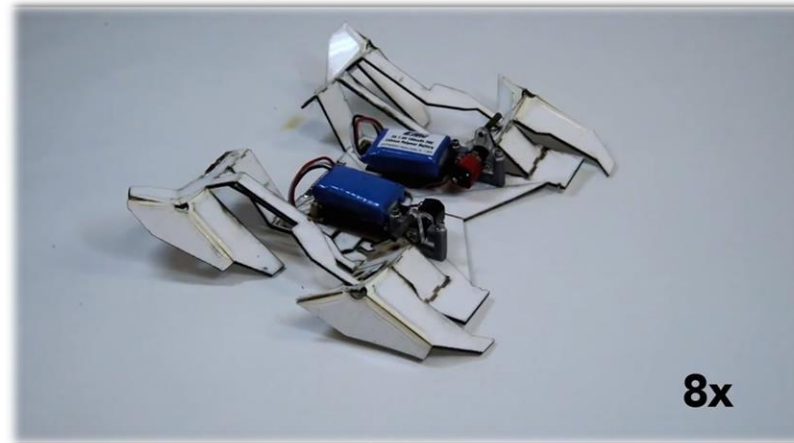


# Novel methodologies



## Shape Shifting/Self Assembly Robots

- **Assemble and morph by itself**
- Can change from **2D to 3D**
- Based on principles of origami and other mechanisms
- Applications: Space, Military



<https://www.youtube.com/watch?v=9M1zNIVGrjM>

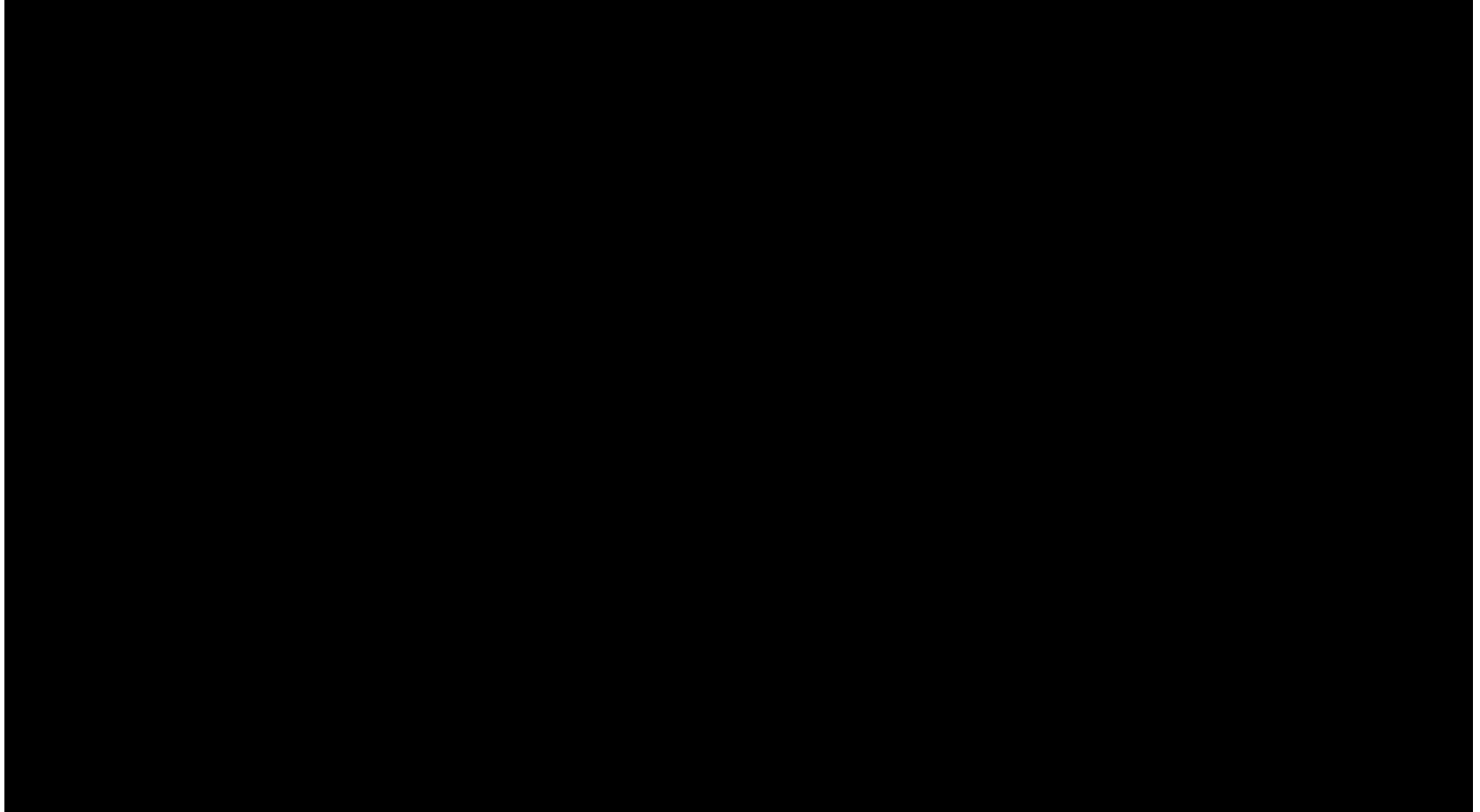




# Novel methodologies



## Self Assembly Robots



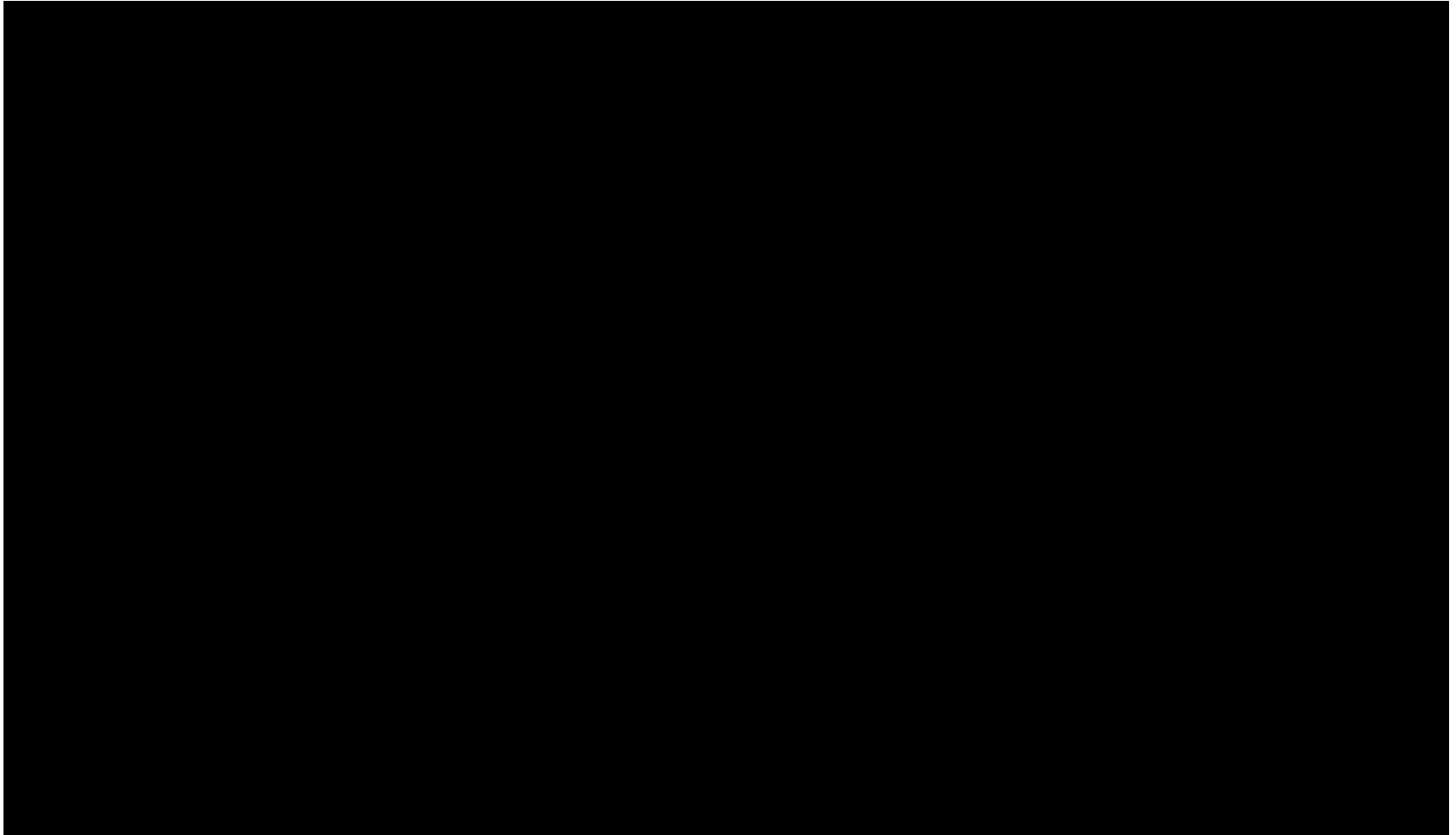
<https://www.youtube.com/watch?v=9M1zNIVGrjM>



# Novel methodologies



## Shape Shifting Robots



<https://www.youtube.com/watch?v=Pfo233eN3HE>



# Novel methodologies



## Telerobot

- Based on a **Master and Slave** approach
- Algorithms may assist pilots to better control the robotic limbs
- Applications: Surgery, Manufacturing, Space, Military... etc.



<https://www.youtube.com/watch?v=3rZYn62Old8>



# Novel methodologies



## Telerobot (Shadow Hand) Example:



<https://www.youtube.com/watch?v=3rZYn62Old8>



# Identifying Use-cases



## Look for:

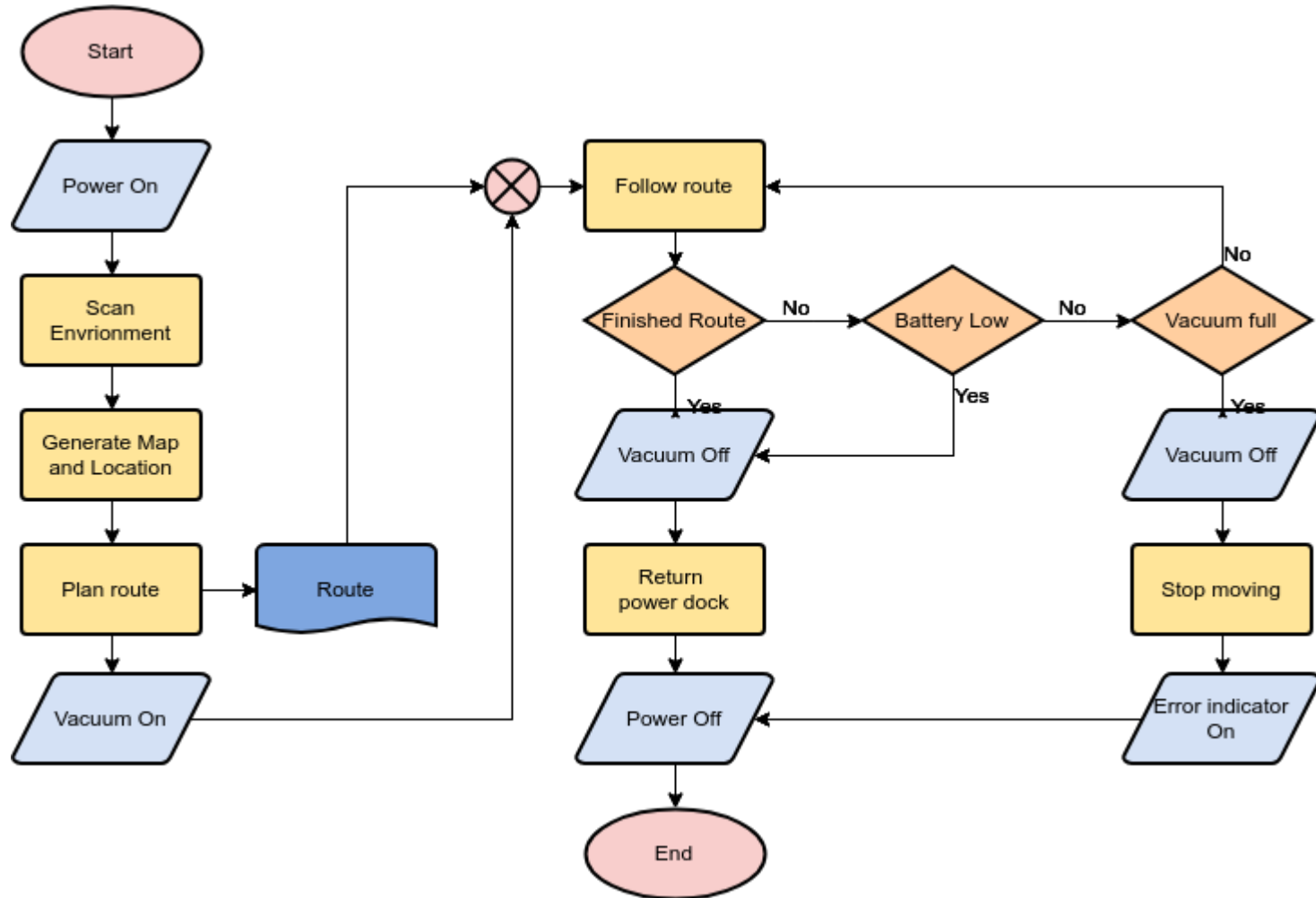
- **Daily pain issues** ( no pain, no interest)
- **Revenue generating or manpower saving or cost saving** opportunities

## After identifying, ask yourself these questions:

- Can the problem be solved with other cheaper alternatives than using robots?
- Will robotics result in cost or manpower savings in the long run?
- Will it infringe any patents or company IT policy or ethical policies?
- Will it cause inconvenience in any way?
- Is it cheap to try out ?



# Example of Robotic flow process





# Homework



- **Prepare a real robotics implementation plan** specific to your work place or identified use-case
- Include all the points discussed in the previous few slides
- **To be presented and submitted on the 5<sup>th</sup> day**
- **5~10 minutes presentation** (10 slides or less) and 5 minutes Q&A per person
- Have more graphics/charts/figures than wordy
- PowerPoint-based
  - Use template provided



# End of Workshop 4