Layout Design of a Factory-in-a-lab

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Motivation

- Engineering and science students learn effectively through hands-on projects.
- Lack of resources and time does not allow them to use and develop skills inside an operational factory.
- A Factory-in-a-lab supports students in learning and demonstrating concepts through project-based learning.
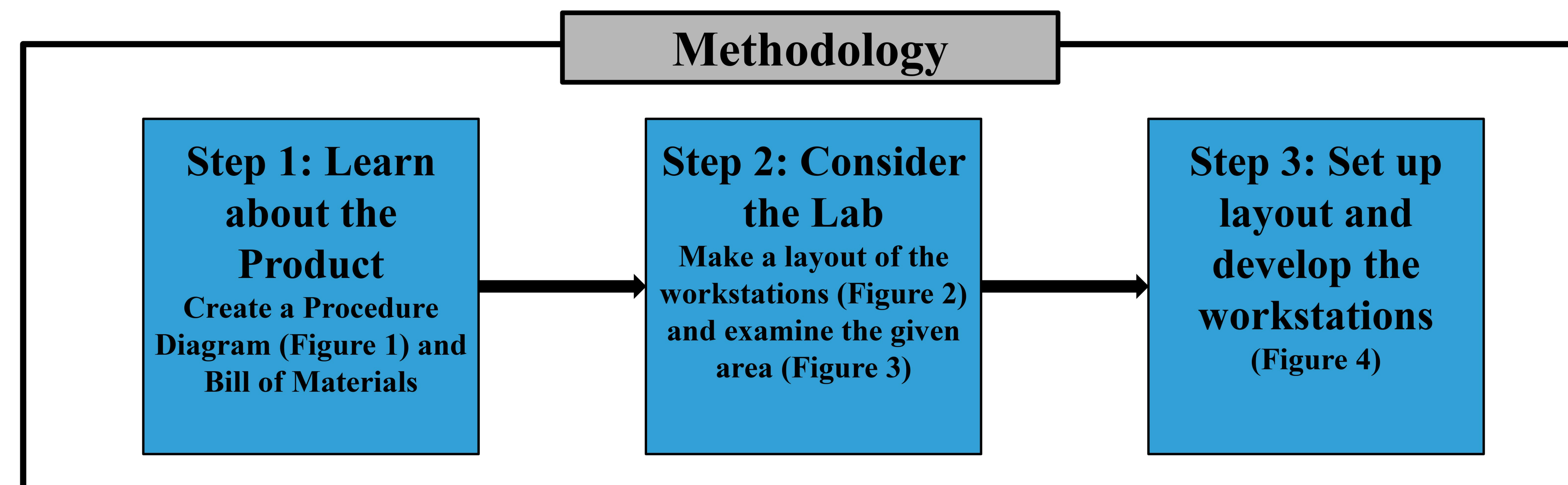
Objectives

- Create an efficient layout for the assembly of a 3D printed robot in a congested space of the lab.
- Learn and understand lean manufacturing for the lab layout.
- Develop and improve an assembly line inside AllFactory (part of LIMDA).

Factory-in-a-lab

A Factory-in-a-lab:
- Is a factory created in a limited space within a laboratory.
- Allows students to overcome challenges through practice problems.
- Gives students an opportunity to design, manufacture, and assemble.
- AllFactory is designed as a Factory-in-a-lab.

Methodology

Step 1: Learn about the Product
Create a Procedure Diagram (Figure 1) and Bill of Materials

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Step 2: Consider the Lab
Make a layout of the workstations (Figure 2) and examine the given area (Figure 3)

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Step 3: Set up layout and develop the workstations
(Figure 4)

Research Progress

Figure 1: Procedure Diagram

Figure 2: Designed factory floor layout linked to procedure diagram.
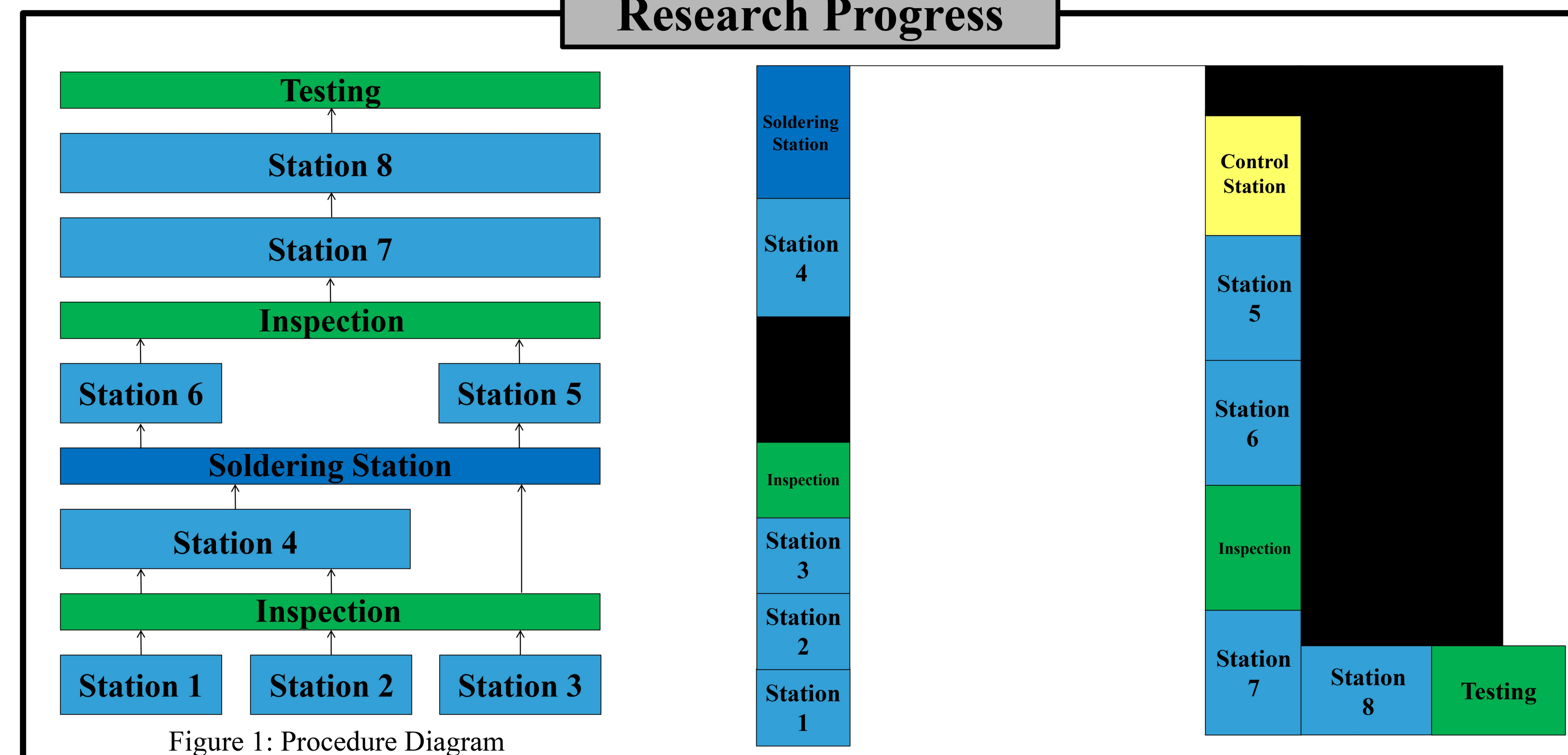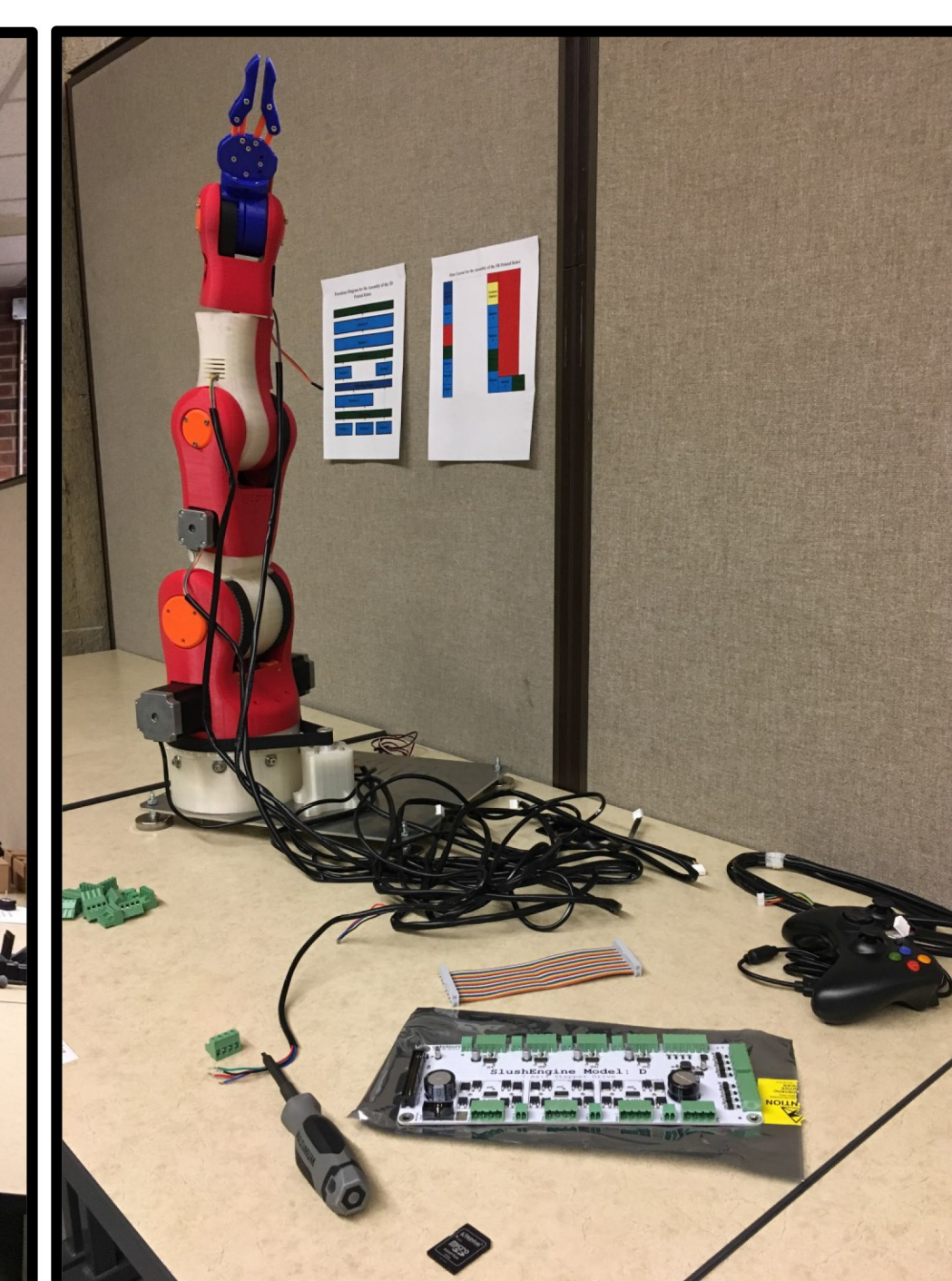

Figure 3: 3D model of LIMDA (courtesy of Juan Ramos)

Figure 4: Real AllFactory Design

Future Research

The Alberta Learning Factory will:
- Demonstrate practical applications of Lean Manufacturing.
- Integrate manufacturing machines into a lab setting.
- Instruct in intelligent assembly procedures.
- Provide an opportunity to research and educate on the latest manufacturing and assembly processes.
- Link into undergraduate and graduate courses.

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Threshold Impact

AllFactory — Uplifting Learning

LIMDA — Laboratory of Intelligent Manufacturing, Design and Automation