IZTECH ME401 Project Proposal

Advisor: Prof. Dr. Gökhan Kiper

Project title: Long range portable and rapidly deployable bridge design

Number of groups: 1 or 2

Number of students in each group: 5

Is the project within the scope of Co-Op Extended?: No

Project Background:

Such portable and deployable bridges (PDB) are mainly used by military and civilian governmental institutions to pass through rivers, ditches, valleys, etc. Portability and rapid deployment of such bridges is important during emergency situations.

Project Objectives:

- To design a practical, light-weight and cost-efficient PDB
- To maximize the span and the deployment ratio of the PDB while maintaining load requirements
- To design the full-scale system and to build a scaled prototype for tests

Project Design Criteria:

- Span coverage: at least 20 m
- Loading capacity: at least 100 tons
- Width: at least 4 m
- Lateral deployment ratio: at least 5
- Weight: at most 10 tons

Expected Outcomes:

- Design of a full-scale deployable bridge verified via simulations
- A small-scale prototype for functional tests

Sustainable Development Goals:

The project aims to ensure uninterrupted transportation in poss-disaster scenarios. The project is related to SDG11 (Sustainable Cities and Communities) via targets 11.1 (By 2030, ensure access for all to adequate, safe and affordable and basic services and upgrade slums), 11.5 (By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations) and 11.b (By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels).

Literature Survey Subjects:

- Types and properties of military and post-desaster PDBs
- Actuation of PDBs
- Deployment systems for spanning gaps
- Materials that can be used for PDBs
- Associated standards and design criteria (load, span, weight, deployment ratio, etc.) for PDBs

Please write your notes below, which you find useful for students to know about the project.

The students should have a good background (grade CC or higher) of strength of materials and theory of machines.