**Trapeze 1&2: On-the-fly automated (re)planning**

**A machine as an AI transport network planner**… This is the moto of our flagship R&D project. A transport network planning system which uses AI and reinforcement learning to:

1. Design an optimized network according to **stability requirements, mobility trends, budget constraints, passenger needs, …**
2. Dynamic **on-the-fly replanning of the network during operation**, optimizing trips and routes for certain criteria…

As a result, a **reduction in OPEX & CAPEX** is achieved, in addition to the benefit of **better decision making** as the machine considers hundreds of scenarios and evaluate the design space

1. based on the dimensions of passenger flow, passenger comfort, network conditions, available and required resources, end-to-end cost, total trip duration, …
2. at **times of service interruption** (compared to **90 seconds** available to the human network planner)

Today, the available network planning tools are comparable to Microsoft Word for an author. In analogy, our proposal is a machine author which writes the text according to the human author needs.

In this project, a prototype shall be built which utilizes AI and reinforcement learning, serving as a proof-of-concept implementation for the application of such technologies in the multi-modal transport industry.

Recommended programming language / technology: Python and Javascript or HTML5

**Trapeze 3&4: Emergency Situation Detection using Speech Recognition**

**Natural Language Processing (NLP)** technology has matured greatly over the last decade, with applications rising in many industries. Reflecting on the current situation of **autonomous vehicles in the transport industry**, even the most progressive cities are licensing autonomous vehicles with impractical constraints –limiting the deployment of autonomous vehicles to pilot projects only. Such constraints contain the requirement of having a human designated as the official driver of the vehicle, who is also responsible for the safety of the passengers.

In this project, we aim to enhance the capability of our system, enabling it to **understand human speech and trigger actions automatically**. A primary target application is **the detection of emergency situations in autonomous vehicles**. This is achieved by having the Trapeze on-board computer unit (OBU) in ambient listening mode, . As a result, **the OBU identifies and signals an emergency situation alarm** to the Operator’s control center whenever an emergency situation is detected. Eventually, the society’s trust in autonomous vehicles for public transport is increased.

A second valuable application of such NLP engine, is **increased automation** inside the control center. As such, an artificially-intelligent (AI) dispatcher agent needs to understand a message/call from a driver in order to trigger the necessary action.

Recommended programming language / technology: Python and Javascript/Node.js