Project No
**9200108**



# AIMLP: Artificial Intelligence Machine Learning Platform

Funding Programme
**Globalstars**

Project Start Date
**01.06.2021**

Project End Date
**30.11.2022**

Coordinator
**8nalytics (SG)**

Partners
**SESTEK (TR), Vakıf Katılım (TR), CreoGroup (HU)**

# Objectives

The AIMLP Project aims to address the "Training and Learning" needs of the industry by creating an AI-assisted and automated novel e-learning platform with 360 data collection and assessment features. The main objective of the project is to provide a robust and remote ML-assisted e-learning platform with data points tailored to align with individual companies' goals.

The unique features of AIMLP technology that distinguish the project from its competitors are its longitudinal capability to track the augmentations in performance and the multi-modal intervention methods on one platform. These methods include behavioral analysis, speech and text analysis, and physical and emotional analytics.

# SESTEK's Ambition to be a Part of This Project

SESTEK prioritizes securing a competitive position in the business world and aligning with emerging technologies essential for a more efficient and rapid employee training and learning roadmap. Integrating conversational analytics technology into the digital learning domain aligns perfectly with this objective. Additionally, SESTEK actively commercializes its technologies in over 20 countries, and the potential to expand its market in the Far East is a crucial reason for SESTEK's participation in the project.

# Project Rationale

- The digital learning trend among Generation Z and Generation Y companies are shifting towards novel learning platforms, including "Training and Learning" through AI assistance and automation.

- A personalized "Training and Learning" journey, including deep analysis parameters, is becoming indispensable "a sine qua non" to meet employee development.

- There is a need for corporate training effectiveness qualification to replace manual workforce training, thereby promoting the growth strategies of companies.

# Scope

The AIMLP project combines multi-modal attributes of employees and students (survey, voice, text, video, EEG) to develop predictive and analytical algorithms and business intelligence services. The collaboration between acknowledged experts in their fields has resulted in a robust product ready for use in different vertices. In this scope, the result of the project includes:

- Digitalization of a 360 data collection and assessment for easy global user access.

- Easy-to-use functionality that can be localized to specific entities and individual needs.

- Insight reports for learners, featuring interactive and engaging charts to inform them of their performance in real time.

- Machine algorithms to extract behavioral patterns and draw insights into correlations between drivers.

- Analysis of speech characteristics to provide insights into students' speech characteristics, such as monotony of speech, anger durations, ratios, hesitation, and silence.

- Textual analysis in targeted languages (Chinese, English, and Turkish)

- Facial emotion recognition and motion analysis to evaluate the effectiveness of the training.

# Novelties for SESTEK

- Development of a new recognition model for Mandarin language.

- Facilitation of further experiments and latest studies, such as end-to-end speech recognition (SR) and neural network-based techniques, to improve recognition accuracy for three target languages: **Chinese, English, and Turkish**

- Design of a new text clustering algorithm to select clusters iteratively.

- Utilization of the new clustering algorithm in text processing activities.

- The first Globalstars project enables collaboration with Singaporean partners.

- Adaptation of conversational analytics technology into the digital learning domain.

# SESTEK's Role and Achievements

- Utilizing RNNLM models for speech recognition, SESTEK has obtained a recognition model with a Character Error Rate (CER) of 5,25%.

- Developed an automatic language detection module to recognize speech using the correct language model when the language of the conversation is unknown. This enables the platform to automatically detect the spoken language and transcribe the speech into text in the correct language, particularly in multilingual interview scenarios.

- For emotion recognition, a method based on classifying mel spectrogram features using convolutional neural networks (CNN), similar to image processing, has been determined. System performance rates, measured using the equal error rate (EER) where miss and false alarm rates are equal, showed initial EERs between 22% and 37%. With improvements, this rate has been reduced to 11.9%.

- Experiments were conducted using two different feature extraction methods and four clustering algorithms. TF-IDF or pre-trained sentence embedding models were used for feature extraction, while the algorithms included agglomerative clustering, k-means, birch, and distance separation. Hybrid methods yielded the most successful results, achieving a 90% success rate with two robust models and nearly 98% success by hybridizing the two models.

- Developed an API to integrate SESTEK's Speech Analysis services into the platform, analyzing acoustic parameters of incoming audio data. This provides insights into speech characteristics such as monotony, anger durations, ratios, levels, hesitation, and silence.

# AIMLP Project Screens