

# Digital Twins in Education

Enhancing Student Well-being and Academic Performance with  
Biometric Insights and Machine Learning

U21 Health Sciences Group 2024 Annual Meeting  
Theme: Data-Driven Health Care and Teaching

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**Tecnológico de Monterrey**  
Escuela de Ingeniería y Ciencias

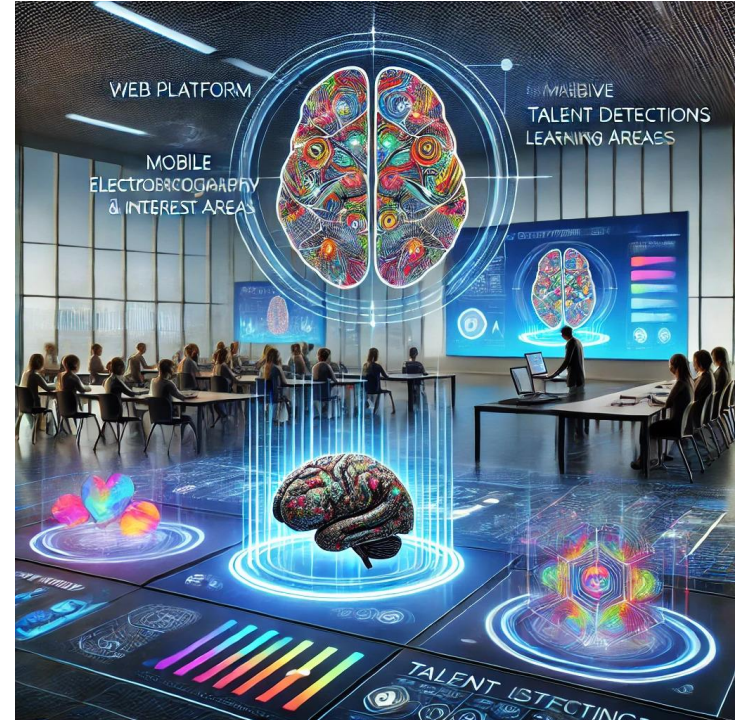








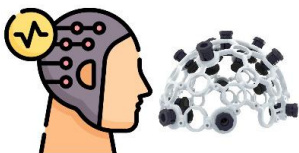


## Introduction

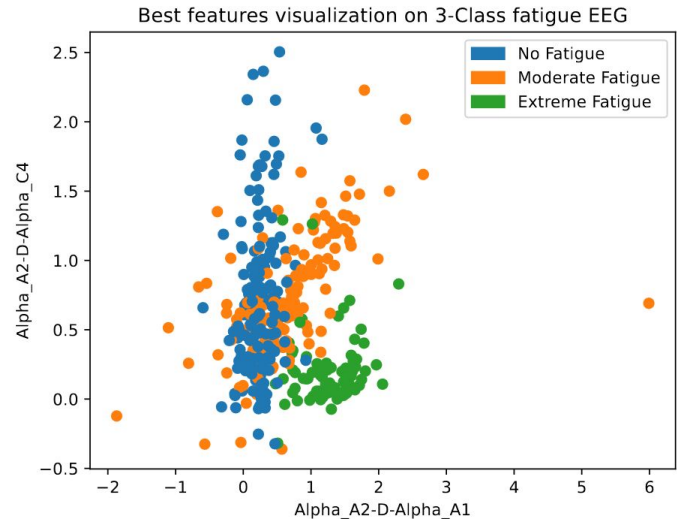
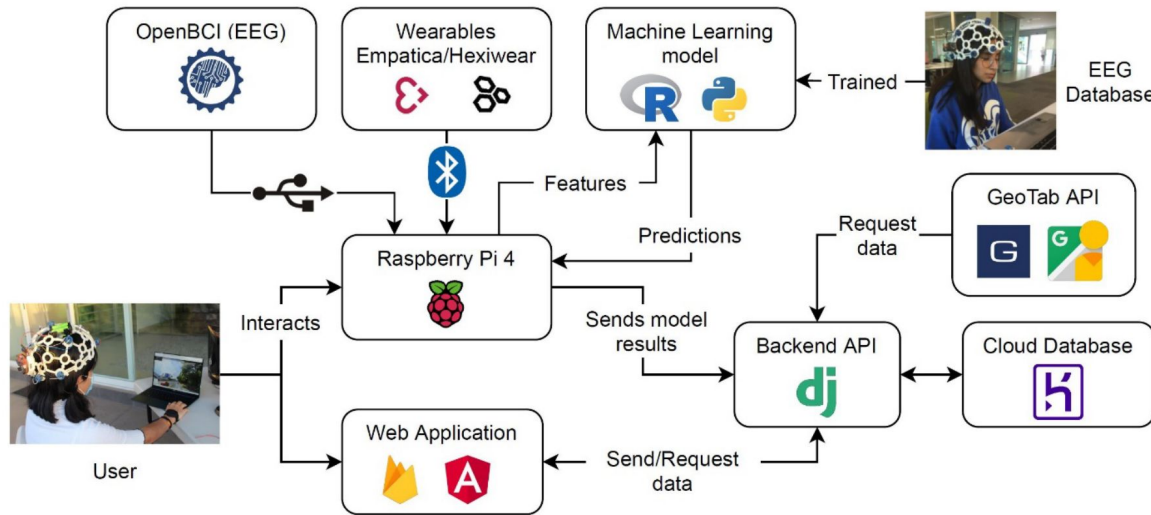
Innovative technologies revolutionize teaching methods and lead to more proficient education.

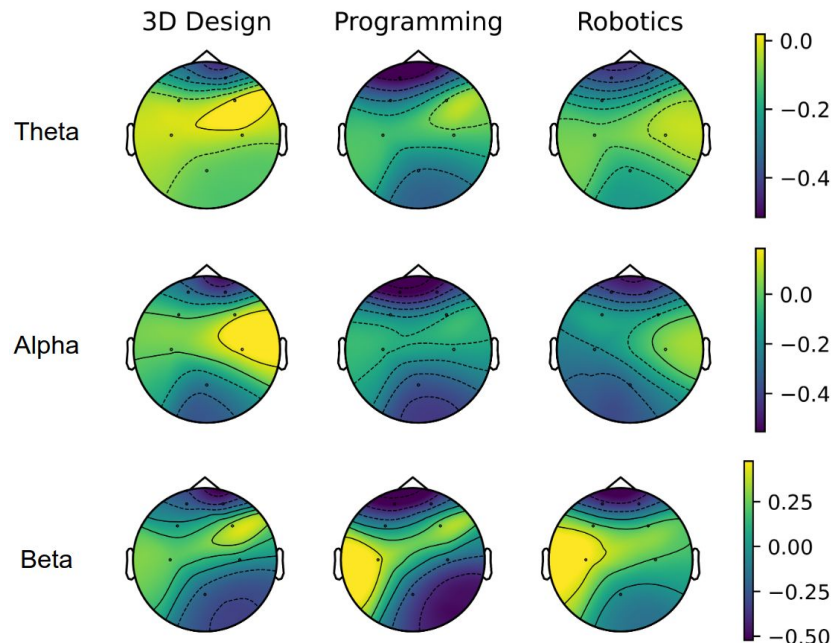
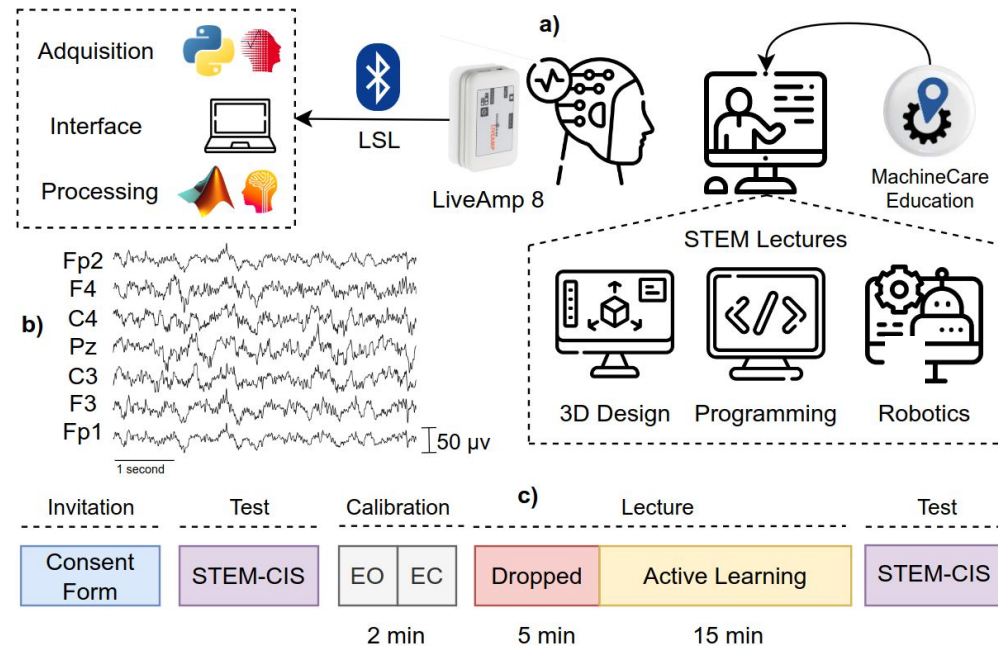
This presentation is about three EEG published projects that gather **neurocognitive learning insights**.

1. **Advanced Learner Assistance System (ALAS)** presents a framework that predicts mental fatigue and synchronizes it into a web-platform.
2. **Talent Detection** predicts professional interest in STEM and shows brain activation patterns.
3. **Neurohumanities Lab** recognizes student's emotion and enhances their learning experience via an interactive immersive space.

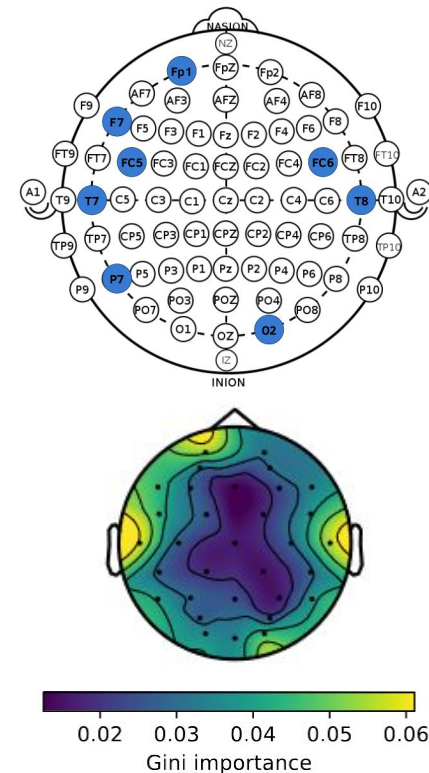
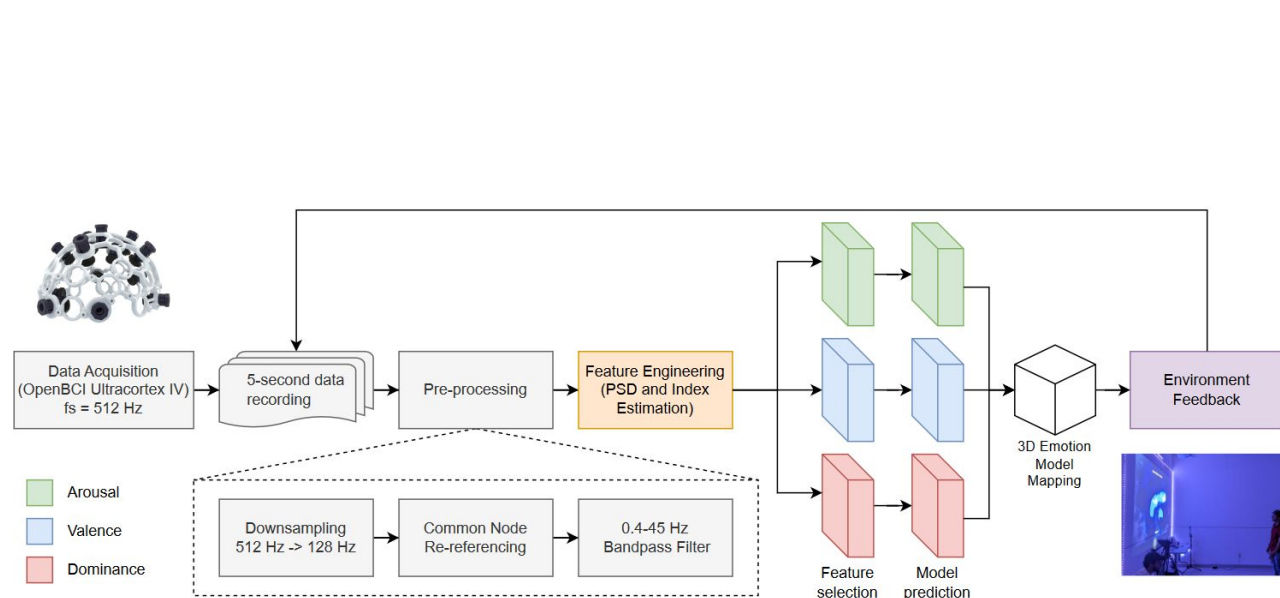


Project	Device	Prediction	Interface
Advanced Learner Assistance System	 4-channel Enophone	 Mental fatigue	
Talent Detection	 8-channel LiveAmp	 Interest in STEM	
Neurohumanities Lab	 8-channel OpenBCI	 Emotion	









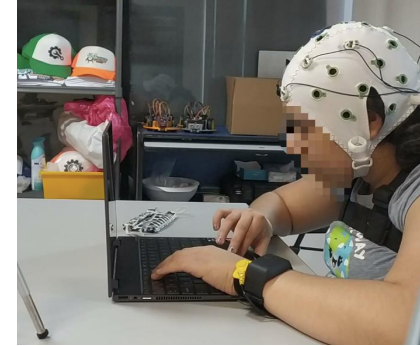
## Conclusion

### Harnessing Physiological Signals for Adaptive Learning

- Underutilized Potential
- Optimizing Learning Experiences
- Explainable Models



Mental fatigue



Interest in STEM

### Personalized Learning in Contemporary Education

- Neurocognitive Insights
- Role of Digital Twins
- The Need for Change



Emotion recognition



Prof. Belinda Carrión  
Chavarria, MD, PhD



Prof. Irene Martín  
Del Estal, PhD



Prof. Manuel  
Cebal Loureda, PhD



Prof. Jorge De-J.  
Lozoya Santos, PhD



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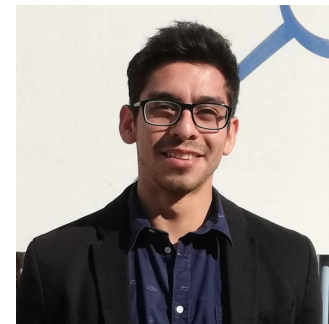
Prof. Manuel  
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