# Health Challenges of Digital Technologies

Prof. Dr. Petre Dini, ex-AT&T/Cisco Systems, Inc., USA (retired)
Prof. Dr. Jaime Lloret Mauri, Universitat Politecnica de Valencia, Spain

# Themes



- Benefits and Warning
- Services and Body Impact
- Digital Addiction and Health Side-effects
- Cognitive Dependency
- Dependency on Immersive environments
- Digital Harassment

# Benefits and Warnings



**Image**: Vision, Position, Muscles, Bones,

**Drugs discovering**

**Situation monitoring**

**Interactive toys**: Mental disorders, mental healing etc.

**Help for vulnerable classes:** Young pupils, children, older adults, etc.

**Rehabilitation tools** (Immersion, Virtual reality)

**Body**: Vision, Position, Muscles, Bones,

**Brain (cognition)**: Sensory interpretation, adaptive real-immersive hysteresis, induced hallucinations, etc.

**(physical)**: Electromagnetic waves (nanoA -10^-9 A -, ..., NanoV, …, nSeconds)

**Habit**: Squared instead of natural, digital guidelines vs human guidelines, addictive, etc.

**Digital stress**: Mental disorders. digital addiction, digital dependency, etc.

**Vulnerable classes:** Young pupils, children, older adults, etc.

# Services and Body Impact



- **Immersive Literacy**
  - Environmental Remanence (Real vs Virtual)
  - Co-evolving with Technologies
  - The power of Augmented Reality and Immersion (from acceptance to use)
- **Personalized Cognitive Assistance**
  - Cognitive Rehabilitation
  - Elderly Cognitive Support
  - Learning Disabilities
- **Challenges**
  - Adaptive algorithms (Interactive Content, Feedback mechanisms)
  - Accessibility (Individuals in low-resource settings or with severe disabilities)
  - Privacy and Ethics (Safeguarding the sensitive data collected from users)
- **(Hidden) Side effects**
  - Spatial deskilling *(individuals lose their ability to perform spatial tasks)*
  - Real-Virtual Cognitive Mismatch *(reduced transfer of skills and knowledge from virtual to real settings)*
  - Immersion Dependency

## Body Health impact

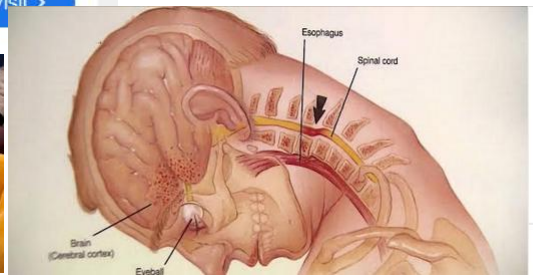
- Impact on Vision
- Impact on Mental status
- Impact on the Backbone
- Impact on Hands, Wrists, and Fingers
- Impacts on Rest, Leisure, and Well-Bein

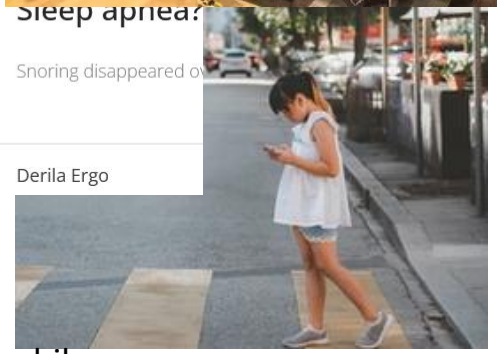
## Dependency on Immersive Environments

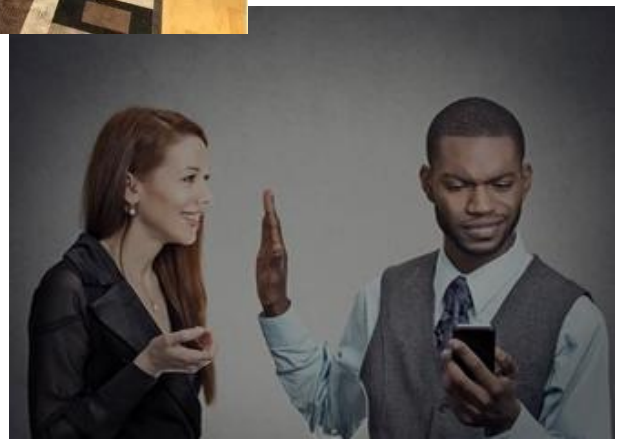
Several ways (sensory disorientation, social interactions, cognitive overhead)
From Immersive to Real Environments (sensory readaptation, isolation, decisions)
From Real to Immersive Environments (overstimulation, confusion, escapism)

## Addiction and health side-effects

### Text neck

### Smartphone finger

Each hand is made of 27 bones, 35 muscles, and over 100 tendons connecting bones and muscles. Your flexor tendons bend your fingers, and tendons that straighten your fingers are called extensor tendons.

### Adversities

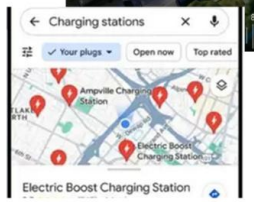
- Becoming Mentally Lazy
- Light emitted from your mobile device's screen might just be messing up your sleep cycle
- It might affect vision (in progress studies)

- **Dependency on Immersive Environments**
  - **Several ways** (sensory disorientation, social interactions, cognitive overhead)
  - **From Immersive to Real Environments** (sensory readaptation, isolation, decisions)
  - **From Real to Immersive Environments** (overstimulation, confusion, escapism)


Google Maps getting major upgrade thanks to new trend taking world by storm

Google Maps gets a massive AI upgrade with 5 new features
The latest updates to Google Maps makes it smarter and more he
https://www.foxnews.com/tech/google-maps-gets-massive-ai-upgrade-5-r

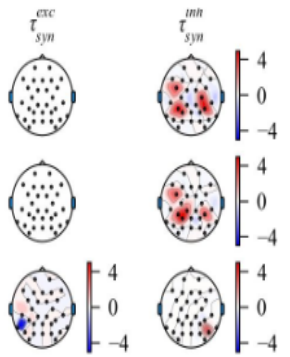

3D



*Abstract*— Effective language processing relies on the brain's capacity to decode rhythmic cues in speech, a function primarily supported by activity in the theta frequency band. According to the Temporal Sampling Framework, impairments in this process may contribute to the phonological deficits observed in individuals with Developmental Dyslexia (DD). These challenges cascade into higher-frequency bands, affecting the integration of phonemes, words, and phrases, ultimately compromising reading and writing fluency. Early diagnosis and treatment are crucial for ensuring proper personal and academic development in children. In this study, we propose a non-invasive methodology that combines ElectroEncephaloGraphy (EEG) data with a surrogate modelling framework to detect early imbalances in Excitation/Inhibition (E/I) mechanisms. We applied this methodology to a cohort of children, divided into controls and DD groups, and compared the inferred E/I mechanisms with patterns predicted by the neural noise hypothesis. We found that the results obtained using this framework align with both the Temporal Sampling Framework and the Neural Noise Hypothesis.

Developmental Dyslexia and Nerve Noise
Low frequency stimuli [4.5, 40]
Parietal occipital regions:
Dyslexia:: deficit in syllables processing which is associated with the Theta band (4-7 Hz)
Brain Models: brain models that captures large-scale brain activity
From Immersive to Real Environments




Increase in E/I in parietal and frontal regions -> Neural Noise Hypothesis in Dyslexia

Increment of $\tau_{syn\,I}$ in frontal and parietal-central for 4.8 Hz. Significant differences decreases as stimuli increases.

Delayed responses of inhibitory currents due to increment of $\tau_{syn\,I}$ also aligns with Neural Noise Hypothesis in Dyslexia.

https://www.thinkmind.org/library/BRAININFO/BRAININFO_2025/braininfo_2025_2_30_90046.html