Enhancing Online Student Engagement:

Leveraging Nvidia Maxine for Video Processing

https://esail.tamu.edu

Gerry Pedraza
gerryp@tamu.edu

TEXAS A&M UNIVERSITY
Engineering Studio for
Advanced Instruction & Learning

How would you feel while…

- Someone is talking to you but at the same time looking distracted?
- Identify what goes through your mind…

Save all those thoughts and keep them in mind…

TEXAS A&M UNIVERSITY
Engineering Studio for
Advanced Instruction & Learning

Objectives

- Awareness of challenges of online education.
- Discuss what factors affect engagement in online videos.
- Compare the before and after of videos processed by Maxine.
- Q&A Kung-fu

Challenges in Online Education

- Rise of emergency online teaching
  - Bad reputation
- Keeping students engaged is increasingly difficult, especially online!
  - Attention economy
  - Sensory overload
  - Video expectations
- Faculty prefer voice over slides vs. camera
  - Weak instructor presence pre-recorded videos

Transition Process -> F2F to Online

- Modes are Different:
  - Dynamics of engagement
  - Contact & feedback
- Aiming for the 4 A's:

○ Adapt ○ Augment ○ Align ○ Assess	**Gerry's 4 A's** for transitioning courses

TEXAS A&M UNIVERSITY
Engineering Studio for Advanced Instruction & Learning

Blur the lines for an augmented experience

Not blended or hybrid, but a purposely designed online course

How do we increase engagement in online courses?

TEXAS A&M UNIVERSITY
Engineering Studio for Advanced Instruction & Learning

Video Engagement Factors

- Relevant information using real world examples, scenarios, add prof. experience
- Not too much content per slide, and well-designed graphics
- Short length, concise, interweaved activities
- Instructor in full-screen talking directly to the students

TEXAS A&M UNIVERSITY
Engineering Studio for Advanced Instruction & Learning

Thought Process

- Videos with a person on screen draw more attention
- These videos are more difficult to produce and edit without rehearsing
- Faculty prefer not to be on screen
- So maybe, module videos with faculty on screen for a few minutes using a script?

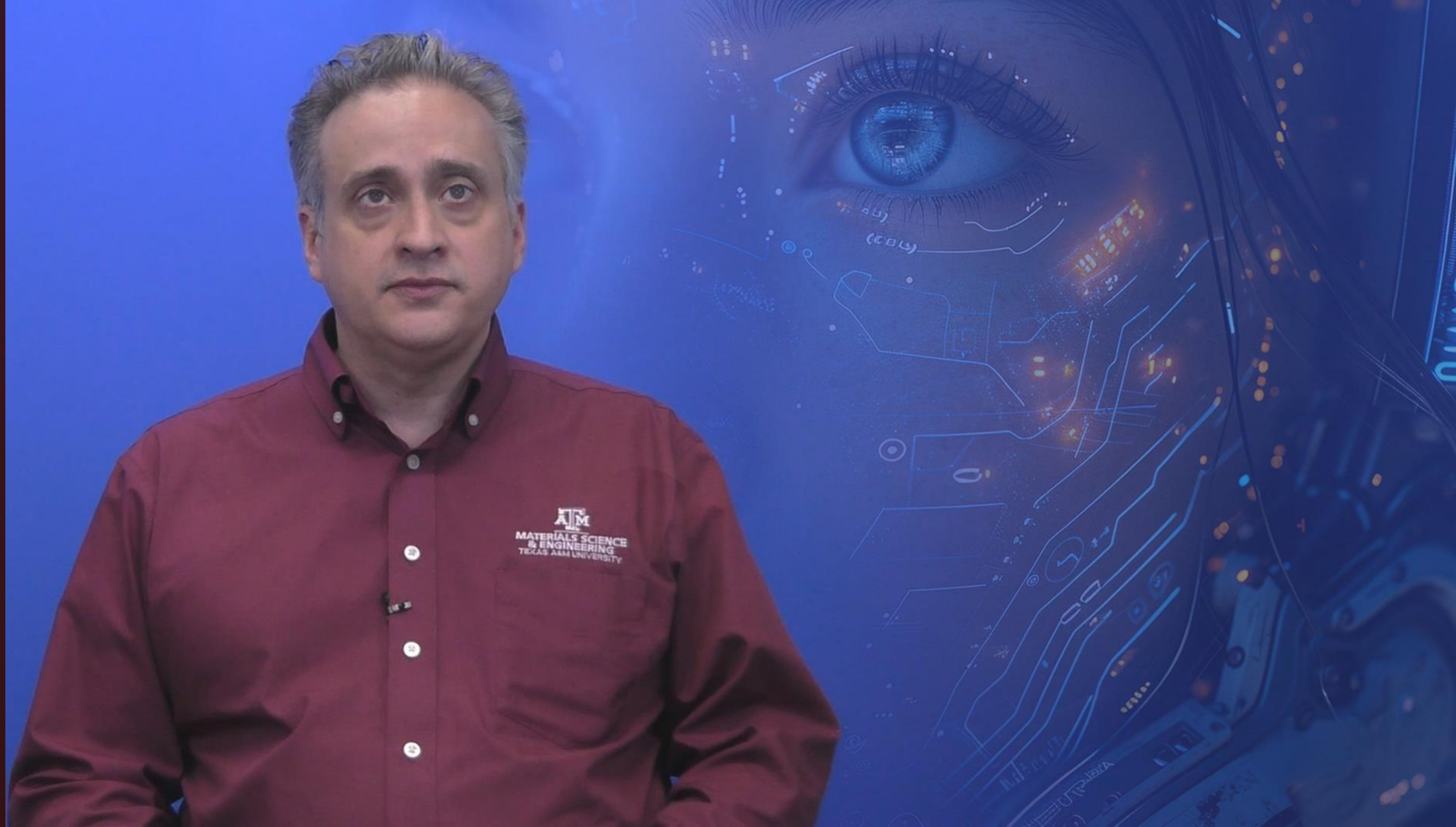
Addressing Challenges through Module Videos

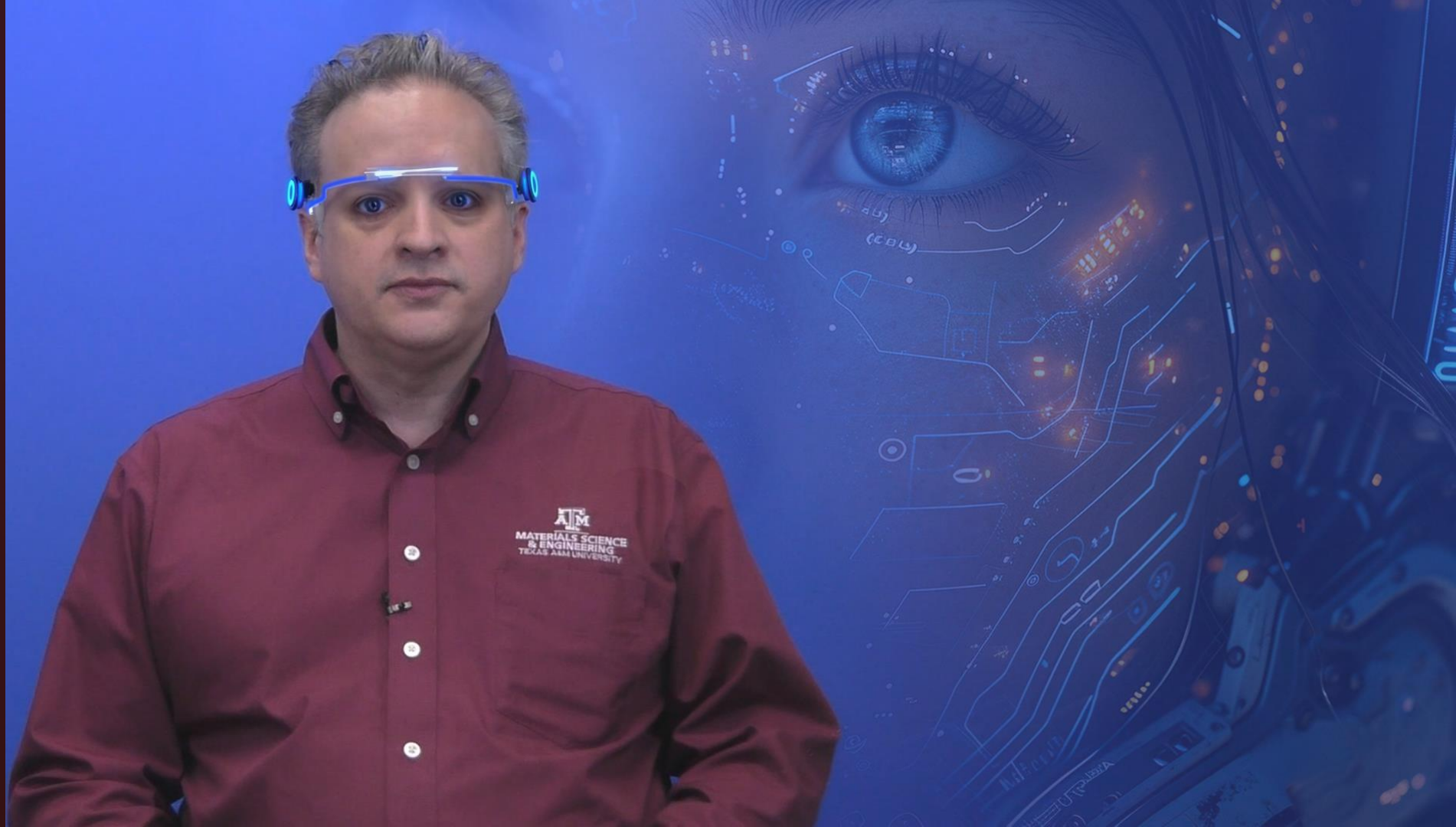
- Increase professor's presence in the course
- Purposely introduce the module and highlight connections with previous topics and modules
- Add interesting examples that connect and apply the module content to the real world

Scripted Prototype of a Module Video


TEXAS A&M UNIVERSITY
Engineering Studio for
Advanced Instruction & Learning
MATERIALS SCIENCE
& ENGINEERING
TEXAS A&M UNIVERSITY


MATERIALS SCIENCE
& ENGINEERING
TEXAS A&M UNIVERSITY


MATERIALS SCIENCE
& ENGINEERING
TEXAS A&M UNIVERSITY


MATERIALS SCIENCE
& ENGINEERING
TEXAS A&M UNIVERSITY

TEXAS A&M UNIVERSITY
Engineering Studio for
Advanced Instruction & Learning

What is Nvidia Maxine?

- NVIDIA AR SDK
  - Set of AI based tools to process audio & video
- Gaze Redirect can work live or post
  - Use a command line interface
  - Use AI and RTX to retrace and redirect the gaze

Side by Side Comparison (sorry low-res)

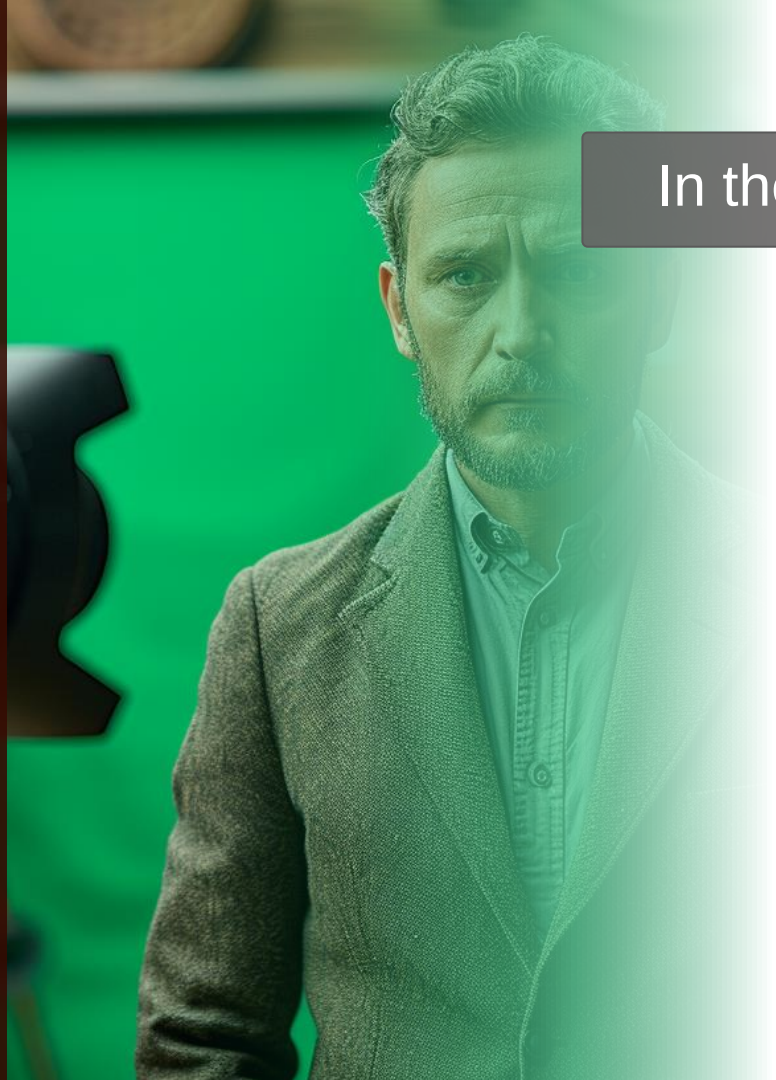
TEXAS A&M UNIVERSITY
Engineering Studio for Advanced Instruction & Learning

Engagement through the Instructor:

- Digital presence
- Looking directly at students (camera)
  making students feel directly addressed.
- Showing important connections to
  - previous topics, and
  - authentic experiences.

ELECTOCHEMISTRY & CORROSION

MSEN 440 – Raymundo Case



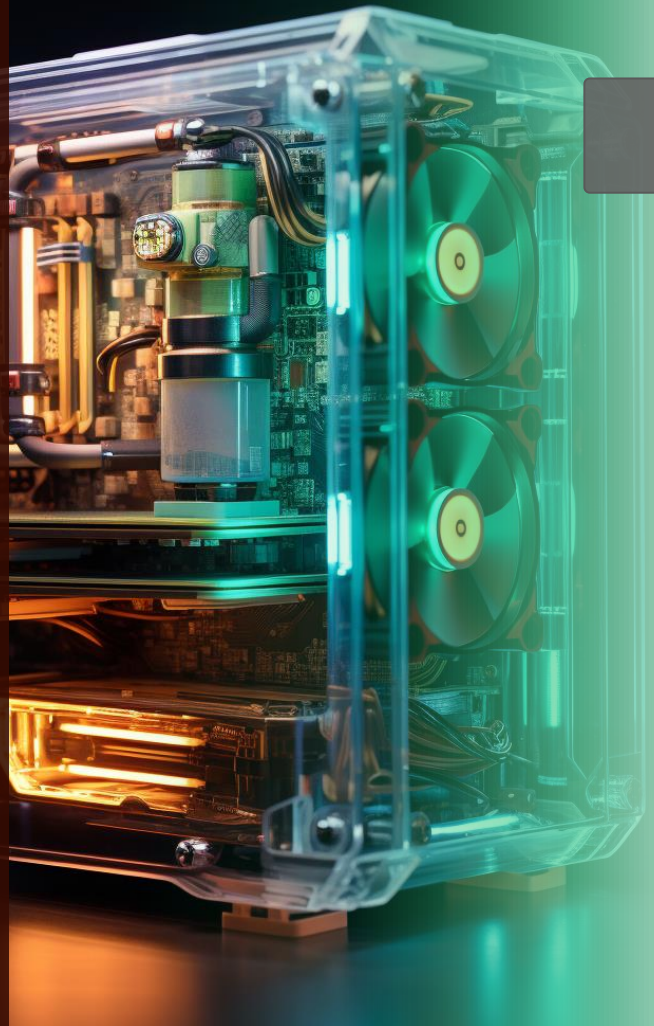
TEXAS A&M UNIVERSITY
Engineering Studio for Advanced Instruction & Learning

In the Studio: We Collaborate with Faculty

- Practicing with them in our studios
- Providing feedback about kinesthetics and voice modulation
- Designing slides and editing
- Assisting with scripts

Requirements

- Nvidia RTX Series 3000 and 4000 cards.
- UPDATE: Microservices!



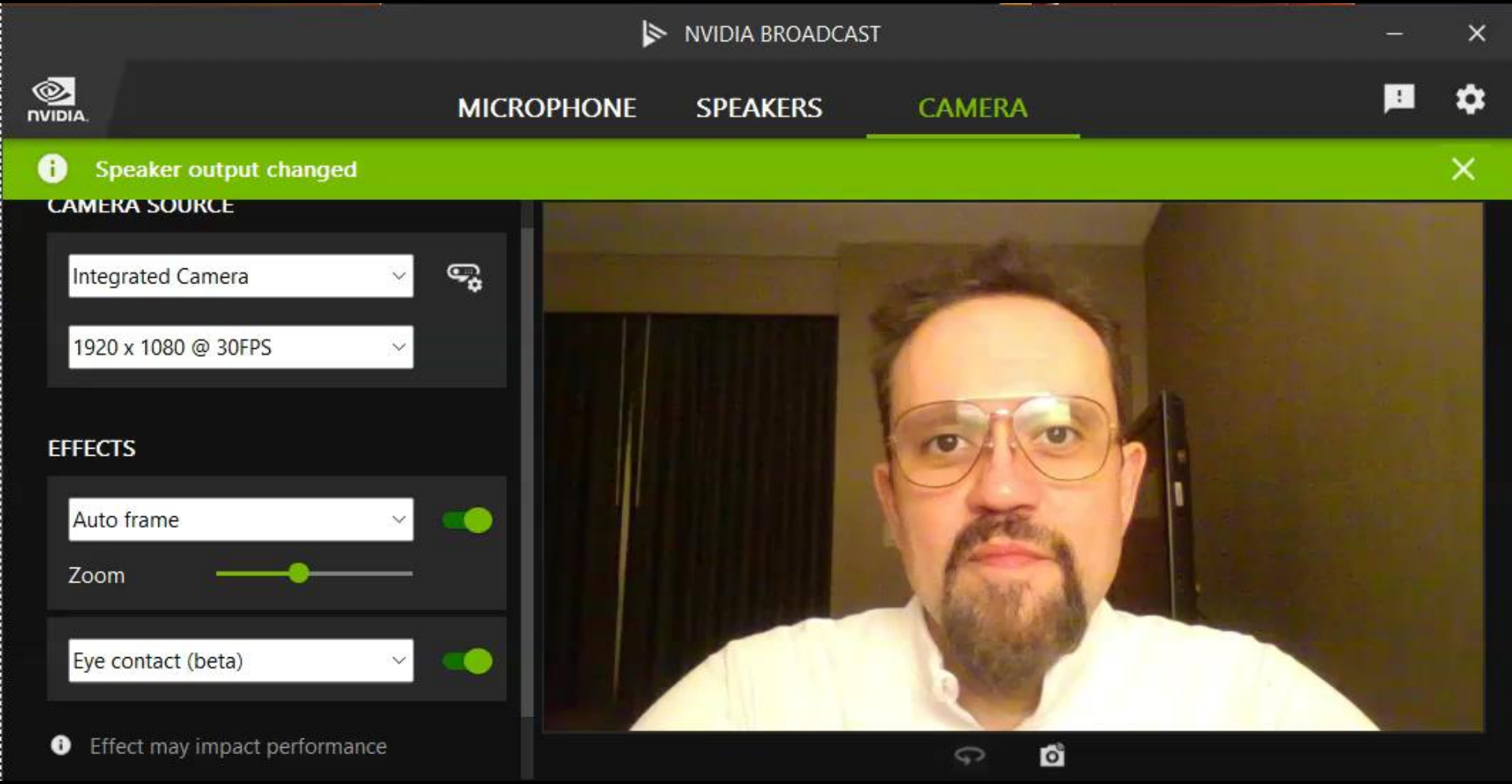
Issues We Experienced While Scaling

- External Thunderbolt video card enclosures
  - Not all USB-C connectors have Thunderbolt
- TB add-on cards
  - do not work if the motherboards are not prepared already with TB
- Better coding to unlock cards' full potential

TEXAS A&M UNIVERSITY
Engineering Studio for Advanced Instruction & Learning

Future Work (Cron Job Automation)

1. Folder monitoring
2. Runs process on new files
3. Merges the audio (update!)
4. Inform owner when complete

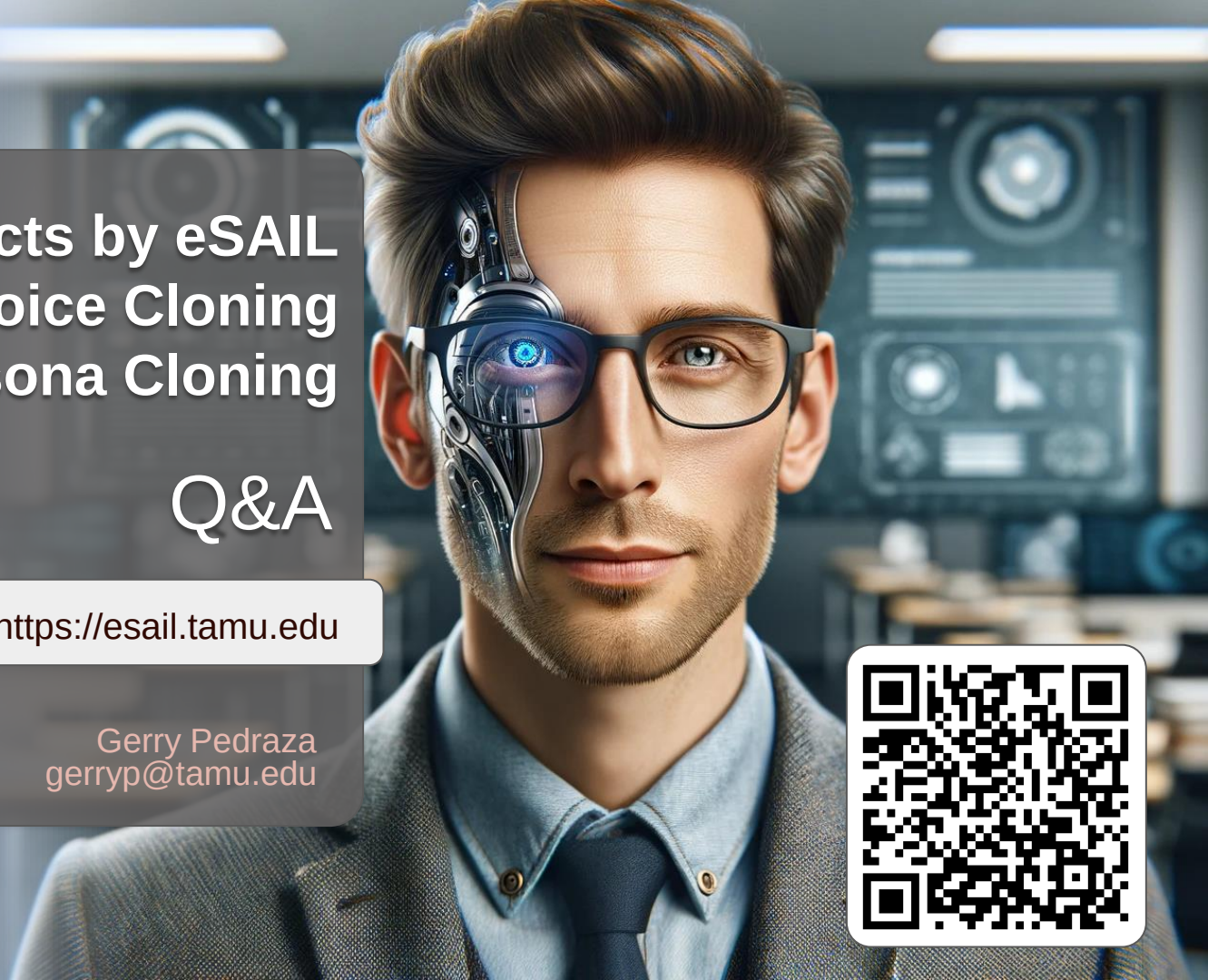

NVIDIA BROADCAST
MICROPHONE
SPEAKERS
CAMERA
Speaker output changed
CAMERA SOURCE
Integrated Camera
1920 x 1080 @ 30FPS
EFFECTS
Auto frame
Zoom
Eye contact (beta)
Effect may impact performance

Other projects by eSAIL
Voice Cloning
Persona Cloning

Q&A

https://esail.tamu.edu

Gerry Pedraza
gerryp@tamu.edu



TEXAS A&M UNIVERSITY
Engineering Studio for
Advanced Instruction & Learning

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. The Internet and Higher Education, 2(2-3), 87-105.

Lacoboni, M. (2009). Imitation, empathy, and mirror neurons. Annual Review of Psychology, 60, 653-670.

Kelly, S., & Tolhurst, A. (2016). The impact of non-verbal communication in teaching and learning in higher education. Research Matters: Linking research to teaching and learning, 1(1), 1-9.

Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. Educational Psychologist, 38(1), 43-52.

Guo, P. J., Kim, J., & Rubin, R. (2014). How video production affects student engagement: An empirical study of MOOC videos. Proceedings of the first ACM Conference on Learning@ scale conference, (pp.41-50). ACM.

El Mawas, N., & Kaba, B. (2019). The Role of an Interactive Visual Learning Tool and its Personalizability in Online Learning: Flow Experience. IGI Global.

Al-Sabbagh, M. Q. (2020). The lack of visual interaction in online classes and its effect on the learning experience of students during the COVID-19 pandemic: A survey of a Bahraini private. Social Science Research Network.

Johnson, W. L. (2015). Promoting motivation with virtual agents and avatars: Role of visual presence and appearance. Philosophical Transactions of the Royal Society B, 370(1666), 1-12.

Guo, P. J., Kim, J., & Rubin, R. (2014). Instructor presence in instructional video: Effects on visual attention, recall, and perceived learning. Journal of Educational Psychology, 106(1), 1-13

Lowenthal, P. R., & Snelson, C. (2017). Creating a sense of presence in online teaching: How to "be there" for distance learners. John Wiley & Sons.

Mayer, R. E., Johnson, C. I., Shaw, E., & Mott, M. (2016). Does visual attention to the instructor in online video affect learning and learner perceptions? An eye-tracking analysis. Computers & Education, 98, 212-225.

Eng, T., Renninger, K., Hoadley, C., & Chen, M. (2015). The visual performance of online identity: Instructor presence and persona across tools and settings. PubPub.