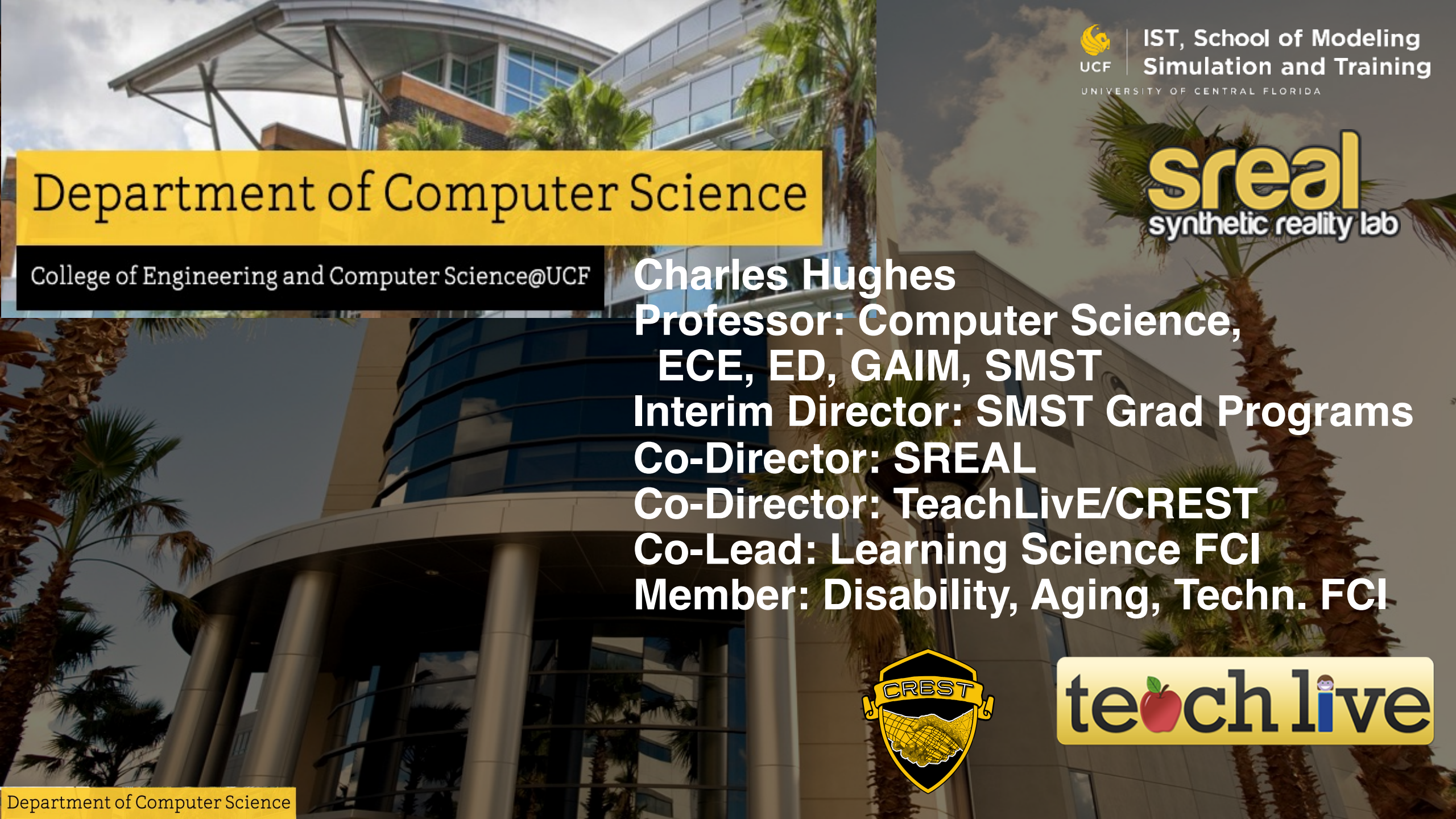

Department of Computer Science
College of Engineering and Computer Science@UCF
UCF
IST, School of Modeling Simulation and Training
UNIVERSITY OF CENTRAL FLORIDA
sreal
synthetic reality lab
Charles Hughes
Professor: Computer Science, ECE, ED, GAIM, SMST
Interim Director: SMST Grad Programs
Co-Director: SREAL
Co-Director: TeachLivE/CREST
Co-Lead: Learning Science FCI
Member: Disability, Aging, Techn. FCI
CREST
teach live
Department of Computer Science

Who I am Academically: The Early Days

- 1962 as a programmer at RCA Aerospace (long gone)
  - Validation of BMEWS software on a Friden Desk Calculator
  - Radix sorting via wiring an IBM 082 card sorter
  - Fortran on IBM 7090/7094;
  - Assembler on IBM 1401/1410;
  - Pin board coding on Burroughs E101;
  - Various Fortran software for Lunar Excursion Module
  - Software for automatic test equipment – mylar tape
  - Microcode to emulate IBM 7094 and AN/UYK-1 computers
- 1966 as a programmer at Advanced Research Laboratory
  - Worked on Mark 48 torpedo acoustic interference

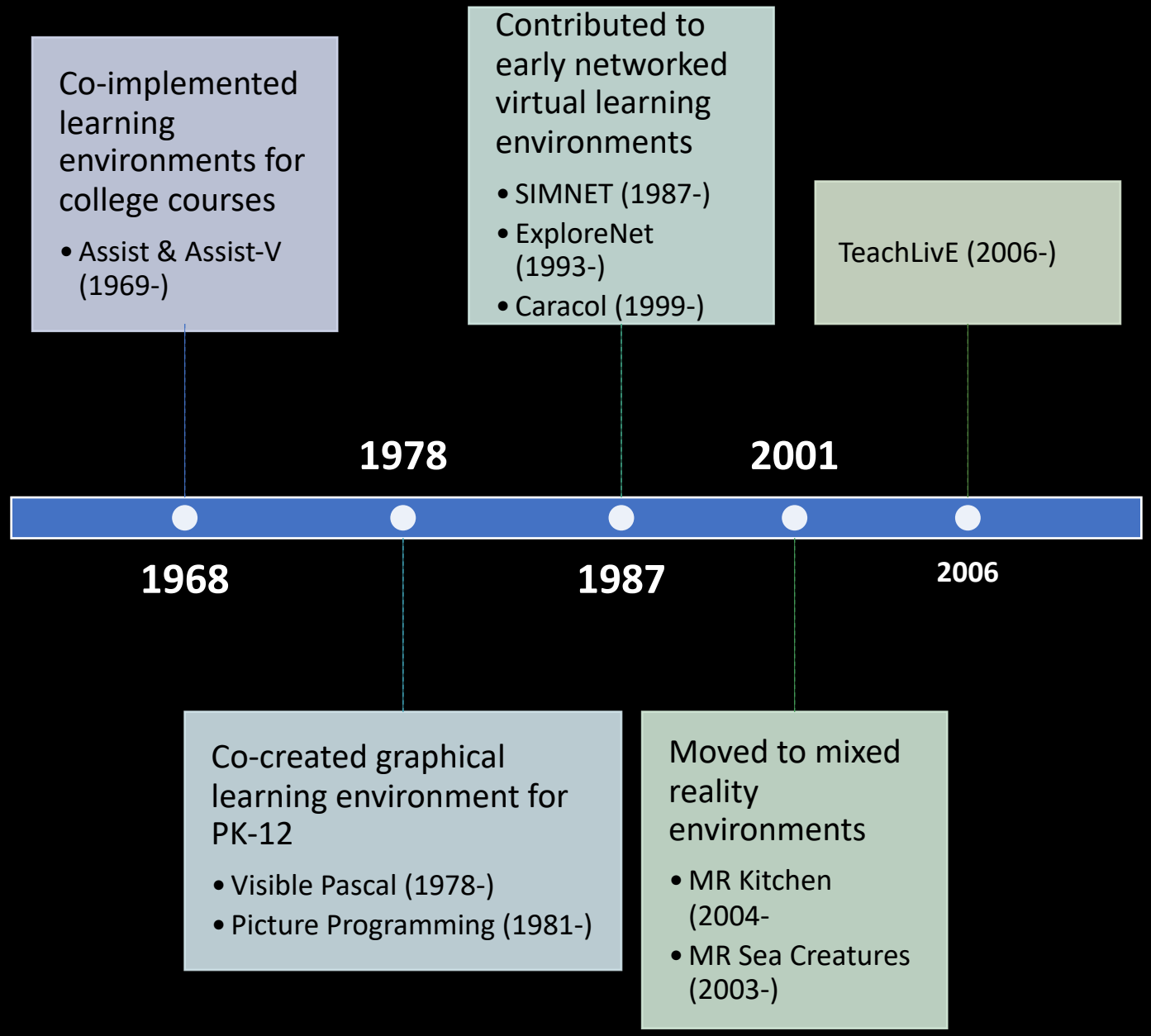
Who I am Academically: The 70s, Early 80s

- NRC Postdoc and then Taught at Penn State, Tennessee
  - Research on Operating Systems, Data Flow Analysis, Computability
  - Computability stuff can be seen at Google Scholar page
  - Developed ASSIST-V virtual machine simulator for IBM 360/370
  - Developed source level optimizers based on interval analysis
- Moved to UCF in 1980
  - Software Environments, usually for K-12
    - Computer Power
    - Visible Pascal
    - Picture Programming
    - Formula Vision
    - Action Graphics

Who I am Academically: Late 80s and 90s

- Moved back into simulation but now through VR
  - SIMNET – network protocols; dynamic terrain
  - Real-Time Fluid Flow
- But stayed mainly focused on learning environments
  - Virtual Academy
  - ExploreNet – Shared virtual worlds for youth
  - Caracol Project
- Also Had Fun with Parallel/Distributed Processing
  - Constraint Logic Programming
  - View Centric Reasoning
  - Tuple Spaces
  - Lazy versus Eager Semantics

My Evolution to Virtual Learning Environments



Who I am Academically: MR in 2001-2010 Decade

- MR via Canon Video See-Through HMD
  - Time Portal -- Entertainment
  - MR MOUT – Situational Awareness
  - MR Sea Creatures – Free Choice Learning in Science Centers
  - MR Kitchen – Cognitive Rehabilitation
- Environmental Economics – Support for Public Policy
- Digital Preservation of Culture – Shadows of Canaveral

The Current Fun I have

- SREAL: Synthetic Reality Laboratory
- TeachLivE: Teaching and Learning in a Virtual Environment
  - Teacher Prep
  - Protective Strategies
  - De-Escalation Skills
  - Non-Suicidal Self-Injury
  - Social Skills, especially for kids with ASD
  - Emotional Responses in Virtual Learning Environments
- Learning Sciences

Examples of Different Ways TeachLivE Can Be Used to Help Prepare Educators

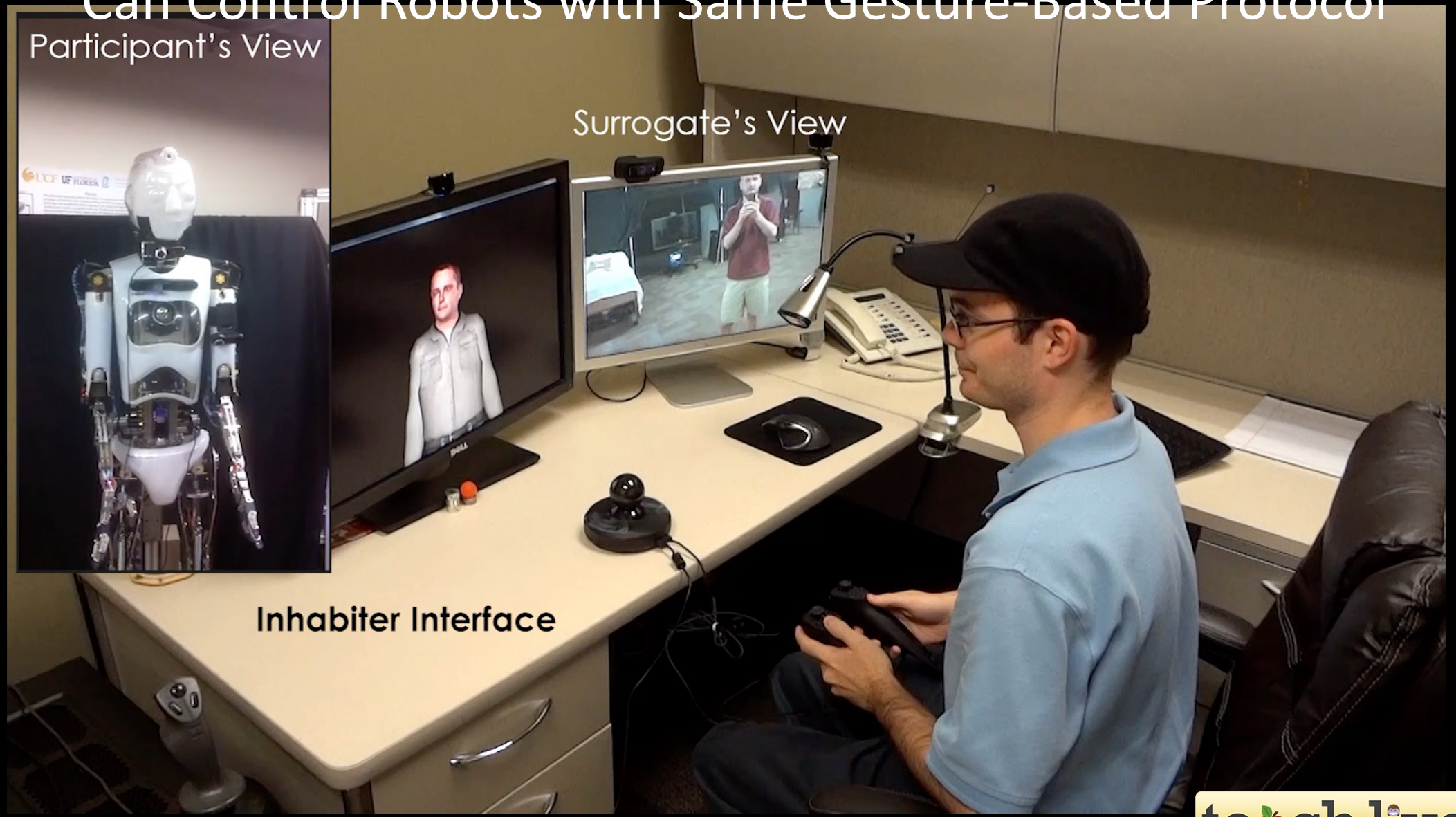
Inclusive Classrooms

Peer Tutors

Parents, Administrators, Witnesses, Interviewers/Interviewees, NSSI, Non-Escalation/De-escalation

Human-in-the-Loop
Puppeteer Controls up to 6 Avatars

Can Control Robots with Same Gesture-Based Protocol



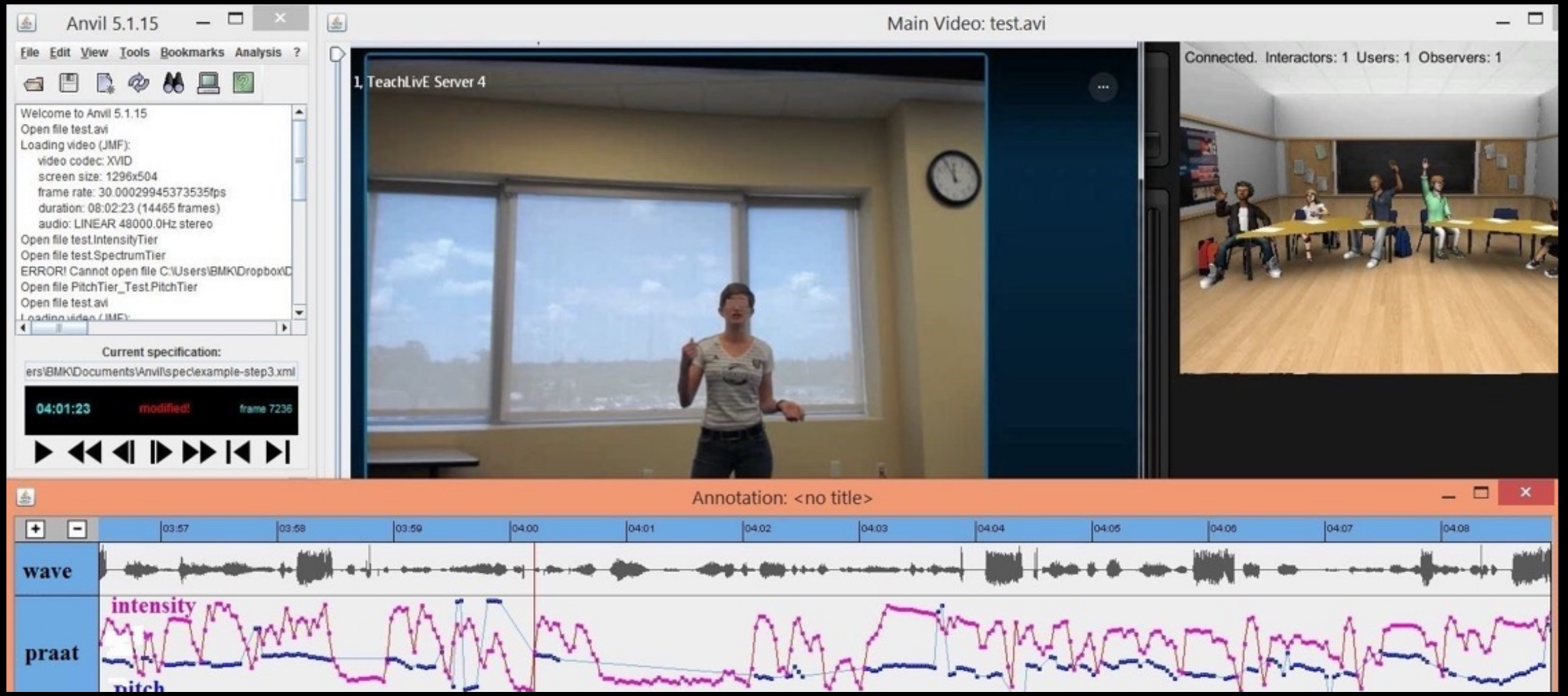
AI Companions used for Coaching/Calming

AI Companions to give advice on Cyberbullying & Personal Information Disclosure

teach live

CREST

Department of Computer Science



Non-Verbal Messaging (posture/vocalization)

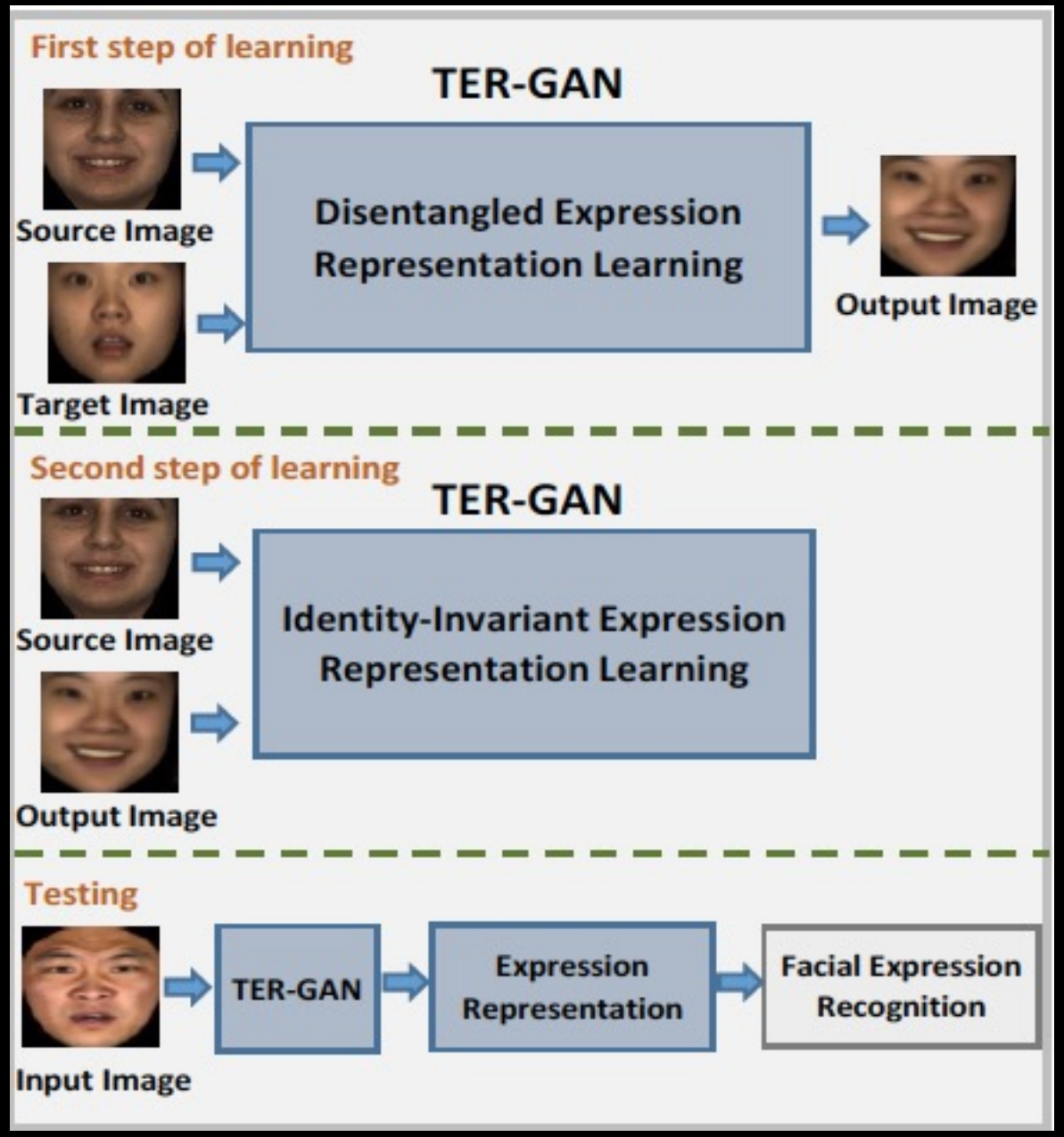
8,365 face images from EmoReact dataset

- 4,003 non-occluded faces
- 4,362 occluded faces
- Generate other examples based on real images

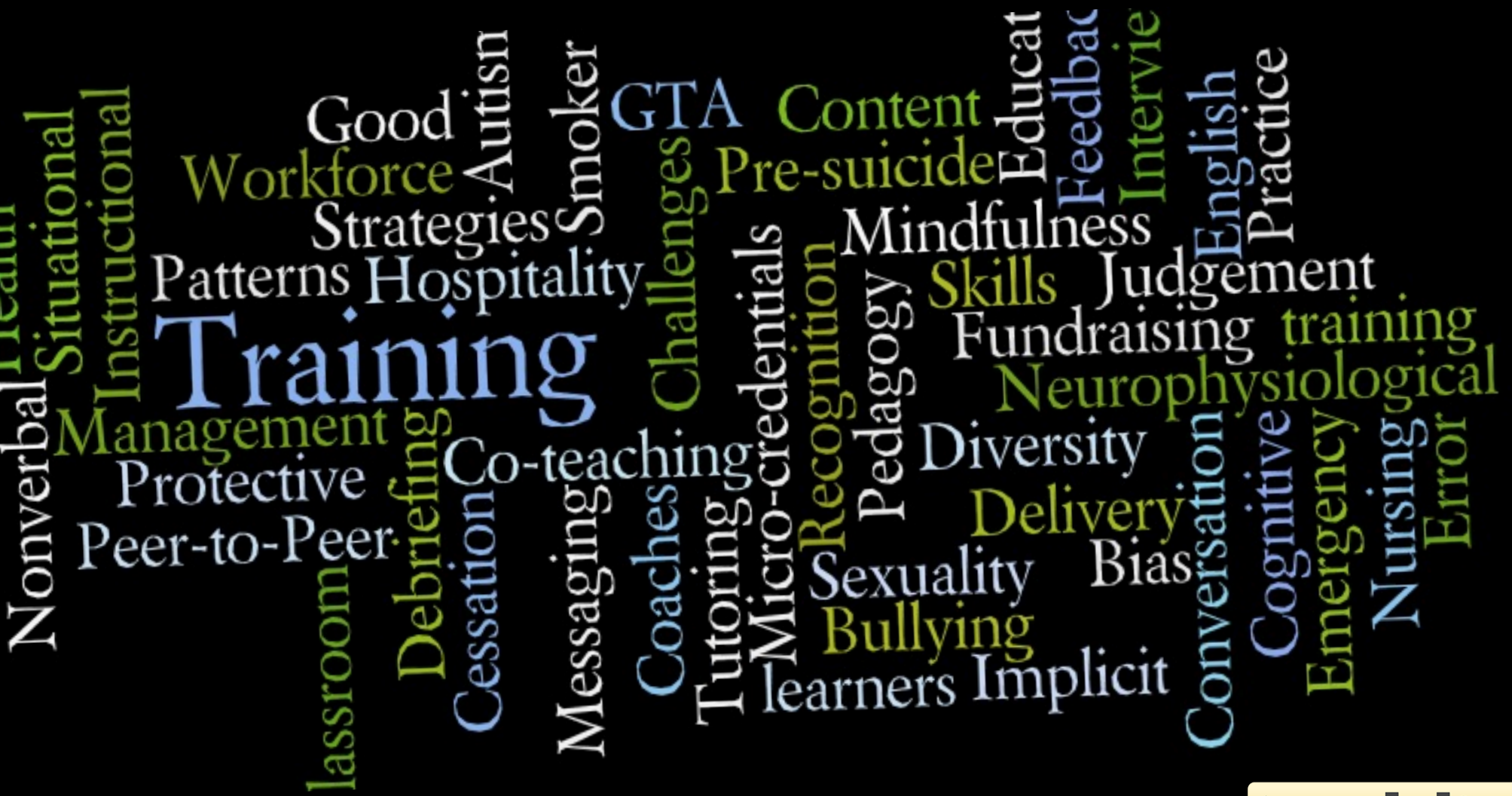
Goals:

- Learn a representation
- Train an algorithm to recognize occlusions

Facial Occlusion Recognition



Facial Expression Recognition: Disentangling Identity from Expression


Training
Good
Workforce
Autism
Strategies
Smoker
GTA
Content
Pre-suicide
Educat
Feedbac
Intervie
Health
Situational
Instructional
Patterns
Hospitality
Challenges
Mindfulness
Skills
Judgement
English
Practice
Nonverbal
Management
Co-teaching
Recognition
Pedagogy
Fundraising
training
Neurophysiological
Protective
Diversity
Peer-to-Peer
Debriefing
Cessation
Messaging
Coaches
Tutoring
Micro-credentials
Delivery
Sexuality
Bias
Bullying
learners
Implicit
Conversation
Cognitive
Emergency
Nursing
Error
lassroom