

## PROFILE

- Invented the **Mixed Reality (MR) character pipeline** for Meta Oculus, [Dynamic Digital Humans](#) (Patent No. PCT/IB2020/050502)
- Created Marija the [first Virtual Human](#) to be granted **real world citizenship**.
- Collaborated with **Microsoft Azure** team to enhance the performance and clarity of the **AI generated phonemes**.
- Advanced the adoption of generative animation leading [M-body](#), an open-source conversational animation datasets and tools
- Regular **panelist and speaker** on **Innovation, AI Research, Virtual Humans, and Animation Production Pipelines**
- Over **2 decades** of award-winning **VFX** and **post-production** experience across film, broadcast and interactive media
- Animated short distributed by Universal Studios, showcased at **11 International film festivals** including LA, Tokyo, and Vancouver
- Over **10 years of teaching experience** at university and college levels, **master's level program development** in animation at Sheridan

## EDUCATION

- Bachelor of Arts and Science, **University of Toronto** • Art and Art History, Method Research; Statistics
- Diploma Fine Arts - **Sheridan College**
- Autodesk Maya Certification - Information Technology and Design, **University of Toronto**

## EXPERIENCE

### **Executive Visual Effects Supervisor / Principal Investigator | Cream Productions | 2024 – Present**

Leads VFX supervision across film and broadcast projects, developing pipelines for previs, production, and post production. Oversees production and post through final delivery, including final picture. Actively leads a team with creative direction while contributing to animation, AIVFX, and compositing while driving research-driven pipeline using latest innovations in AI, animation and VFX.

### **Principal Artist | Lakeview Animation | 2004 – 2015**

High-quality animation, virtual humans, and interactive experiences for entertainment and commercial projects. Specialized in neural rendering, dynamic simulations, character design, animation and real-time rendering. Directed art and technical workflows including final compositing, set design, editing, and tracking for diverse industries.

### **Principal Investigator / Lead of CG, Animation, and Visual Effects | Sheridan College, SIRT | 2016 – 2024**

Led research and production teams advancing animation and VFX in entertainment, health sciences, and education. Secured funding and industry partnerships to develop AI/ML-driven pipelines and virtual human workflows. Integrated virtual production and real-time rendering to merge live-action and CGI for immediate production feedback.

### **Visual Effects Supervisor / Artist | Corus Entertainment | 2015 – 2016**

Supervised visual effects for commercial and broadcast campaigns across film, mobile, online, and live events. Delivered end-to-end production including 2D/3D animation, matte painting, simulation, texturing, lighting, rigging, rendering, and compositing. Directed campaign design, budgeting, and project management.

### **Visual Effects Supervisor / Technical Director | Shaw Media | 2010 – 2015**

Supervised broadcast and film VFX projects from preproduction through final delivery. Managed pipelines for 2D/3D animation, matte painting, lighting, simulation, and compositing. Partnered with creative teams to design and deliver large-scale advertising and broadcast campaigns.

### **Visual Effects Artist / Technical Director | Canwest | 2006 – 2010**

Produced VFX and animation for broadcast commercials, network branding, and advertising. Delivered creative content for promotions, channel identity, and corporate campaigns.

### **Compositor / Visual Effects Artist | IMAX | 2006**

Team lead on stereoscopic 3D conversion for Superman Returns. Executed compositing, Z-depth, and rotoscoping for stereoscopic pipeline.

### **Motion Designer | Alliance Atlantis | 2001 – 2006**

Designed motion packages and promotional spots for specialty TV channels.

Key contributor to channel launches including BBC Canada, Discovery Health, Food Network, HGTV, History Television, IFC, National Geographic Channel, Showcase, Action, Diva, and Slice.

### **3D Animator | Soho | 2000 – 2001**

Developed 3D character animation, modeling, rigging, texturing, and rendering for commercial and entertainment projects.

### **Instructor Roles**

Seneca College (2003–2005) - Taught 3D modeling, character animation, VFX, and compositing.

University of Toronto (2000–2002) - Instructed certified Maya courses in modeling, lighting, animation, and visual effects.

## CLIENT LIST

Coca-Cola, Disney, Pixar, RBC, Unilever, General Electric, Johnson and Johnson, Shaw, Rogers, Global, Slice, HGTV Canada, Showcase, Food Network Canada, National Geographic Channel, BBC Canada, History, Universal, Paramount, Guinness, Colgate, Miller, Tim Hortons, Turner Broadcasting, ESPN, Ford, Chrysler, TD Bank, Scotia Bank, Side FX

## SKILLS

### SOFTWARE

Gen-AI software and tools, Maya, Z-brush, Substance, Mari, Marvelous Designer, Nuke, Resolve, Unreal, Unity, Houdini, Photoshop, Illustrator, Premier, After Effects, Omniverse, Reallusion, Faceware, Ziva, Blender, Cascadeur

### SCOPE OF WORK

Expertise in advanced software innovation, including generative AI and VFX integration, workflow creation, skills training, and VFX direction for live action and CG integration. Expert in photogrammetry, modeling, rigging, texturing, lighting, animation (2D-4D), motion capture, simulation, rendering, and compositing for both real-time and in-line workflows. Production scope includes complete comprehensive pipelines for characters, environments, and VFX, from conception to creation. Specializes in virtual humans and the architecture of digital doubles. Experienced in mixed reality, AI (generative AI), rendering development, virtual production, web development, procedural animation and automation, in-camera VFX, motion capture (multi-modal body, face, and hands), real-time compositing, and object and human scanning.

### LEADERSHIP

Led pre-production, planning, quotations, and directing visual effects shots that combine live action and CG. Collaborate with directors and producers to achieve desired effects with cost-effective solutions. Works with companies and teams to develop synchronized workflows, promoting technological advancements. Educates the public and industry on standardizing workflows and leveraging cross-industry innovations, including AI, machine learning, and procedural animation. Enhances public awareness through education and collaboration with Sheridan College leadership to create new programs. Focuses on creating sustainable employment in the digital economy by leveraging the skills and talents of youth and underprivileged communities. Responsible for hiring and training personnel, managing multiple groups on various grants in film production, software development, motion capture, animation, character creation, and virtual production.

## PATENTS

**Animation of Avatar Facial Gestures** (Patent No. 11436782, Application No. 17/425117, Issued September 6, 2022)

## CONTRIBUTIONS

### Procedural Animation of Conversational Gestures for Virtual Humans

- Collaborating with three research centers aiming to accelerate the advancement and adoption of generative character animation.
- Enhanced realism and precision of virtual human movements, creating standards, and novel datasets for ML.

### Real-time AI Sign Language Translation Virtual Humans for the Deaf

- Developing a real-time bilingual translation system for the Deaf Community in collaboration with Transport Canada.
- Improving accessibility in transportation environments

### AI supported Characters for Dementia and Alzheimer's

- Created AI-supported assistants for those suffering with cognitive impairment, the elderly, and caregivers.
- R&D in interaction quality and user experience for the elderly and caregivers.

### Dynamic Digital Humans (DDH)

- Developed cost-effective photorealistic articulate digital human characters for Oculus Quest and Mixed Realities (VR/AR).
- Introduced the first optimized, high-fidelity facial animation for VR game platforms.

### Human Animation and Behavioral Modification Research

- Collaborated with SideFX in creation of photorealistic character pipeline for Houdini software.
- Supported R&D of new tool in Houdini called Topo Transfer and boosted productivity in digital character modeling.

## PUBLICATIONS/ PROJECT LINKS

Features – Creature, VFX and AIVFX- [Productions](#), [DreamEater](#)

AI- Open-source data and tools for Generative AI - [M-body.ai dataset Article](#), [M-body.ai Animation Article](#), [Webinar](#), [Academic Poster](#)

AI - Polytechnic Showcase - [Leveraging AI for Improved Elder Care](#)

Character Pipeline - 2024 Canadian Screen Award Winner - [Survivorman VR with DDH](#) , [DynamicDigitalHumans.com](#)

Character Pipeline - AI Characters with Reimagine AI - [Reimagine.ai](#)

Character Artist - Worlds First Virtual Citizen - [WorldRecordAcademy.org](#)

Webinars - [Link](#), [Workflow Webinar](#)

Interviews - Before and After VFX and Reallusion magazines - [M-body.ai BeforeAndAfter.com](#), [Reallusion.com](#), [Philip Curry Museum](#)

Please navigate links and feel free to contact me for references and additional projects.

## F103CV Part II - Contributions

### 1. Most significant contributions to applied research, innovation, knowledge mobilization and/or translation

#### **Procedural Animation of Conversational Gestures for Virtual Humans - SIRT**

**Innovation:** Collaborating with Durham College's AI Hub and MRC, Cegep de Matane's (CDRIN) and (LLio), SIRT is developing a free to use, open-source procedural animation system that incorporates advanced, data-driven analysis and leverage machine learning (ML) to allow for automation and procedural generation of complex Virtual Human (VH) gestures, including natural human modalities of hand, limb and body movements. **Impact:** This technology marks a significant advancement in animation, for animators, software development and academia by delivering realistic, data-driven gestures for virtual humans and resolving prevalent issues in existing datasets, such as foot sliding, geometry intersection, and neutral skeletons. It integrates synchronized movements across the human modalities of body, hands, and face, enhancing the realism and precision of human actions.

**Contribution:** Principal Investigator, Computer Graphics (CG), Animation Lead. Developed character architecture and animation pipeline to process the natural and realistic movements of human motion in conversations for machine learning datasets. Developed and created the workflow to support renders, optimized the production, character and dataset pipeline.

#### **Visual Debugging Interface for Enhanced Facial Animation Accuracy – JALI Research**

**Innovation:** Collaborating with JALI Research, the project focused on addressing the prevalent challenges in automatic facial animation, particularly those related to the limitations of animation rigs and models, and the inaccuracies observed in mouth movements during speech. It explores the role of motion capture data in enhancing the fidelity of animations and employs side-by-side comparisons to identify and analyze discrepancies between expected and actual animation outcomes. **Impact:** This system will streamline the animation process by providing animators with precise, actionable insights. By identifying discrepancies between ground truth models and automated animations, the tool highlights areas needing refinement. This allows animators to quickly pinpoint and address inaccuracies, leading to more efficient workflows, reduced iteration times, and improved overall animation quality. **Contribution:** Principal Investigator, CG and Animation Lead. Designed and implemented character architecture and animation pipeline for creating digital doubles with realistic human motion in conversational settings, supporting machine learning datasets including m-body. Streamlined workflows for rendering, optimized production processes, and enhanced character and dataset pipelines for efficiency and accuracy.

#### **Real-time Translation Technology for Transportation - Transport Canada**

**Innovation:** Collaborating with Transport Canada this project is designed to bridge a critical gap in accessibility for travel, providing the Deaf Community with real-time bilingual translation of text into American Sign Language (ASL) and Langue des Signes Québécoise (LSQ). The innovation focuses on creating new pathways for communication where traditional access has been limited or non-existent, ensuring scalability and ease of use. **Impact:** The technology will significantly enhance the accessibility of critical transportation information, especially in complex environments like airports. By providing deaf passengers with real-time translation, it ensures that they can navigate spaces safely effectively promoting equitable access to travel. **Contribution:** Initiated, led the project, designed the overall framework and provided technical direction for character architecture and the procedural animation pipeline for real-time. The project involved extensive collaboration, including validating the effectiveness of the application across airport environments.

#### **Mediated AI Supported Characters - Reimagine AI**

**Innovation:** In collaboration with Elder Care Research and Reimagine AI the development and integration of user-friendly mobile and tablet interface featuring AI-supported assistants. This innovation focused on enhancing caregiving through personalized AI companions designed to significantly improve the interaction quality and user experience for the elderly, those who suffer with cognitive

memory loss and their caretakers. **Impact:** This project equipped both the elderly and caregivers with advanced tools that facilitate engaging and responsive interactions with virtual humans. By enhancing communication and companionship, this technology has the potential to significantly improve the quality of life for the elderly and enable caregivers to provide more personalized and effective support. The success of this initiative has led to additional funding and the establishment of further research partnerships, including collaborations with the McGill University and the Sheldon Memory Lab.

**Contribution:** Principal Investigator, CG, Animation Lead. Character architecture and animation pipeline to utilize procedural and real-time animation. Managed the project, designed overall character pipeline, provided both technical and creative direction while troubleshooting the framework, ensuring the technology's reliability and effectiveness in real-world testing.

### **Dynamic Digital Human (DDH) Avatar - Cream Productions**

**Innovation:** In collaboration with Cream Productions in the development of Dynamic Digital Humans (DDH) technology. This technology revolutionized the creation of photorealistic digital human characters by introducing a novel methodology and software that significantly reduces costs while maintaining high performance and exceptional image face detail. DDH received a patent and was used to create interactive experiences that received nominations from the Canadian Screen Awards for best experience, underscoring its novelty and achievements in the field of digital animation for mobility.

**Impact:** DDH technology has made high-fidelity, lightweight volumetric facial performances accessible across various media platforms, including Mixed Reality, PlayStation, PC. This breakthrough allows for the creation of cost-effective, photorealistic avatars and has significantly influenced both the entertainment industry and the broader field of digital media by improving the quality and lowering the cost of creating digital doubles for Mixed Reality. The success of the DDH led to its commercialization and the establishment of a new department within the collaborating company, dedicated to supporting ongoing development and application of this technology. **Contribution:** Principal Investigator, CG, Animation Lead. Developed and led the project, managed a comprehensive virtual human pipeline including methodology, assets, animations, and software integration. Created and executed rendering pipeline for all prototype performances and content delivery, providing both technical and creative direction and resolving framework errors.

### **Human Animation and Behavioral Modification Research - Side FX**

**Achievement:** In collaboration with Side FX, SIRT contributed to enhancing the creation of photorealistic characters using Houdini Software, aimed at boosting realism and audience engagement across digital cinema, game engines, and extended reality experiences. Working alongside the software development team, SIRT provided insights that improved the integration of new features into their animation workflows, particularly with the animation workflow. SIRT played a pivotal role in the development of Topo Transfer, a retopology matching tool. This tool was successfully integrated into the Houdini software environment, enriching it with sophisticated modeling, and texturing abilities.

**Impact:** This innovation significantly advanced the creation and manipulation of digital characters, streamlining workflows inside Houdini software. The integration of the retopology tool into the existing software framework allowed for more efficient character modeling processes, enhancing productivity and creative possibilities within Houdini software. **Contribution:** Principal Investigator, CG, Animation Lead. Developed character architecture to utilize procedural creation and animation. Managed the project, designed overall character pipeline, provided both technical and creative direction while troubleshooting the framework, ensuring the technology's reliability and effectiveness using Houdini Software.

## **2. Research Contributions**

**Virtual Humans Characters – An Interdisciplinary Approach - Total Cost: \$1,000,000 | Partners: 4 AMD, Cream, Secret Location, SEED Interactive**

**Achievement:** Collaborated with four companies to revolutionize the media and entertainment sector by integrating user and virtual human interactions across multiplatform user experiences. **Contribution:** Technical director, animation Lead. Developed animation pipeline for real-time digital doubles and

research for facial and body performances to create a motion database capturing natural human expressions, speech, and gestures. Performance integration, managed motion capture production, directed performances, and designed a rendering pipeline for prototypes.

**Rapid Digital Character Asset Library - Total Cost: \$50,000 | Partners: 1 - Industry Corporation**

**Achievement:** Automated the creation of digital characters for animated series, streamlining the process within budget constraints. Developed a Rapid Digital Character Asset Library to enhance animation workflows, ultimately boosting revenue and providing employment opportunities.

**Contribution:** Pipeline TD, managed and designed the overall framework, providing technical direction for character architecture and procedural animation. Sourced software and tools for a digital double pipeline, improved performance integration. Developed enhanced capture solutions, automated environments and rendering pipeline, producing content for prototype.

**Real-time AI Character Sign Language Translation - Total Cost: \$30,000 | Partners: 1 – Deaf AI**

**Achievement:** Developed a real-time animation framework for virtual humans as sign language interpreters to enhance public accessibility for the deaf community. This project involved designing a procedural workflow with asset management, collaboration, character design, animation, and real-time rendering. The prototype also investigated motion capture, AI implementation, and comprehensive documentation to support content creation and workflow processes. **Contribution:** Principal Investigator, CG, Animation Lead, AI artist. Initiated, led the project, designed overall framework and provided technical direction for character architecture and procedural animation pipeline for real-time.

**Modelling and Animation of Digital Characters within Multi-platform Production - Total Cost: \$150,000 | Partners: 1 - Side FX**

**Achievement:** Developed character animation workflows within Houdini Software, focusing on realistic digital characters and behavioral simulations. Showcased the effectiveness of procedural workflows in animating digital humans that interact naturally with their surroundings and streamlined asset creation.

**Contribution:** Principal Investigator, CG, Animation Lead. Initiated, led the project, designed overall framework, and provided technical direction for character architecture and procedural animation pipeline.

**Memory Care AI Character Designer - Total Cost: \$30,000 | Partners: 1 - Reimagine AI**

**Achievement:** Deployed an AI system and integrate it into a mobile platform, to help those who suffer from Alzheimer's and the caregivers that support them. These avatars are lightweight, efficient computer-generated non-biased stylized characters that exhibit human-like qualities. **Contribution:** Principal Investigator, Lead. Developed Character architecture and animation pipeline to utilize procedural animation techniques. Designed and created character assets, materials and textures that support optimized Realtime production pipelines.

**Hybrid Volumetric Character - Total Cost: \$30,000 | Partners: 1 - Holy City VR**

**Achievement:** Developed a VR character creation workflow, integrating rigging, volumetric capture, and AI animation. Developed pipeline for virtual characters to react dynamically to text and user interactions, enabling diverse story developments and responses. **Contribution:** Character Pipeline Architect and Technical Director. Led and directed facial animation pipeline using facial capture. Collaborated with VR team, to refine production and create workflows for creating and optimizing VR characters and digital double assets.

**Virtual Human Pro-Rendering Pipeline - Total Cost: \$48,000 | Partners: 1 - AMD**

**Achievement:** AMD's Pro Render is a physically based render engine that enables users to create photorealistic renders. SIRT provided essential feedback and support to AMD's engineering teams, which contributed to the development of specialized render shaders that were integrated into their public applications for production in the industry. **Contribution:** Principal Investigator, Pipeline Architect. Developed prototype pipeline for virtual human assets and animations aimed at rendering

digital double performances for film. Managed the creation and processing of motion capture and facial performances and developed a rendering pipeline to produce prototype performances for a technical paper.

**Real-time Animation Workflow – Total Cost \$30,000 | Partners: 1 - Post Office Sound**

**Achievement:** Optimizing animation and production workflows, aiming to reduce costs through procedural workflows and real-time environments. Their joint effort focused on leveraging cutting-edge technology to establish an efficient animation studio. Together, they developed a prototype for an episodic series that uses music to teach children life skills. **Contribution:** Principal Investigator, CG, Animation Lead. Character architecture and animation pipeline to utilize procedural and real-time animation. Managed the project, designed overall character pipeline, provided both technical and creative direction while troubleshooting the framework, animated and rendered and the prototype ensuring the technology's reliability and effectiveness.

**Real-time Production Workflow - Total Cost: \$25,000 | Partners: 1 - Champlain Media**

**Achievement:** Focused on researching and developing virtual production workflows using 4D animation libraries to streamline production times, increase output, and establish a scalable process for digital assets and real-time engines. The project delivered a comprehensive production workflow that included sourcing digital assets and creating scenes for real-time rendering. **Contribution:** Principal Investigator and Project Lead. Developed the production pipeline and its accompanying documentation, along with a prototype scenario and editable scene files. Established a compositing and rendering pipeline, producing all rendered content for documentation.

**Geometry Optimization for Neural Networks - Total Cost: \$6,500 | Number of Partners: 1 - Babylon VR**

**Achievement:** Artificial intelligence assisted optimization for virtual reality. **Contribution:** Technical lead. Created a best practice guideline for polygon topology, UV mapping and texturing meshes that are optimized for virtual reality applications with low poly count. Developed data for a training model for a detection, optimization and geometry layout for an optimized model for VR experiences.

**3. Other evidence of impact and contributions**

**College Masters Program Committee:** As a member of the Program Development Team (PDT) at Sheridan College, played a critical role in crafting the institution's first master's program proposal. This involved extensive consultations with industry leaders in film and VFX to address production challenges and foster innovative solutions through strong industry collaborations with research and SIRT.

**AI-Assisted Indigenous Systems:** In collaboration with Star Tribe Media, led the pioneering development of animated actors that represent First Nations people from the ten geographic regions of the world. This initiative aimed to address biases in ML datasets and integrate Indigenous knowledge systems, enhancing the cultural diversity and accuracy in media representations. This work is instrumental in embedding Indigenous knowledge, language, culture, and experiences into postsecondary education and broader societal contexts.

**EDI Initiative for Youth with ASD:** Partnering with Technology North, establish employment opportunities within production for youth with Autism Spectrum Disorder (ASD). This program matched the unique skills of these individuals with roles in a supportive environment and includes training programs and mentorships, developed in collaboration with technology firms and educational institutions.

**Patents:** Two international recognized patents Application No. PCT/IB2020/050502, Filed January 22, 2020. Animation of Avatar Facial Gestures, in animation technologies for VR, including an advanced speech and emotional character system optimized for virtual reality, enhancing user interaction and realism.

**Collaborations and Technological Advancements:** Collaborate research with Reimagine AI and Microsoft led to a refined Azure viseme for accurate speech synthesis, contributing significantly to advances in digital communication technologies. Led the digital creative aspects of the team that led to the creation of the world's first AI assisted Virtual Human that got recognized with real-world citizenship.

**Speaking Engagements and Professional Influence:** Invited to speak at industry conferences and seminars focused on standardizing animation workflows and fostering innovation within the animation and technology sectors. Emphasizing the importance of universal frameworks that enhance operational efficiency and promote technological advancements across industries.

**Educational and Public Contributions:** Initiatives to document and provide the next generation of technologists and animators with the necessary skills, often providing mentorship and resources to help others implement complex technological processes effectively.

#### 4. Contributions to the training of students and other talent

Principal Investigator and project lead on various government-funded programs, developing a comprehensive mentorship and training strategy that boosts professional growth and skill development in production, software development, and animation. Our approach features regular one-on-one and group sessions that promote relationship building and skill sharing, enhancing leadership and communication abilities among trainees. We immerse trainees in cutting-edge technologies and methodologies, aligning them closely with the project's goals through ongoing evaluations to maintain a responsive and goal-oriented learning environment. Additionally, the program extends to professional networking, providing essential industry connections and insights into global standards. A strong focus on equity, diversity, and inclusion underpins our strategy, with a commitment to addressing gender imbalances and engaging marginalized groups through EDI-focused recruitment processes. This holistic approach not only fosters academic and professional excellence but also equips a new generation of talents for future challenges, significantly enriching the academic and professional fields.

#### 5. Publications

- Kozak S. (2024) [Advancing Animation with the M-body.ai Dataset](#) NSERC - Applied Research and Technology Partnership Grant (ARTP). Primary Investigator for animation and AI research
- Kozak S. (2024) [Generative AI Revolutionizes Animation](#) NSERC - Applied Research and Technology Partnership Grant (ARTP). Primary Investigator for animation and AI research
- Kozak S, Darmitz M, Idenouye S, Hunter J, Porier M, Taheri S, Vardanyan V, Jasmin JF, Coll J. (2024) [Open Source Data and Tools for Generative Animation - Introducing M-body.ai](#) Webinar. NSERC - Applied Research and Technology Partnership Grant (ARTP). Primary Investigator for animation and AI research
- Tsotsos L, Kozak S (2024) [Polytechnic Showcase Spotlight: How Sheridan is Leveraging AI for Improved Elder Care](#), Polytechnics Canada, Opinions Section. NSERC - Advanced Health Technology Innovation (AHTI) grant. Primary Investigator for AI research in collaboration and innovation.
- Busch P, Kozak S, MacDonald A (2023) [Dynamic Digital Humans: A Facial Pipeline for Digital Humans](#) Webinar. Ontario Centres of Excellence (OCE) - Colleges Applied Research and Development Fund (CARDF). Dynamic Digital Humans Faceware integrated facial pipeline.
- McAnally, M. (2023) [Creating Dynamic Digital Humans](#). Sheridan Newsroom, Article. NSERC - Ontario Center of Excellence / Voucher for Innovation and Productivity (OCE VIP).
- Reallusion Magazine. (2022) [TV production company Cream creates digital double Survivorman Les Stroud with character creator](#). Reallusion Magazine interview on technology innovation.
- Failes, I. (2022). [Cream creates Survivorman VR Les Stroud digital double with character creator](#). before & afters. Ontario Centres of Excellence (OCE) - Colleges Applied Research and Development Fund (CARDF). Techniques to using Reallusion in the pipeline.