# QINGGUO XU

**Computer Visionn and Graphics, Machine Learning Engineer**

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⚯ https://xu-qingguo.com

I have a master's degree in computer science and 8+ years of experience in Computer Vision and Graphics. I worked as a research engineer at 3Bodylabs ai, TikTok and Pinscreen and have machine learning engineer experience.

| Computer Vision and Graphics | Artificial Neural Network | 3D Data process | Mobile App development |

## WORK EXPERIENCE

### Research Scientist

**3bodylabs AI**

📅 Sep 2024 – Present  📍 Los Angeles, CA

- Audio driven lip syncing, both image-based and video-based.
- Video Super Resolution (Improved old movies' quality)
- AI Trailer (automatically and efficiently edit long videos)
- Human detector and segmentation (foreground/background segmentation)

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### Research Engineer - TikTok Inc.

**Virtual Human Group**

📅 Feb 2022 – Nov 2023  📍 Los Angeles, CA

- Face tracker training and improving
- Auto benchmark face tracker pipeline (Generate inference results, compute errors, plot error map)
- Face data capture (iPhone's ARKit for face and 3dMD for full head)
- Face data process (auto registration and retopology etc.)
- Mouth shape calibration

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### Research Engineer - Pinscreen Inc.

**Pinscreen Inc.**

📅 Dec 2017 - Mar 2021  📍 Los Angeles, CA

- 3D human data processing
- Face tracker training and training data prepare
- DeepFake projects, more details on my website
- WebRTC live streaming
- iOS & Android App development
- Server side unity rendering and offline rendering
- Backend (AWS) management

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## EDUCATION

### Master - Computer Science

**University of Kentucky**

📅 Sep 2015 - May 2017  📍 Lexington, KY

### Master porgram (PEIK) - Electrial and Computer Engineering

**University of Kentucky**

📅 Sep 2013 - May 2015  📍 Lexington, KY

### Bachelor - Computer Science

**Xi'an Jiaotong University**

📅 Sep 2007 - May 2011  📍 Xi'an, China

## SKILLS

- Engineer experience in **Computer Vision, Graphics** and **Artificial Neural Network**
- Development tools: **pyTorch, Maya, Wrap3D, Nuke, Unity, Unreal, OpenCV, OpenGL**
- Programming Language: **Python, C/C++, Matlab, Java, Objective-C, C#, JavaScript**
- Language: **Mandarin** (native speaker), **English** (fluent)

# SELECTED PROJECTS

### Audio driven lip syncing
**Intro:** This project is used for generating an introducing video of a platform product. There are 3 speakers to introduce and demo the platform and I generated all the videos for them. The whole video is about 25 minutes.
**Role:** I did literature research and refined an existing open-sourced model. I also built an automatic pipeline to generate all the videos.

### Video Super Resolution (VSR)
**Intro:** This goal of this project is to improve visual quality of old movies. The company has signed many old movies IPs. We want to improve the visual quality for all of them.
**Role:** I lead an research intern and trained a VSR model based on CogVideoX. We collected many high-quality videos and split them into small clips. Then decrease the visual quality for all clips and get the <high quality, low quality> paired training data. I also built an automatic pipeline to process the training data.

### AI Trailer
**Intro:** This project is to generate trailers for long movies. For long movies, it can generate trailers based on interesting key words.
**Role:** I built an automatic pipeline and also wrote all the ComfyUI nodes for the pipeline. So it's very easy to deploy and use. The first step is to split the long movie into small clips. Then try to understand every clip's content and assign tags. Based on the tags, choose interested clips and generate the trailer.

### Human detector and segmentation
**Intro:** This project is to segment foreground (human) and background. Then apply style transfer on foreground and background separately. Finally, blend processed foreground and background together.
**Role:** I built an automatic pipeline to detect human first and then segment human out. The pipeline outputs foreground and background, as well as corresponding masks, which will be used for final blending.

### TikTok Avatar
**Intro:** TikTok Avatar used to be an effect in TikTok App and users can drive 3D virtual avatars with front camera. There is a set of predefined blendshapes and we trained a neural network that can estimate those blendshapes weights.
**Role:** I prepared part of the training data (including capture and process), trained and refined the neural network, built up an automatic benchmark pipeline.

### Face replacement projects
**Intro:** I did many face replacement projects with Deepfake technology. It can replace one person's face with another person's, and it can also replace a CG rendered face with a real human's face and vice versa. Video results are on my website
**Role:** I built an automatic pipeline for deepfake and it can generate most Deepfake videos perfectly. I worked on all procedures: processing data, training models, inferencing raw results, and compositing final results with either my own blending code or commercial software (Like Nuke).

### Normalized Avatar Synthesis Using StyleGAN and Perceptual Refinement
**Intro**: The system takes a single frontal face as input and generates a normalized avatar using StyleGAN. No matter the input frontal face has expressions or has contrast lighting, the system can generate normalized avatar (neutral face with consistent lighting)
**Role**: I prepared all the training data (3D meshes and textures), and ran some comparison experiments.

### Master Thesis: 3D body tracking using deep learning – in 2017
**Intro**: This project is a system project. The system leverages Kinect as input capture device and can track 3D body movements almost in realtime (10 fps).
**Role**: I built the whole system and captured data with Kinect. With Kinect, I can get 2D images and aligned 3D depth at the same time. I first run body tracking on images and get joints' position on 2D, since 3D depth is aligned with 2D image and the camera parameters are pre-calibrated, I can map 2D position into 3D space, that's how I can track body movement in 3D with deep learning.

### Mask-off: Synthesizing Face Images in the Presence of Head-mounted Displays
**Intro**: This is a research project and published a paper, and the system can recover photo-real face images from faces wearing head-mounted displays.
**Role**: I built the whole hardware, synchronized all 3 cameras (one for frontal view and two for each eye), helped capture data and ran some experiments.

### Littlehelper: Using Google Glass to Assist Individuals with Autism in Job Interviews
**Intro**: LittleHelper takes advantage of Google glass, which has a camera and a very small display. The app can do simple face tracking and find where the face is, then it will show an arrow pointing to the detected face and notice the individuals with autism which direction to look at. It can also calculate the sound volume, if the individuals speak too loud, it can notice him/her speak lower, and vice versa.
**Role**: I implemented the Google glass (Android) app and did some experiments in an office room. After many experiments, I pre-defined some thresholds for "too loud" and "too soft".

# AWARDS

Teaching Assistant                Sep 2016 - Dec 2016
Kentucky Opportunity Fellowship    July 2015 - June 2016
Teaching Assistant                Sep 2014 - June 2015
PEIK Tuition Scholarship        Sep 2013 - June 2014

# PUBLICATIONS

- Huiwen Luo, Koki Nagano, Hanwei Kung, **Qingguo Xu**, Zejian Wang et al. "Normalized Avatar Synthesis Using StyleGAN and Perceptual Refinement" 2021 IEEE Conference on Computer Vision and Pattern Recognition (CVPR)

- Yajie Zhao, **Qingguo Xu**, Ruigang Yang et al. "Mask-off: Synthesizing Face Images in the Presence of Head-mounted Displays." 2019 IEEE Conference on Virtual Reality and 3D User Interfaces (VR).

- **Qingguo Xu**, Sen-ching Samson Cheung, et al. "Littlehelper: An Augmented Reality Glass Application to Assist Individuals with Autism in Job Interview". Asia Pacific Signal and Information Processing Association (APSIPA), December 2015

- Pengfei Zheng, **Qingguo Xu**, Yong Qi. "An Advanced Methodology for Measuring and characterizing Software Aging". International Workshop on Software Aging and Rejuvenation (WoSAR), 2012