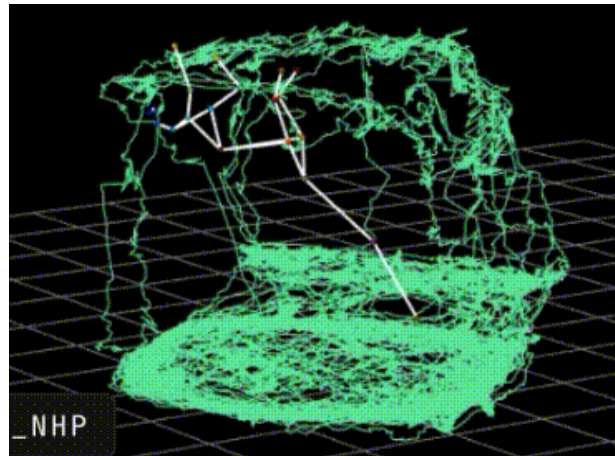


NHP Behavior Atlas

AI-Based 3D Behavioral Phenotyping for Drug Development

Integrating NHP Disease Models with Quantitative Behavioral Analysis



James Song

GM & Co-Founder, Prisys Biotech

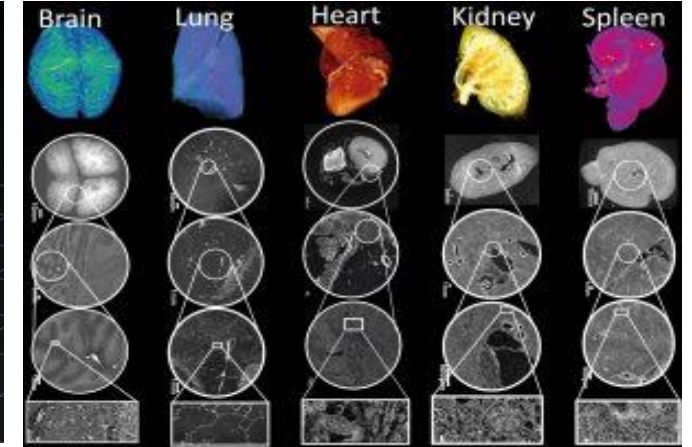
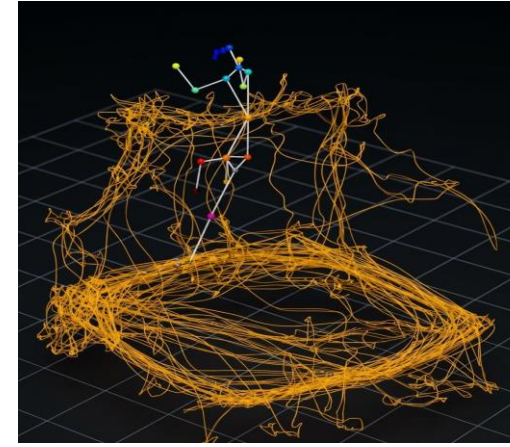


PRISYS



BAYONE

Prisys: Integrated NHP Model + AI Behavioral Analysis Platform



Sterile Preclinical OR



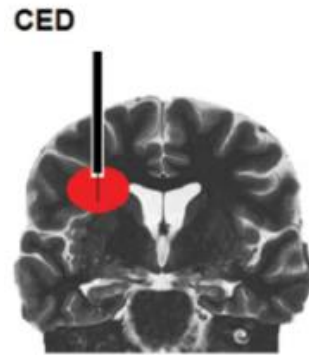
Digital Subtraction Angiography

- AAALAC-accredited NHP CRO
- Integrated NHP disease model platform

- Advanced surgical & intervention capabilities
- AI-enabled translational research ecosystem

Advanced Technologies Supporting NHP CNS Research

MRI-Guided CED



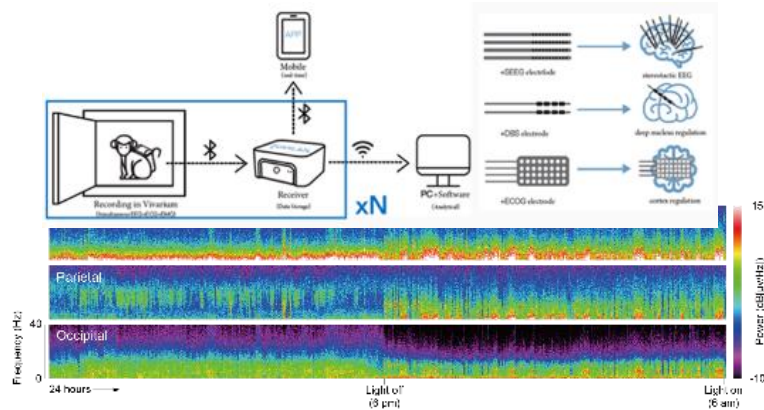
Convection-enhanced delivery for intracranial administration

Clinical Imaging



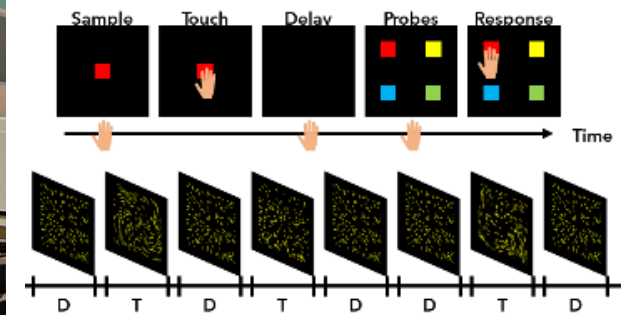
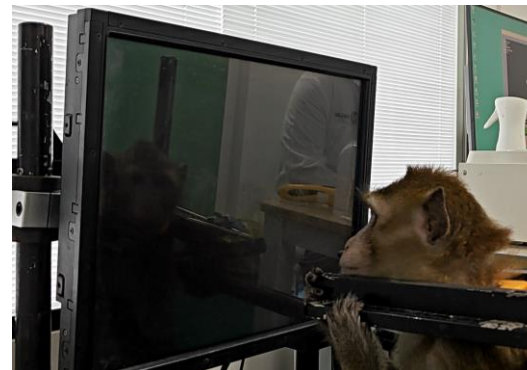
MRI, fMRI, PET/CT, SPECT multimodal imaging

Wireless EEG/EMG



Continuous physiological monitoring via telemetry

Cognitive Assessment



Learning, memory & executive function evaluation

Why Quantitative Behavioral Phenotyping Matters

Current Challenges

Subjective Scoring

Manual behavioral assessment introduces inter-rater variability and limits reproducibility

Limited Sensitivity

Conventional endpoints fail to capture subtle functional changes across dosing timepoints

Fragmented Endpoints

Behavioral data rarely integrated with PK/PD or imaging in a unified framework



AI-Based Solution

Continuous Monitoring

24/7 automated behavioral surveillance with no observer effect

Objective Quantification

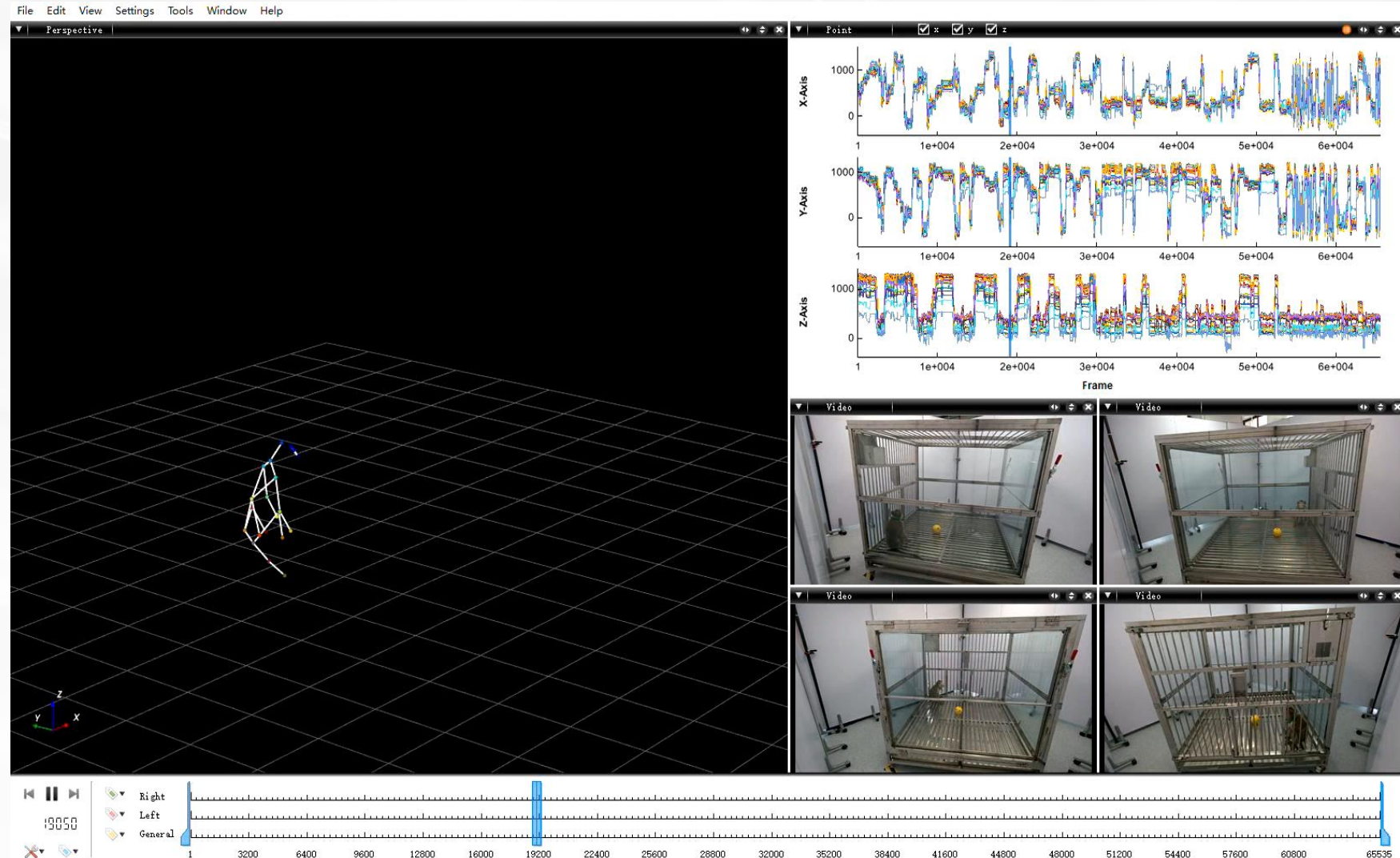
Standardized AI-derived metrics replace manual scoring

PK/PD + Imaging Integration

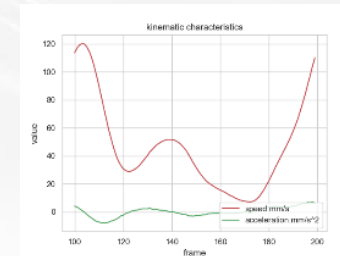
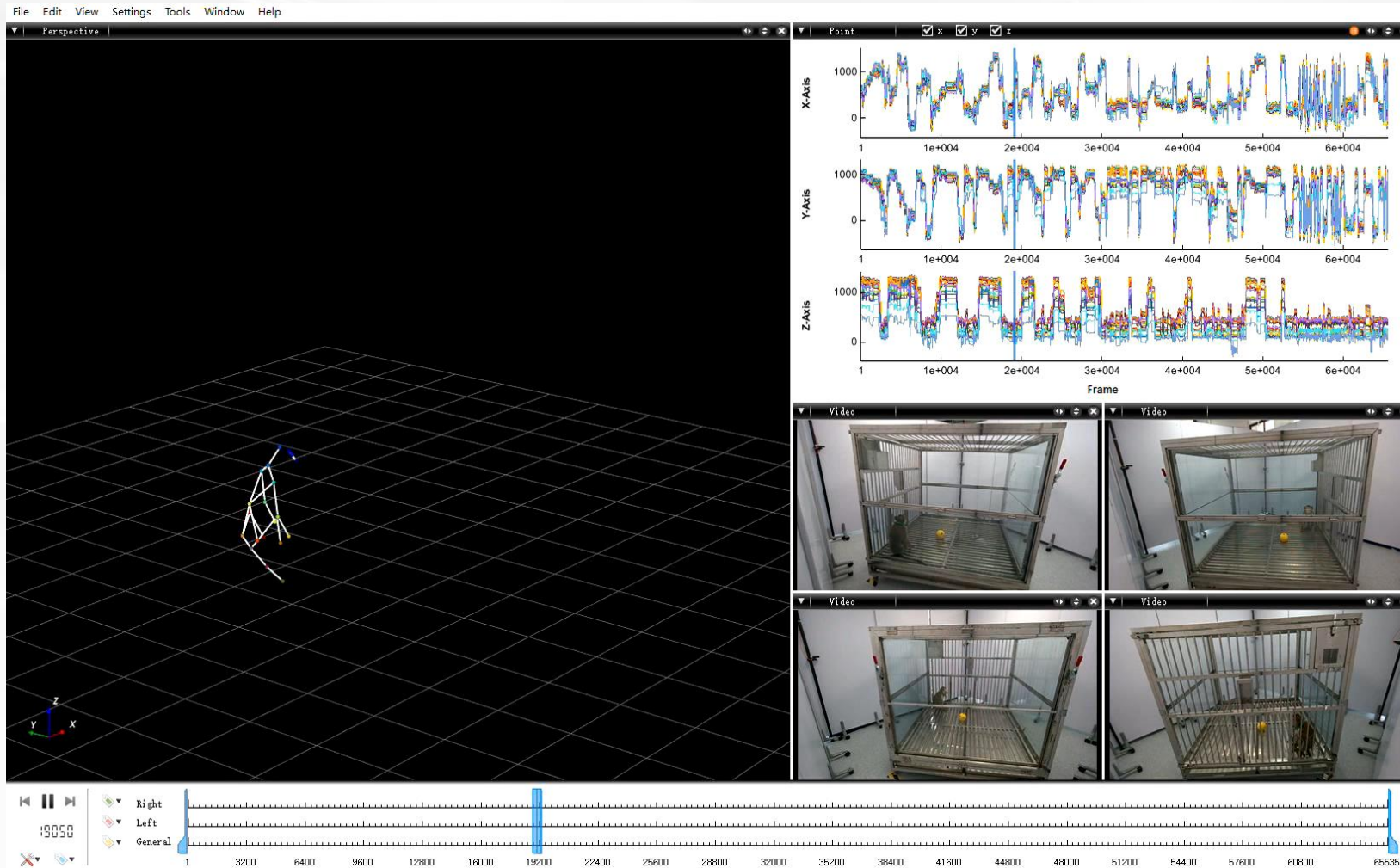
Behavioral readouts fused with pharmacological and imaging data

AI-Powered 3D NHP Behavioral Analysis

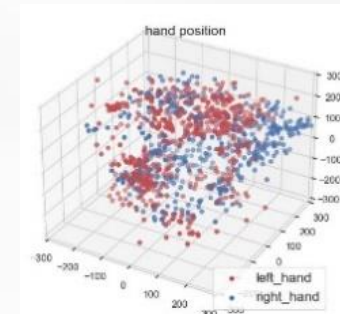
Multi-View Video Acquisition



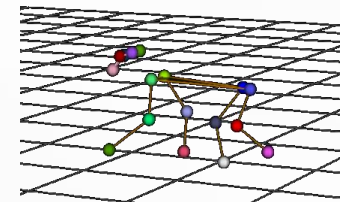
AI-Powered 3D NHP Behavioral Analysis



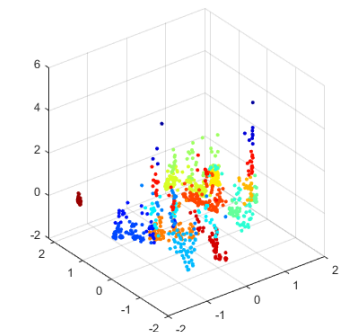
Velocity & Acceleration



Limb Position
Gait Tracking

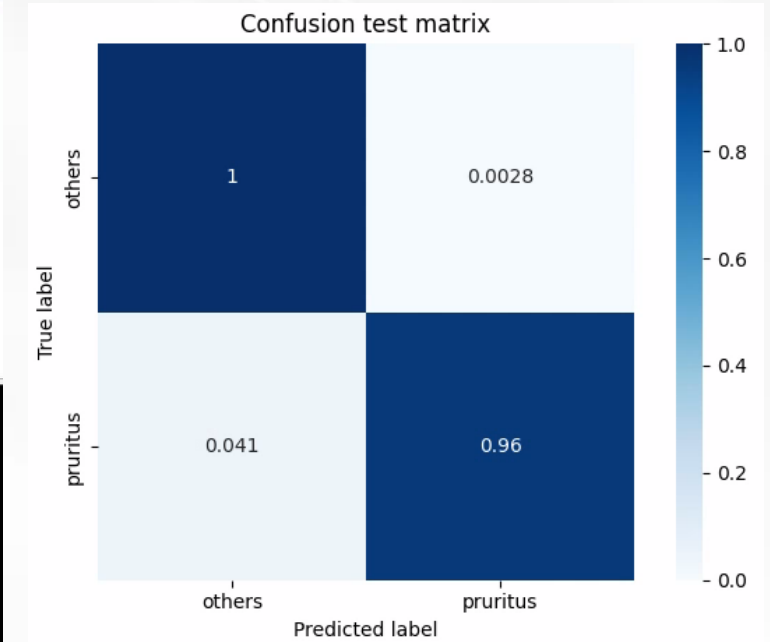
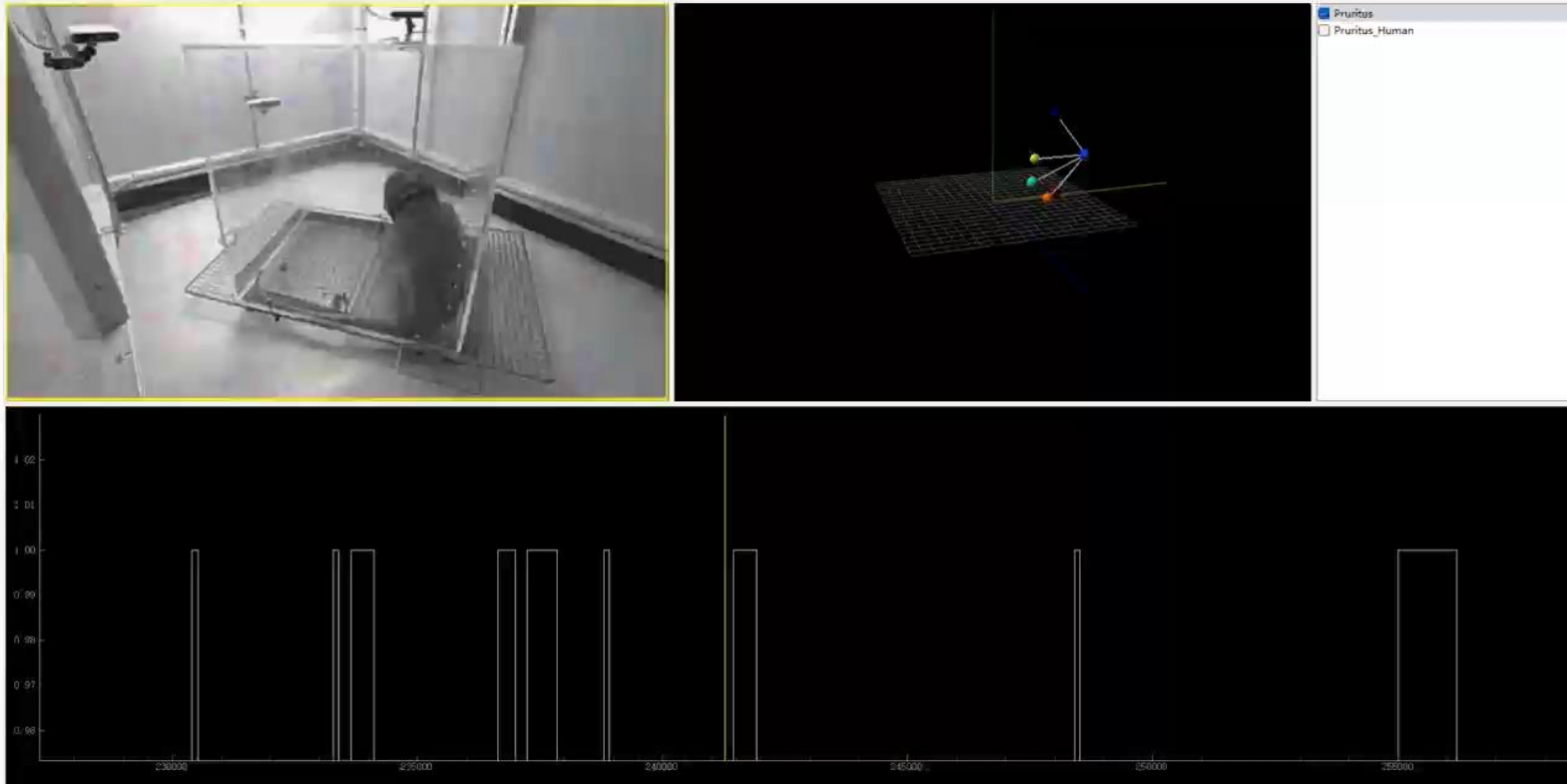


3D Pose
Estimation



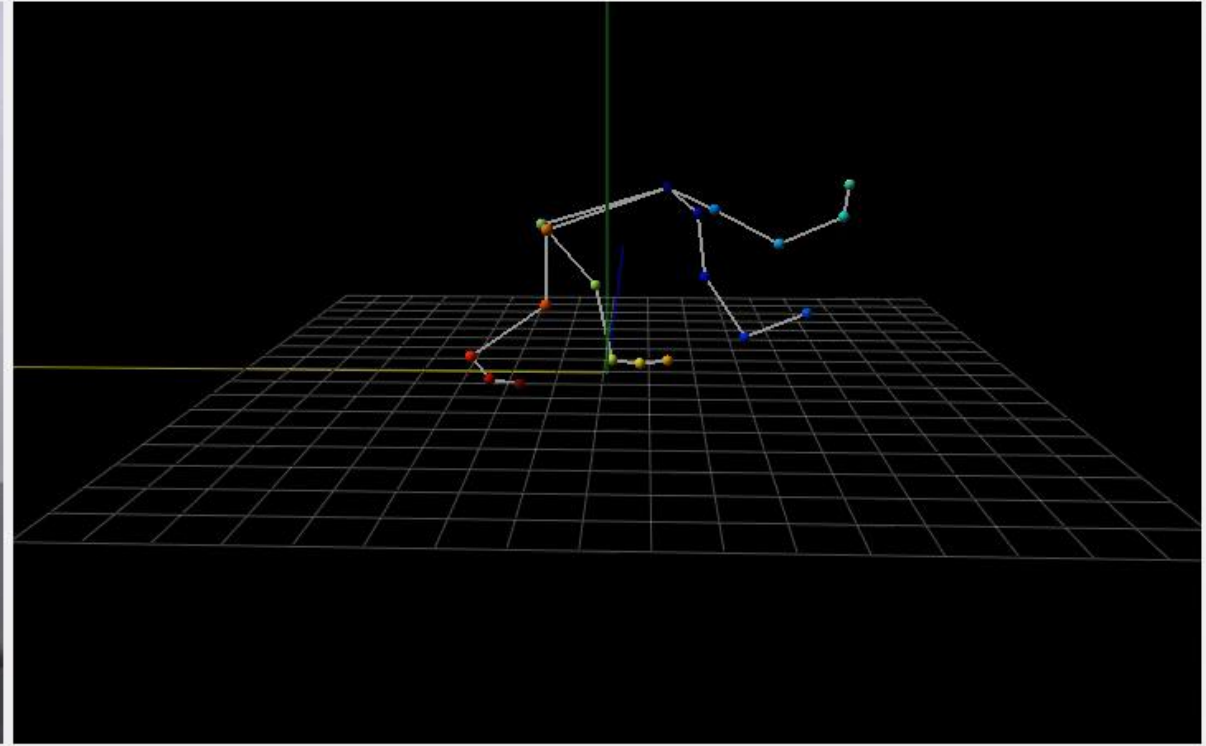
Automated
Behavior
Segmentation

Case 1: Pruritus (Scratching) Behavior Recognition in Cynomolgus Macaque



- ✓ Feature extraction utilizing 3D pose estimation and optical flow methods;
- ✓ Recognition accuracy exceeded 96%.

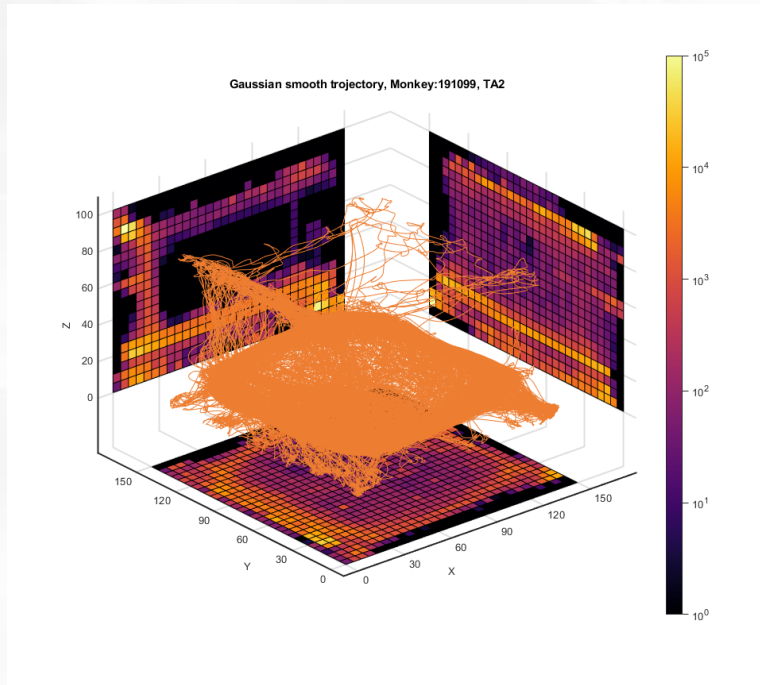
Case 3: 3D Motor Function and Kinematic Analysis



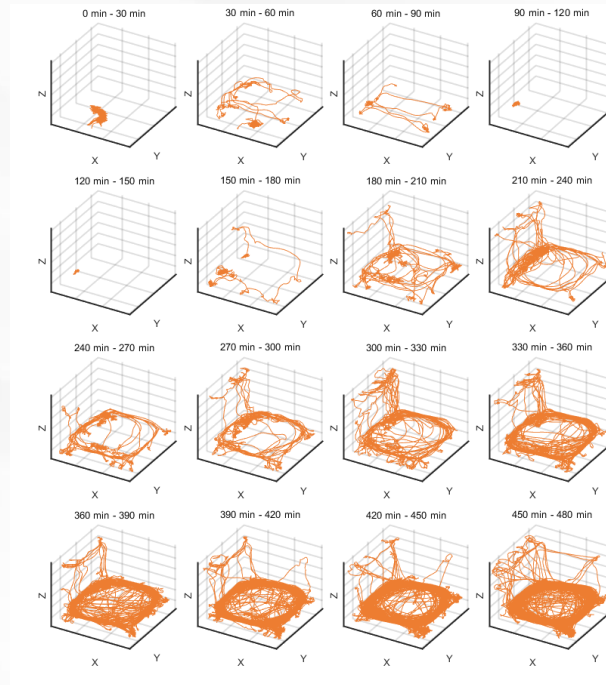
- ✓ Enables fully **non-contact, marker-free** gait analysis for **limb and joint injury** models.
- ✓ Enables **naturalistic behavioral measurement** without physical intervention.

Case 4: Fine-Grained Behavioral Phenotyping and Data Mining

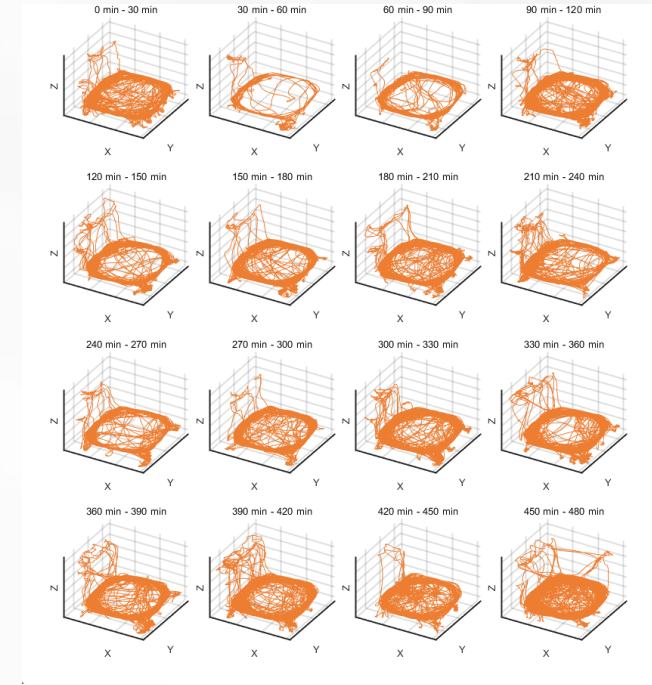
3D Spatial Trajectory



Treatment 1



Treatment 2



Longitudinal Multi-session Behavioral Monitoring

Visualization and analysis of **longitudinal behavioral trajectories**
reveal dynamic **changes in behavioral patterns over time.**

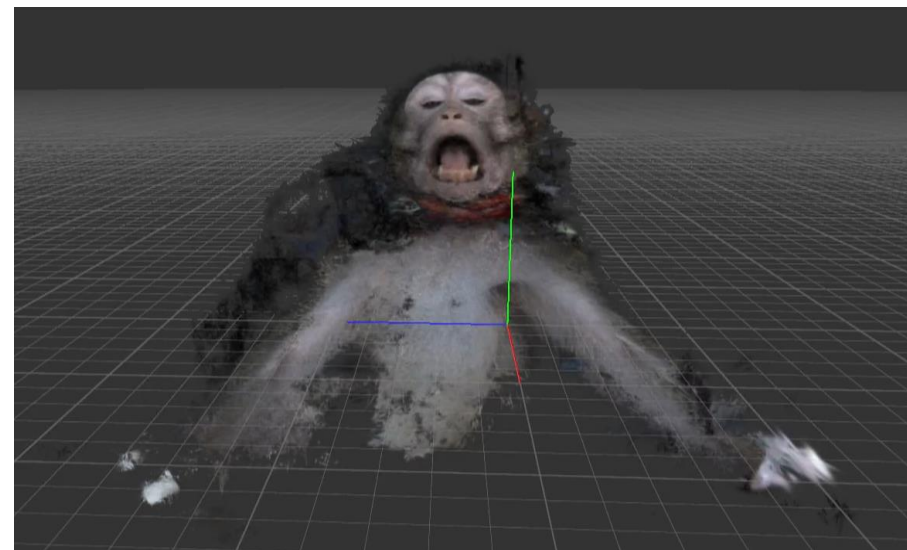
AI-Based 3D Facial Expression Analysis in NHPs

A standardized, camera-based AI — reconstructs NHP facial geometry in 3D, extracts validated Action Units, and delivers objective behavioral quantification free from observer bias.

① Multi-view reconstruction from synchronized cameras



② Detect and score validated facial Action Units



③ Objective behavioral phenotype measurement

Image Acquisition



Annotation



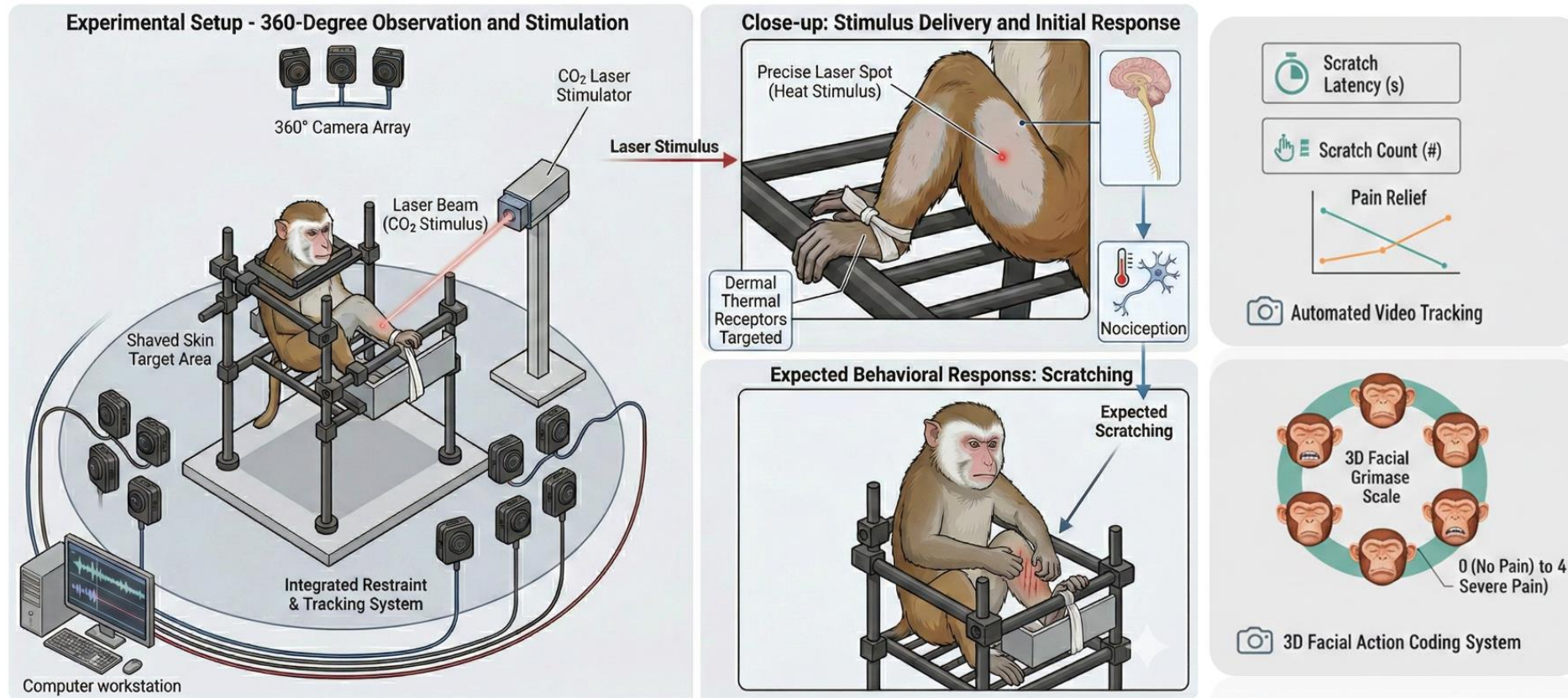
Model Training



Deployment

Applications: Disease Progression | Pharmacological Response

Case Study: AI-Assisted Assessment in an NHP Pain Model



Experimental Workflow

- Mechanical stimulation
- Thermal stimulation

Quantitative Readouts

- Response latency
- 3D facial expression analysis
- Pain-related Action Units

Current Progress

- Ongoing pharmacology validation

Key Takeaways: Integrated AI Behavioral Phenotyping for Translational Research



KEY MESSAGES

- Integration of NHP disease models with imaging, telemetry, and AI-based behavioral analysis
- Objective behavioral endpoints complement traditional efficacy assessments
- Multi-modal data integration enables comprehensive evaluation of pharmacological responses

FUTURE APPLICATIONS

- Preclinical pharmacology studies
- Translational biomarker development
- Pre-GLP and IND-enabling studies
- Customized behavioral algorithm development

Thank You — Questions & Discussion

James Song · General Manager & Co-Founder, Prisys Biotech · *In collaboration with Bayone*

Thank you!

AI-Based 3D Behavioral Phenotyping for Drug Development

Integrating NHP Disease Models with Quantitative Behavioral Analysis

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