NeuroCheck AI

Clinical Prototype — Instructions & Technical Overview

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Classification: **Confidential — Internal Team Only**

What You Are Receiving

This package contains three working demos and this documentation:

#	Demo	URL	Description
1	Clinical Prototype (START HERE)	neurocheckai.com/ neurocheck-prototype.html	Full 3-screen product prototype: Live Assessment with elderly ICU patient, C
2	AI Patient Demo	neurocheckai.com/ neurocheck-ai-demo.html	Standalone self-running demo. AI face performs full CN II-XII sequence with
3	Live Webcam Demo	neurocheckai.com/ neurocheck-demo.html	Uses YOUR webcam to track your face in real-time with AI overlays. Follow
4	This PDF	(attached)	Complete instructions, inputs/outputs, AI pipeline, predictive capabilities, and

Demo 1: Clinical Prototype (Start Here)

How to Open

1. Open **https://neurocheckai.com/neurocheck-prototype.html** in Google Chrome
2. The prototype loads immediately — no install, no login, no camera required
3. Use the **three tabs** in the top navigation bar to switch between screens

Screen 1: Live Assessment

This is the primary clinical assessment view — what a clinician would see on the ICU monitoring workstation.

Element	Location	What It Shows
Patient Card	Left sidebar, top	Margaret Chen, 74F, MRN HMC-7742901. Neuro ICU 4B, Post-Op Day 2, L MCA aneurysm clipping
Camera Config	Left sidebar, bottom	ICU hardware specification per patent: Intel RealSense D435i (bedside), Axis M3068-P (foot-of-bed)
AI Video Feed	Center panel	Elderly patient rendered in ICU room setting — IV pole with drip line, heart rate monitor with live wav
CN Test Prompt	Center overlay	Current instruction displayed to patient. Cycles through all 10 cranial nerve tests automatically: "Look
Temporalis Measurement	Center overlay (during CN V + Frailty)	Orange dashed outline highlights temporalis muscle region bilaterally. Red measurement brackets sh
Clinical Alert Banner	Center bottom (triggers during delirium)	Red pulsing alert: "Delirium Score Increase — CAM-ICU-7: 3/7 — Notify attending." Demonstrates th
GCS Score	Right panel, top	Glasgow Coma Scale: Eye (E), Verbal (V), Motor (M) components populate individually, then total (1
CN Grid	Right panel	10-cell grid showing all cranial nerves II-XII. Each dot transitions: gray (pending) → amber blinking (t
CAM-ICU-7	Right panel	Delirium screening: RASS (-1), Acute Onset (Yes), Inattention (+1), Disorganized Thinking (No), Alte
Frailty Index	Right panel, bottom	CFS (5/9), Temporalis Thickness (7.8mm ↓), Grip Strength (14.2 kg ↓), Fall Risk (HIGH). Red indica

Screen 2: Clinical Alerts

This screen shows the automated clinical decision support system. When assessment scores cross clinical thresholds, the system generates alerts with severity classification and recommended actions.

Severity	Alert	Score	Recommended Action
CRITICAL	Delirium Score Increase — CAM-ICU-7 rose from 2→3	3/7	Notify attending. Reorientation protocol. Review sedation orders.
CRITICAL	Temporalis Wasting Below Threshold — 7.8mm (below 10mm)	7.8mm	Nutrition consult. Protein supplementation. PT strength evaluation.
WARNING	Fall Risk Elevated — Hopkins composite score HIGH	HIGH	Fall precautions. Bed alarm. 1:1 sitter. PT clearance before ambula…
INFO	GCS Improvement — 14→15 (verbal 4→5)	15/15	Continue monitoring. Document improvement.
INFO	CN Baseline Updated — All CN II-XII intact	10/10	No intervention. Update UPI longitudinal record.

Screen 3: Patient History & Trends

Longitudinal tracking view showing how the patient's assessments change over time. This demonstrates the UPI (Unique Patient Identifier) concept from the patent — each assessment builds on historical data for trend analysis and predictive modeling.

Chart	Data Shown	Clinical Interpretation
GCS Trend	GCS total score from Day 0 (11) through Day 2 (15). Red reference line at 13 = neurological threshold.	Patient showing steady neurological improvement post-op. GCS 15…
CAM-ICU-7 / RASS	Dual-line chart: CAM-ICU-7 delirium score (red) and RASS sedation score (orange). Reference line at 2 = delirium thres…	Delirium initially high (5) post-op, trended down to 3 [illegible]
Frailty + Temporalis	CFS frailty score (orange) and temporalis muscle thickness in mm (red). Reference line at 10mm = sarcopenia threshold	Temporalis declining from 9.2mm to 7.8mm by Day 2 [illegible]
Baseline vs Current	Side-by-side bar comparison: GCS, CFS, CAM, Grip Strength, Temporalis. Blue = pre-op baseline, teal = current.	Quick visual comparison showing which metrics improved (GCS) a…

Demo 2: AI Patient Demo (Self-Running)

Open **neurocheckai.com/neurocheck-ai-demo.html** in Chrome. This is a standalone version of the assessment view with a full dashboard layout including the ICU room camera visualization and PredictWell integration pipeline. The demo starts automatically after 3 seconds. No camera or setup needed.

Demo 3: Live Webcam Demo

1. Open **neurocheckai.com/neurocheck-demo.html** in Google Chrome
2. Click **"Start Camera"** or **"Initialize Camera System"**
3. When Chrome asks for camera permission, click **Allow**
4. Position your face 18-30 inches from camera, facing a light source
5. The system detects your face and begins the CN II-XII test sequence automatically
6. Follow the on-screen prompts to perform each movement

This demo uses **MediaPipe Face Mesh** (Google's computer vision library) to track 468 facial landmarks on your face in real-time. It draws the same AI overlays seen in the other demos — but on your actual face. **Requirements:** Chrome browser, any webcam, good lighting, internet on first load.

System Inputs & Outputs

What the System Takes In (Inputs)

Input	Source	Data Type	Purpose
Video Feed	CAM 1: Bedside	RGB + Depth, 1280x720, 30-90fps	Facial landmark detection, eye tracking, mouth/tongue analysis, expre
Video Feed	CAM 2: Foot-of-bed	RGB, 4K panoramic	Full body position, gross motor, gait analysis (TUG), fall detection
Video Feed	CAM 3: Room	RGB + IR night vision	Sleep/wake cycles, agitation detection, wandering, environmental mor
Audio	Bedside mic	Waveform + NLP	Voice quality (CN IX/X), verbal response (GCS-V), speech coherence
Patient Data	EHR via HL7 FHIR	Demographics, Dx, meds, vitals	Baseline context, medication awareness, historical comparison
Prior Assessments	PredictWell DB	Historical scores + UPI	Longitudinal trending, drift detection, predictive modeling

What the System Produces (Outputs)

Output	Score Range	Clinical Meaning
GCS Total	3-15	E(1-4) + V(1-5) + M(1-6). <13 = concern. <8 = severe.
CN II Visual Acuity	Pass/Fail	Pupillary light reflex and visual tracking
CN III Oculomotor	Pass/Fail	Upward gaze tracking. Deficit = CN III palsy or brainstem lesion.
CN IV Trochlear	Pass/Fail	Downward/inward gaze. Most commonly injured CN in trauma.
CN V Trigeminal	Pass/Fail	Masseter activation via temporalis muscle CV analysis.
CN VI Abducens	Pass/Fail	Horizontal gaze. Deficit = inability to abduct eye laterally.
CN VII Facial	Pass/Fail + Symmetry %	Bilateral expression analysis. Asymmetry flags stroke risk.
CN IX Glossopharyngeal	Pass/Fail	Audio + visual: phonation and palatal movement.
CN X Vagus	Pass/Fail	Laryngeal tracking during swallow. Critical for aspiration risk.
CN XI Accessory	Pass/Fail	Trapezius/SCM contraction via shoulder landmark analysis.
CN XII Hypoglossal	Pass/Fail + Deviation	Tongue symmetry. Deviation = contralateral lesion.
CAM-ICU-7 Delirium	0-7	0-2 = None. 3-5 = Mild-mod. 5-7 = Severe delirium.
RASS Sedation	-5 to +4	-5 = unarousable. 0 = alert/calm. +4 = combative.
Clinical Frailty Scale	1-9	1-3 = Fit. 4 = Vulnerable. 5-6 = Frail. 7-9 = Severely frail.
Temporalis Thickness	mm	CV measurement. <10mm = sarcopenia threshold.
Grip Strength Est.	kg	Estimated from hand/finger movement via computer vision.
Fall Risk (Hopkins)	Low/Mod/High	Composite: gait, balance, cognition, medications.

AI Processing Pipeline

Stage	Technology	Function
1. Capture	Multi-camera + edge compute	Simultaneous RGB, depth, audio from 3 cameras. Edge via NVIDIA Jetson Orin Nano
2. Detection	CNNs (Convolutional Neural Nets)	468 facial landmarks per frame at 30+ FPS. Body pose estimation. ROI segmentation
3. Temporal	RNN / LSTM Networks	Movement patterns over time: gait cadence, tremor frequency, saccades, response la
4. Assessment	Task-specific classifiers	GCS auto-scoring, CN pass/fail, CAM-ICU delirium probability, CFS frailty staging.
5. Fusion	Multi-modal ensemble	Video + audio + depth + EHR fused. Confidence scores and anomaly flags generated
6. Output	PredictWell CommandOS	Dashboard, EHR (HL7 FHIR R4), Digital Health Binder, UPI longitudinal tracking.

Predictive Analytics (With Longitudinal Data)

Capability	Required Data	Clinical Value
Delirium Onset Prediction	Serial CAM-ICU + RASS + sleep + meds over 48-72h	Predicts delirium 12-24h before clinical onset. Enables prophylactic inter
Post-Op Cognitive Decline	Pre-op baseline + serial post-op CN + GCS trending	Identifies patients deviating from expected recovery. Early neuro consult
Fall Risk Trajectory	Serial gait (TUG) + frailty + meds + sleep quality	Dynamic fall risk updates with each assessment. Automatic nursing alert
Sarcopenia Progression	Temporalis thickness over weeks/months via US	Tracks muscle wasting. Triggers nutrition/PT when decline exceeds thre
Recovery Benchmarking	Cohort data matched by Dx, age, frailty, procedure	Compares individual to population norms. Flags outliers for review.
Readmission Risk	Discharge frailty + cognition + delirium hx + social	Stratifies 30-day readmission risk. Informs discharge planning.

The key differentiator is the **Unique Patient Identifier (UPI)** system. Each patient's history builds a personal baseline, making every subsequent assessment more accurate and enabling trend-based predictions that single-point assessments cannot provide.

Recommended Camera Hardware

Camera	Model	Position	Specs	Function
CAM 1 Bedside	Intel RealSense D435i	18-30" from patient face	RGB+Depth 1280x720, 90fps IMU sensor	Primary face/CN assessment. 3D landmarks. Temporalis measurement.
CAM 2 Foot-of-Bed	Axis M3068-P	Ceiling mount at foot of bed	12MP panoramic 360°, IR	Full body. Gross motor, gait, TUG test, fall events.
CAM 3 Room	Axis M3068-P PTZ	Wall mount corner	PTZ, IR Audio input	Sleep/wake, agitation, visitor interaction.
Tablet Portable	iPad Pro TrueDepth	Handheld or bedside stand	TrueDepth LiDAR, Neural	Portable assessment. Outpatient follow-up.

Edge Compute: NVIDIA Jetson Orin Nano per ICU room. Processes video locally, reducing bandwidth. Only scores and anonymized metrics transmitted to cloud. HIPAA compliant.

Next Steps

1. **Review all three demos** — start with the prototype, then explore the AI and webcam demos
2. **Provide clinical feedback** — which assessments need refinement? Edge cases to model?
3. **Confirm hardware** — validate camera recommendations for Hurley ICU pilot
4. **Define validation protocol** — data needed to validate AI vs manual CN assessments
5. **IRB/compliance pathway** — requirements for camera monitoring in Hurley ICU

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NeuroCheck AI — Patent Pending: "Artificial Intelligence-Based Assessment System with Continuous Monitoring and Long-Term Data Tracking"