X6 PRODUCT REQUIREMENT DOCUMENT

Project Name: X6 Glasses PRD

Glasses

- Comfortable for all day use
- Glasses kit should include multiple lenses of various tints and corrective optics
- Software and Hardware support (at least one dedicated support staff)
- Initial training and instructional program
- SDK for third party application development that will enable seamless framework for porting and developing of Android Applications on the X6 platform
- SDK that will enable 3D and Augmented Reality tool kits
- To support 2 hours of operational time when operating from only the internal battery in the intended operating environment.
- External battery compatible with 5590 batteries that allow for 12 hours of run time (per ONR)
- To provide a platform of integrated embedded sensors (e.g. Camera, Microphone, Audio, IMU, Pressure, Ambient Light, etc.), radios (WiFi, Bluetooth and GPS) and a see-through display for third party applications such as those that enhance situational awareness.
- To provide a HUD platform, 3rd party developer support and framework for enabling Augmented Reality (AR) and Computer Vision (CV) applications and the ability to load applications.

1. Processor(s)

Type 1 - Application	● The Application processor (ACPU) must be capable of running the Android operating system 4.0 (Ice Cream Sandwich) and synchronize interface signals with WiFi, Bluetooth, and GPS radios. ● The processor must be able to run a platform of integrated embedded sensors (camera, microphone, audio, IMU, pressure, ambient light, etc.), radios (WiFi, Bluetooth and GPS) and dual see-through displays (720P resolution). ● The baseline CPU is the Texas Instruments OMAP 4470 (Dual 1.5 GHz).

2. Physical Product Specs

Optics	● Ovoid design ● FOV: 30 degree ● Eye Relief: 15mm ● Front Light source: Single LED ● Mounting: rigid to frame ● Half Wave: thermoformed curved
Shields	● Optically clear, injection molded, spherical FOV ● Photochromic will quickly adjust shield tint from outdoor sun to indoor lighting. ● User Changeable ● Transition timing TBD

	● Tint (%) and Transmission (%) ● Harden/Scratch Resistant ● Ballistic Rating ANSI Z80.3 - 2001
Weight	● Not to exceed 6.0 oz
IPD	● Fixed - no adjustment
Construction Material	● Frames: To meet or exceed appropriate MIL STDs and robustness specs outlined below. Needs to be immune to damage from face oils, sweat, able to withstand high temperatures (vehicle dashboard), stiffness to maintain optical stability, etc. ● Earhorn: to provide up to 8 hours of support, stability, comfort across a all head sizes
Thermal	● Thermal management via Top Cap, target 36C user forhead surface
Nose Bridge	● New vertical and horizontal adjustable design
Temple	● Temples fold flat ● Temple Pad Lining
Frame Colors	● Black
User Interface	● Crucial Tech – ability to control glasses UI without additional, external controls ● Power Button – ability to turn glasses on and off ● Home Button – provide Android home ● Back Button – provide Android back button ● Dual magnetic removable Ear Buds (Sealable) - for stereo audio ● New USB/Charging Connector (Magnetic)
Tamper Resistance	● Screw Types ● Tamper Switches

3. Image Display Subsystem

Display Image	● Binocular ● 1280 x 720 (720P) ● Virtual ~60 Inch Screen at 8 feet Distance ● Optical Correction (snap on modules, +3 to -6) ● Virtual Image Plane at 8 feet

4. Correction

Correction	● Range ● Increments of correction: +3 to -6 diopters
Physical attributes	● Ability for user to easily and quickly add or remove optical correction elements ● Correction elements will not impact user safety, comfort or external appearance ● Elements will not shift or break free under required MIL STD conditions

5. Connectivity

Short Range	● Bluetooth 2.0, enhanced data rate
Network	● Wi-Fi, 802.11 (B,G,N) ● Modes: Infrastructure & Ad Hoc ● Soft AP (Hot Spot Access Point) ● IP over USB tethering ● Wireless connections (3G or WiFI)
Long Range	● External connectivity to 3G/4G devices
GPS	● GPS
USB	● USB 2.0, on the go in the left temple magnetic connection

6. Power

Battery	• (2) Internal • non-removable (650 mAh) Li-ion rechargeable batteries
In Glasses Charging	• Through USB Magnetic
Run Time (stand alone)	• Display Off / suspended: TBD • In Launcher, idle: TBD • Navigating: 2.8 Hours • Movies: 5.3 Hours • Video Capture: 2.8 Hours • Internet: 4.2 Hours • Music: 22.6 Hours
Run Time (with extended battery pack)	• Allows for 12 hours of extended run time - per ONR • Navigating: XX Hours • Movies: XX Hours • Video Capture: XX Hours • Internet: XX Hours • Music: XX Hours
Charging Time	• Max charge time 2 hours
Charging Modes & Time	• External battery pack: 3 hours • AC: 3 hours • Temple Connector: XX hours
AC Power	• via 5V wall plug accessory via mag temple connector

7. Camera

Type	• Still, 5MP, Digital, Auto-focus, Color
Video	• 720P @ 60 fps, 1080P @ 27 fps
Focus	• Auto focus, 3" to infinity
Modes:	• 5 MP Still • Video Camera (above) • Auto (bright sun and low light conditions) face detection and capture • Video conferencing (voice and environmental capture)

8. Sensors

IMU	• 3-Axis Gyro • 3-Axis Accelerometer • 3-Axis Compass
Other	• Altimeter • Ambient Light Sensor - for auto and/or manual control of display brightness • Need to fix the offset issue (currently 15 degrees, needs to be 0 degrees)

9. I/O

Connections	• Temple Connector (USB 2.0, Magnetic Connection)
Voice detection & Capture (Microphone)	• User Voice detection/capture • Subject Voice detection/recording at TBD distance • Noise Cancelling for user and subject capture

Auto (Earbuds)	● Dual Earbuds, Stereo, magnetic

10. Storage

Internal Memory	● 1 GB SDRAM Memory ● 16 GB eMMC NAND Flash

11. Software

Operating System	● Android 4.0 Ice Cream Sandwich
Custom Applications	● Launcher (Homescreen) ● Video Player ● Slideshow Player ● File Browser ● Camera ● Gallery ● ODG Maps/Navigation ● AR Demo ● Stream Cam
Custom System UI	● ODG Keyboard ● Linear Keyboard ● Control Panel ● Password Screenlock ● Battery Percentage in Status Bar ● ODG HUD UI framework

Setting Modifications	● Display/single on or off
	● Bluetooth Settings
	● Wi-Fi Settings
	● GPS Settings
	● Lock Screen Type
	● Password
	● Brightness Control & Modes
	  ● Boot - outdoor mode (brightest x %)
	  ● Medium light (%)
	  ● Low light (%)
	● Volume Control
	● About
	● SAM Track Pad/Mouse Mode/ 3D

Framework Modifications	● Glasses IO Library ● Menu long press behavior ● Back Long press behavior ● Trackpad Gesture Detector ● Trackpad routing to input methods ● Android Touch interface conversion
3rd Party Applications	● Browser ● Email ● Music Player ● Video & Audio app ● Navigation ● Maps (both connected and selection downloaded onto the glasses) ● Biometric Voice, face ● Communication Applications: sms, voice via smartphone tether, Skype or similar
Custom Control Input	● Voice Control ● Custom Bluetooth Keyboard ● Bluetooth Ring Mouse (SAM) ● SAM should fit on finger and be capable of being mounted on an M16 ● Crucial Tec
Developer	● Required - Level of support TBD

Support	
SDK	● Quick Start Guide (for casual user) ● User's Guide (for power user, to operate base platform functions) ● Developer's Guide (for simple application developer - extend initial one with URL references for different developer configurations) ● UI/UX Developer's Guide (that outlines look and feel, conventions for Apps to follow, depending on how we end up implementing the Platform Rules for Apps) ● Need to be able to seamlessly port generic Android Applications to X6 ● Converts UI/UX to headworn computer vision platform ● Contains AR and CV API's that are proprietary (forcing developers to use our SDK)
Security	● Suite B Algorithms ported to Ice Cream Sandwich - (Per ONR Whitepaper): ● Data-At-Rest Encryption (Flash Encryption AES) ● Data-In-Transit Encryption (AES/HMAC/SHA/IPSEC) ● User Authentication (username/password) ● Depending on customers requirements: ● Type 3 encrypted and FIPS 140-2 Level 2 accredited - per ONR BAA ● Trusted Boot Integrity (root/chain of trust boot process) ● Unmodifiable (read-only file system) ● Secure method for updating software on the device ● Physical Security enhancements, with Tamper detection ● Connecting to Secret Network: ● All of the above ● GFE Antivirus, firewall, intrusion detection ● All operating system patches applied

12. Environmental & Robustness

Ruggedization Objectives	● Explosive Atmosphere ● High Storage Temperature: 71C (160F) ● Low Storage Temperature: -51C (-60F) ● High Operational Temperature: 55C ● Low Operational Temperature: -20C ● IP54 ● Vibration: Procedure I: Truck and semitrailer combination ● Shock: 40g's ● Humidity: 50% RH for 24 hours, and 10 cycles in 24-hour at 95%t RH ● Drop: Drop on each face, edge, and corner (26 total) at 122cm (48in) ● Salt Fog: ● Solar Radiation ● Fungus ● Ballistic: 0.15 caliber, 5.8 grain, T37 shaped projectile at a velocity of 640ft/sec ● RE102 - Radiation Emission, Electric Field ● RE103 - Radiated Emission, Antenna Spurious and Harmonic Outputs ● RS- 103 Radiated Susceptibility, Electric Field ● AR 385-10 Safety Release (http://www.atec.army.mil/safety.html#sr) ● Electro-Static Discharge ● Surface temperature Note: Consistent with appropriate MIL STD 810, 461, 1472, 270

13. Reliability

Metrics - TBD	● MTTF & MTBF: Type I - III (per KH definitions) ● Mechanical element requirements ● Electrical & Software requirement ● Product life

	● Life Cycle Actuations

14. Certifications

	● SARS ● HSE ● Mil Specs (810G, 461F,1472G, 217) ● EMC (FCC, Class B) ● Safety (CE, UL)

15. System Performance - TBD

Performance	● Image Quality ● Audio Performance ● Charging - see power section ● Power - see power section ● Time to first use ● Radio Performance ● Sensor Performance (IMU) ● Camera Performance ● Network Performance & Compatibility ● Application Metrics ● Heat (Surface Temperature) ● User Comfort - wearability, vistibular disturbance, etc. ● Performance Testing (battery life, boot time, processing benchmarks)

16. Compatibility

Works with	● SAM ● MEN (Wi-Fi) ● Biophone

17. Accessories

	● Glasses Case ● USB Cable with Magnetic Connector ● Glasses SAM & BUC Case

18. Documentation

	● Quick Set-up Guide ● User's Manual (including bundles applications)

19. Support

Warranty	● One year

20. Cost

COGS	● TBD
BOM	● Not to exceed $220 @ 1 million units

21. Future Features

I/O	● Volume control buttons
	● Proximity Sensor