Give Maintainer’s ‘Super Powers’ with Augmented Reality

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BIO – Dan Mittelstadt

Principal Applications Engineer, PTC
20 years FA&D Experience
  PLM / SLM (S1000D)
5 years Augmented Reality / IOT Experience
MS ME / AI

Based in Pacific Northwest
Enjoy travel and hiking
Augmented Reality unlocks the value created by the CONVERGENCE of the PHYSICAL, DIGITAL and HUMAN worlds.
Increasing Pressures in Industrial Markets

Worker Skill Gap
- 31% turnover rate\(^1\)
- 10 million jobs unfilled\(^2\)
- Ongoing skills upgrading

Complex Products & Workspaces
- Service/maintenance challenge, configurations
- Information access & content creation

Increased Customer Demands
- Expectations of immediacy
- Fiercely competitive & shifting marketplace

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\(^1\) Source: Aberdeen, Tom Paquin, Best-in-Class Augmented Reality Studies. September 2018.

Lengthy training pipelines and increasingly complex machines, coupled with a young, rapid turnover workforce requires a new approach to learning, maintenance activities and manufacturing operations.
• Augmented Reality experiences rapidly train your workforce on complex tasks, improve productivity, oversight and operations management, and maintenance accuracy.

• Augmented Reality allows the maintainer to experience the digital information and digital representation of the aircraft or equipment in the context of a physical product using digital twins, 3D overlays, augmented work instructions with IoT data in a safe environment with full scale or miniature representations in any location or environment.
Mixed/Augmented Reality (AR/MR) – Advancing the State of the Art for Instruction

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USE OF AR IN AIRCRAFT MAINTENANCE TRAINING

June 2018
Vuforia AR Empowers Front-Line Workers

Augmented Remote Assistance

Vuforia Chalk App
- Easy access to remote experts
- Leverage existing devices
- Annotate on shared live view of environment

Augmented Expert Guidance

Vuforia Expert Capture
- Fast and easy creation of AR-enabled training and hands-on guidance
- No pre-existing assets required to create step-by-step instructions
- Efficient documentation of standards operating procedures

Augmented 3D Work Instructions

Vuforia Studio
- Efficient creation of scalable AR work instructions leveraging existing CAD
- Easily incorporate animated sequences
- Leverage IoT data to provide deeper situational understanding

Augmented Training and Demonstration

Vuforia Studio
- Utilize 3D CAD models to provide interactive digital twins of physical assets
- Real-time, on-the-job training and upskilling for new or unfamiliar tasks
- Train in or out of context of physical product or equipment
Vuforia Product Portfolio

The fastest and easiest way to capture and share expert knowledge

vuforia® expert capture™

The most accessible real-time, remote expert guidance app

vuforia® chalk™

The most efficient way to author and publish scalable AR for the enterprise

vuforia® studio™

The most widely-used computer vision s/w for custom AR apps

vuforia® engine
**Real-time, Remote Assistance & Collaboration**

- **Accelerate** problem resolution
- **Reduce** cost of expert truck rolls
- **Improve** uptime and customer satisfaction

Facilitate Instant Collaboration  
Precisely Annotate Directions  
Improve Access to Experts  
Leverage Existing Devices
Immediatly Access Remote Experts

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SESSION SUMMARY
Fast and easy knowledge capture and sharing

- **Increase** workforce productivity
- **Reduce** cost of errors and downtime
- **Improve** safety and compliance adherence

Accelerate Content Creation  
Simplify Knowledge Capture  
Highlight Spatial Relevance  
Effortlessly Scale Expertise
Creating AR content is As Easy as 1 – 2 – 3!

- Easily record step-by-step instructions on how to perform critical tasks
- Securely fine-tune, enhance, publish and manage content
- Dynamically deliver optimized content across the enterprise

1) Capture expertise
2) Enhance expertise
3) Scale expertise
Easily Capture and Share Critical Expertise
Efficient, scalable AR authoring and publishing

- **Boost** workforce safety and performance
- **Improve** assembly, quality & inspection
- **Increase** revenue & customer satisfaction

Accelerate Time-to-Value
Deliver Actionable IoT Insights
Streamline Enterprise Scalability
Precisely Display Information
• Built with the industrial technology used for connecting **5 million assets** at over **75,000 sites** around the world

• Benefitting from PTC’s ongoing leadership in areas like CAD and PLM, ThingWorx has an **unmatched understanding** of how “things” are designed, operated and serviced

• Leveraging our experience and understanding of our industrial customers’ needs, we have created a platform of unprecedented **simplicity, power, and flexibility**
Create Compelling AR Content

IMPROVING MAINTENANCE WITH AUGMENTED REALITY

vuforia® studio™
Access and View Across the Enterprise
PLM Connected Augmented Reality (Digital Thread)

AR with IOT Connected Pump Equipment (Digital Twin)

AR with Connected Product Support Artifacts / Authoritative Data
The World’s Most Widely Deployed AR

- **Increase** brand value and differentiation
- **Improve** customer engagement
- **Ensure** excellent user experiences

600K+ registered developers

60K+ commercial apps

Vuforia Engine

- Vuforia; 60.3%
- ARKit; 11%
- ARCore; 8%
- EasyAR; 5%
- Unknown; 11%
- Other <2%; 3%
- Wikitude; 2%

**Key Benefits:**

- Deliver Unique AR Experiences
- Leverage Advanced Technology
- Reach Broader Audience
- Build Branded AR Apps

600,000+ registered developers and 60,000+ commercial apps demonstrate the widespread adoption of Vuforia. The pie chart shows the distribution of AR technologies used, with Vuforia leading at 60.3%.
View Content on your favorite devices

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Mobile

3D Eyewear

2D Eyewear

iOS

Android

Microsoft HoloLens

M300

M300

realwear hmt-1
AR Benefits

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• Improve retention, understanding of tasks
• Reduce errors and improve quality
• Empower technicians with step-by-step work instructions
• Enhance operator efficiency – work faster
• Rapid problem detection/resolution – with remote assistance

Success Stories
• Up to 50% reduction in training time (GlobalFoundries)
• Installation reduction time of up to 60% (AGCO)
• 50% improvement in assembly (BAE)
• 20-30% improvement in training rates (BAE)
• 32% more productive workforce (Industry Report on AR)
• 30% Higher quality output (Industry Report on AR)
• 40% Higher on the Job Training retention (Industry Report on AR)
Thank You!

Contact info
Questions?