Enhancing BIM with Augmented & Virtual Reality

How Contractors and Technology Solutions Providers are Partnering to Bring Advanced Technology

James Benham

Twitter: @JamesMBenham, #JBTechTalk
A Little About Me

COLLEGE STATION, TX
BATON ROUGE, LA
CORDOBA, MEXICO
SALTA, ARGENTINA
ABOUT
A RECENT QUOTE

“I got into construction decades ago because you didn’t have to be a rocket scientist, only to find out that now, you have to be a rocket scientist to be in construction.”
"The only constant is change."

"To improve is to change, so to be perfect is to have changed often."

Winston Churchill

© 2014 JBKnowledge, Inc.
What changed in the last 12 months

Jobsite connectivity continues to improve

Google fiber (up to 1Gbps)
XLTE READY (up to 80Mbps)
5G (up to 1Gbps)

© 2014 JBKnowledge, Inc.
What changed in the last 12 months

Devices and hardware continue to improve

© 2014 JBKnowledge, Inc.
What changed in the last 12 months

Cheap sensor hardware is here

Leap Motion
SoftKinetic
Structure Sensor

© 2014 JBKnowledge, Inc.
What changed in the last 12 months

The internet of things has arrived

© 2014 JBKnowledge, Inc.
What changed in the last 12 months

Google got into construction

Google Genie

Project Tango

© 2014 JBKnowledge, Inc.
We surveyed over 450 industry professionals from all levels of construction: 38.6% estimator, 30.7% owner/principal, 14.3% project manager.

2013 Construction Technology Integration Survey

Over 700 construction professionals answered our survey.

We conducted the 2014 Construction Technology Report survey to investigate the cloud, mobile and wearable technology solutions that builders are using in the office and on the job site.

Over 1,000 construction professionals responded

From companies of all sizes...

© 2014 JBKnowledge, Inc.
BIM Software

**2013**

- Autodesk Revit®: 80.6%
- Autodesk Navisworks®: 58.7%
- Other: 19.4%
- Innovaya: 12.3%
- Tekla Structures: 12.3%
- Autodesk® QTO: 12.3%
- VICO: 8.4%
- Beck Technology DProfiler™: 3.9%

**2014**

- Revit (Autodesk): 42.6%
- We do not use BIM: 37.6%
- Navisworks (Autodesk): 30.1%
- Sketchup (Trimble): 18.9%
- We outsource BIM: 11.1%
- Tekla (Trimble): 6.1%
- Other: 4.4%
- VICO: 4.0%
- QTO (Autodesk): 4.0%
- Innovaya: 4.0%
- Assemble Systems: 3.0%
- Custom In-House Solution: 2.7%
- Beck Technology DProfiler: 2.1%
Are they using augmented or virtual reality solutions?

- Yes: 3.4%
- No: 70.6%
- I don't know: 26%

Are they using wearable devices?

- Yes: 2.5%
- No: 81%
- I don't know: 16.5%
Augmented and Virtual Reality

© 2014 JBKnowledge, Inc.
Augmented and Virtual Reality

What is enabling this?

© 2014 JBKnowledge, Inc.
AEC PROFESSIONALS USE AR AND VR TO SHOW HOW THINGS SHOULD BE BUILT ON SITE
AUGMENTED REALITY FOR BUILDERS

CONTRACTORS, DEVELOPERS AND ARCHITECTS USING AR TO MORE EASILY PITCH NEW PROJECTS
AUGMENTED REALITY FOR BUILDERS

AEC PROFESSIONALS TAKE SCHEDULES TO THE FIELD TO FIND PROBLEMS THEY NEVER WOULD HAVE
What do we use for scanning and targets?

How do we get the data and models in?
Integration of BIM with AR/VR thru Cloud

<table>
<thead>
<tr>
<th>Name</th>
<th>Quantity</th>
<th>Unit</th>
<th>Count (EA)</th>
<th>Area (M2)</th>
<th>Volume (M3)</th>
<th>Perimeter (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceilings</td>
<td>3,685.90</td>
<td>M2</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceilings: Compound Ceiling</td>
<td>2,733.24</td>
<td>M2</td>
<td>60</td>
<td>2,733.24</td>
<td>142.31</td>
<td>1,581.31</td>
</tr>
<tr>
<td>Ceilings: Furred Ceiling</td>
<td>921.99</td>
<td>M2</td>
<td>3</td>
<td>921.99</td>
<td>35.17</td>
<td>533.87</td>
</tr>
<tr>
<td>Ceilings: Plain</td>
<td>30.67</td>
<td>M2</td>
<td>2</td>
<td>30.67</td>
<td>1.75</td>
<td>31.34</td>
</tr>
<tr>
<td>Curtain Panels</td>
<td>2,556.26</td>
<td>M2</td>
<td>1,541</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curtain Panels: Glazed</td>
<td>2,207.00</td>
<td>M2</td>
<td>1,362</td>
<td>2,207.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curtain Panels: Solid</td>
<td>349.25</td>
<td>M2</td>
<td>159</td>
<td>349.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

© 2014 JBKnowledge, Inc.
Augmented and Virtual Reality

Scanning for AR & VR - Photogrammetry & Machine Learning with BIM

MANI GOLPARVAR-FARD, Ph.D., NCSA Faculty Fellow and Assistant Professor
University of Illinois at Urbana-Champaign
Virtual Reality - Oculus and Gear VR

VR - The Pursuit of Presence & Mobility
Drones for AR and VR

© 2014 JBKnowledge, Inc.
Drones for AR and VR
The lines between computer science and construction science will blur. IT departments will transform into revenue generators.
Conclusions and predictions

Micro location systems like iBeacons become common deployments on construction jobsites to support augmented reality, layout and more.
Conclusions and predictions

Inexpensive 3D printers, drones, wearables and other hardware become available - and companies set budgets for experimentation.
Conclusions and predictions

Digital offsite prefabrication and 3D building printing become a reality.
Conclusions and predictions
Conclusions and predictions

The pace of change will increase.
We build collaborative solutions that keep construction projects from getting out of hand.

Literally.

JB KNOWLEDGE™

SMARTBIDNET™ for commercial bid management
smartbidnet.com

SMART COMPLIANCE™ for vendor compliance management
smartcompliance.co

SMART REALITY™ for mobile 3D model visualizations
smartreality.co
Founded in 2013

Augmented Reality Mobile App for Construction
Available on Android & iOS

1292 users