

# XR IM FINANZWESEN



125,058	154,568	95,054	124,500
125,487	56,845	97,511	125,000
124,000	110,000	99,011	154,000
150	150,000	99,216	95,000
	35,000	101,090	154,200
		101,684	110,000
		101,962	89,000
			50,000
			10,700

# ÜBERBLICK

1

Paper vorstellen

- Ziel, Methode, Ergebnis, Kritik

2

Wahl für  
Langvortrag

3

Frage Runde

4

Quellen



Contemporary Journal of Management | ISSN 2766-1431  
Published by AIR JOURNALS | <https://airjournal.org/cjm>  
12011 WestBrae Pkwy, Houston, TX 77031, United States  
[airjournals@gmail.com](mailto:airjournals@gmail.com); [enquiry@airjournal.org](mailto:enquiry@airjournal.org)



RESEARCH ARTI

### Virtual Reality and Augmented Reality: Its Impact in the Field of Accounting

Chukwuani, Victoria Nnenna, PhD.

Department of Accountancy, Enugu State University of Science and Technology

Accepted: March 16th, 2022

Published: March 28th, 2022

#### Citations - APA

Chukwuani (2022) Virtual Reality and Augmented Reality: Its Impact in the Field of Accounting. *Contemporary Journal of Management*, 4(2), 35-42.

Virtual-Reality and Augmented-Reality technologies are forming a new environment in accounting, where actual and virtual elements are combined at various levels. The possibilities of Virtual Reality and Augmented Reality (VR/AR) technologies in supporting the dynamics of global accounting systems and addressing the grand impact on accounting were examined in this study. This research looked into the uses, applications, and benefits of virtual reality and augmented reality in accounting, as well as the potential constraints. This article aims to provide a better understanding of how new technologies affect accounting. It explains the applications, benefits, and limitations of virtual reality and augmented reality in accounting, as well as how it has made accounting easier. The paper finishes with a discussion of theoretical and managerial consequences, as well as a research agenda for the future.

**Keywords:** Virtual Reality, Augmented Reality, Field of Accounting



Copyright: © 2022 Chukwuani. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

# VIRTUAL REALITY AND AUGMENTED REALITY: ITS IMPACT IN THE FIELD OF ACCOUNTING

## ZIEL/HYPOTHESE

- Bewerten von VR/AR Nutzung in der Handhabung von unerwarteten Ereignissen und allgemeiner Datenverarbeitung
- Hypothese: VR/AR erhöht die Produktivität und verringert Fehler

# METHODE/STUDIE

- Literaturanalyse zu Anwendungsfällen von XR in der Buchhaltung
- Keine eigene Studie

# ERGEBNIS

- Identifizierte Anwendungsbereiche von XR
  - Inventar Management, Integration, Handhabung von Finanzen, Homeoffice, Vorbereiten von Finanzstatements, Finanzprüfungen, Teamwork
- VR/AR bietet Vorteile wie weniger Papierarbeit, bessere Datenvisualisierung und Effizienzsteigerungen (z.B. durch 3D-Dashboards)
- Einschränkungen wie hohe Kosten und Datenschutzbedenken

# KRITIK

- Pros
  - Einfache Sprache
  - Guter Einstieg
- Cons
  - Oberflächliche Analyse
  - Wenige Paper berücksichtigt (7 Paper)
  - Keine Angabe wie Paper ausgewählt

## Visualizing Financial Stock Data within an Augmented Reality Trading Environment

Dariusz Rumiński, Mikołaj Maik and Krzysztof Walczak

Poznań University of Economics and Business, Department of Information Technology, Niepodległości 10, 61-875 Poznań, Poland  
[ruminski, maik, walczak]@kti.ue.poznan.pl

*Abstract. In this paper, we present a novel augmented reality (AR) system for visualization of financial stock data. The system enhances the equity traders' working environment with virtual charts and live business TV streams, overlaid onto the real trading workspace. The presented research investigates how human cognitive capabilities can be extended by the use of artificial computer-generated 3D representation of financial data and interaction with such data representation using hand gestures. We combined the nVisor ST30 headset with InteriaCubed and Leap Motion devices to enable tracking of head orientation and controlling the AR environment with hands. With the use of hand gestures, a user is able to create virtual charts displaying real-time stock data and financial TV streams within his/her surroundings. To evaluate the system, we conducted experimental tests with 22 users. Our objective was to evaluate tasks completion times and users' experience while creating and parametrizing virtual stock charts through the AR interface. The obtained results are promising and demonstrate that most users were able to finish tasks in acceptable time without significant difficulties.*

### 1 Introduction

Professional stock traders are responsible for buying and selling tradable financial assets such as stocks, bonds, futures, options, and swaps – to name a few. They also conduct intensive and extensive research and observation of how financial markets perform, e.g., when new macroeconomic data or other relevant news are published. Traders, in their daily work, use traditional workspaces that may be composed of multiple monitors on which diverse financial information, charts, tables, and indicators are presented simultaneously, as presented in Figure 1a. Moreover, to operate a stock trading system, a standard keyboard and mouse are typically used. Also, a landline is a standard tool of traders to verbally communicate with managers, colleagues, or clients when there is a need to consult and make a buy/sell decision. Moreover, traders often simultaneously track live business TV channels or social media to 'catch' profitable news. In such an environment, a trader has to be focused all the time, while observing continuous

# VISUALIZING FINANCIAL STOCK DATA WITHIN AN AUGMENTED REALITY TRADING ENVIRONMENT

## ZIEL/HYPOTHESE

- Finanzhändler stehen vor kognitiver Überlastung durch die Verarbeitung zahlreicher Datenquellen
- Hypothese: AR helfen kann, kognitive Fähigkeiten zu erweitern und Entscheidungsprozesse durch interaktive 3D-Visualisierungen zu verbessern



(a)



(b)

Figure 1

Fig. (a) Traditional trading workspace with multiple screens; Fig. (b) AR trading workspace controlled with hand gestures.

# METHODE/STUDIE



Figure 5  
Practicing Task #2 – writing on a virtual keyboard

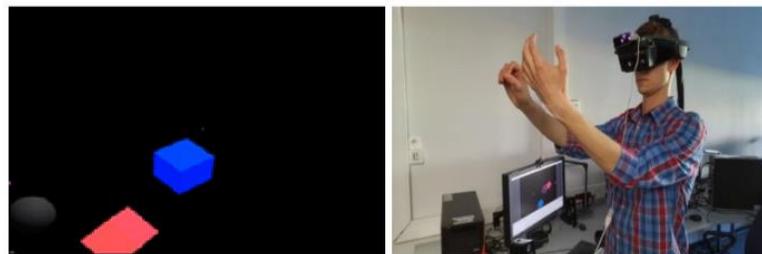


Figure 4  
Practicing Task #1 – changing positions of virtual cubes

- Experimentelle Studie mit 22 Teilnehmern
  - sieben Frauen und 15 Männer
  - 20 bis 25 Jahre alt
  - Keine Vorerfahrung mit handgesteuerten AR-Systemen
- Teilnehmer mussten drei Aufgaben in AR abschließen
  - T1 Greifen und Bewegen von roten/blauen Würfeln
  - T2 Vorgegebenen Text auf virtueller Tastatur schreiben
  - T3 Greifen und Bewegen zweier Graphen
- Ziel: Benutzerfreundlichkeit und Effizienz testen

# ERGEBNIS

- Die meisten Nutzer konnten die Aufgaben in akzeptabler Zeit abschließen
- Die Gestensteuerung wurde als intuitiv empfunden
- Es wurde eine gewisse Lernkurve und technische Einschränkungen identifiziert

# KRITIK

- Kleine Stichprobengröße (22 Teilnehmer)
- Eher technischer Fokus, weniger auf langfristige Nutzerakzeptanz und reale Trading-Umgebungen
- Potenzielle Ablenkung durch die Vielzahl an virtuellen Elementen

## Evaluation of a Financial Portfolio Visualization using Computer Displays and Mixed Reality Devices with Domain Experts

Kay Schroeder  
HDI.Lab, Zuyd University of Applied Sciences  
Heerlen, Netherlands  
kay.schroeder@zuyd.nl

Batoul Ajdadilish  
Zuyd University of Applied Sciences  
Heerlen, Netherlands  
betty.ajdadilish@zuyd.nl

Alexander P. Henkel  
Center for Actionable Research of the Open University (CAROU), Open University  
Heerlen, Netherlands  
alexander.henkel@ou.nl

André Calero Valdez  
HCIC, RWTH Aachen University  
Aachen, Germany  
calero-valdez@comm.rwth-aachen.de

### ABSTRACT

With the advent of mixed reality devices such as the Microsoft HoloLens, developers have been faced with the challenge to utilize the third dimension in information visualization effectively. Research on stereoscopic devices has shown that three-dimensional representation can improve accuracy in specific tasks (e.g., network visualization). Yet, so far the field has remained mute on the underlying mechanism. Our study systematically investigates the differences in user perception between a regular monitor and a mixed reality device. In a real-life within-subject experiment in the field with twenty-eight investment bankers, we assessed subjective and objective task performance with two- and three-dimensional systems, respectively. We tested accuracy with regard to position, size, and color using single and combined tasks. Our results do not show a significant difference in accuracy between mixed-reality and standard 2D monitor visualizations.

### Author Keywords

information visualization; mixed reality displays; HoloLens; user study; UX study.

### INTRODUCTION

Financial services, particularly investment banking, is a high-stakes industry. Highly trained humans need to apprehend and

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from [permissions@acm.org](mailto:permissions@acm.org).  
CHI '20, April 25–30, 2020, Honolulu, HI, USA.  
© 2020 Copyright is held by the owner/author(s). Publication rights licensed to ACM.  
ACM ISBN 978-1-4503-6906-4/20/04...\$15.00.  
<http://dx.doi.org/10.1145/3313831.3376556>



Figure 1. Experiment: Mixed reality and conventional display

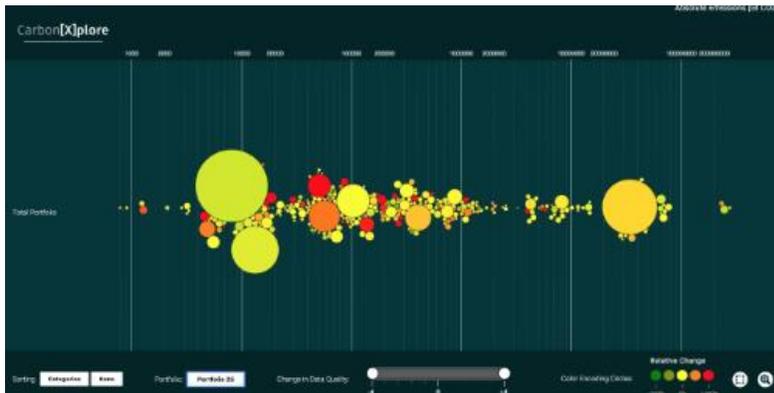
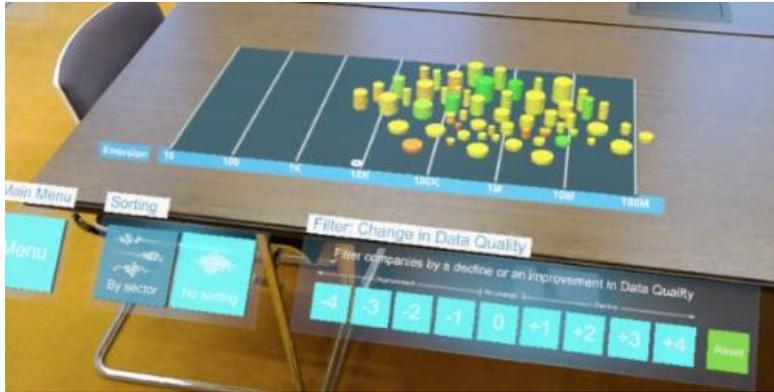
process masses of data in split seconds and make far-reaching investment decisions. To make these individual investment decisions, financial professionals are supported by technology. However, so far, the visualization technology deployed in financial services merely provides a limited benefit to professionals, as the important underlying relationships are high-dimensional and require novel interaction techniques.

The proliferation of mixed reality devices has given rise to questions among researchers and practitioners regarding how these technologies can be utilized to interact with information in a spatial context [21]. Prior research has shown that the three-dimensional visualization of data can outperform two-dimensional representations in terms of accuracy and performance under specific conditions, especially when the information has spatial characteristics. However, there is a long-standing debate within the research community about the

# EVALUATION OF A FINANCIAL PORTFOLIO VISUALIZATION USING COMPUTER DISPLAYS AND MIXED REALITY DEVICES WITH DOMAIN EXPERTS

## ZIEL/HYPOTHESE

- Vergleich von 2D- und 3D-Visualisierungen (via HoloLens) hinsichtlich ihrer Effektivität bei der Analyse von Finanzportfolios
- Hypothese:  
Mixed Reality könnte präzisere Entscheidungen unterstützen



# METHODE/STUDIE

- Experimentelle Studie
- 28 Investmentbanker; je 14 Männer und Frauen
- Insgesamt 14 Aufgaben; je in 2D und 3D
  - Gemessen wurde die Qualität der Entscheidungen

# ERGEBNIS

- Keine signifikanten Unterschiede in der Genauigkeit zwischen 2D- und 3D-Visualisierungen
- Nutzung der Mixed-Reality-Anwendung wurde als leicht angenehmer empfunden

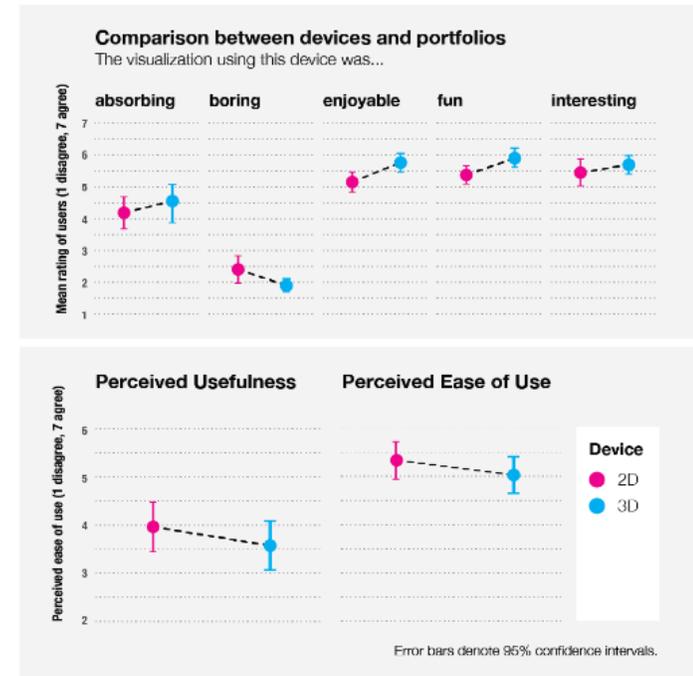


Figure 7. Comparison between devices and portfolios

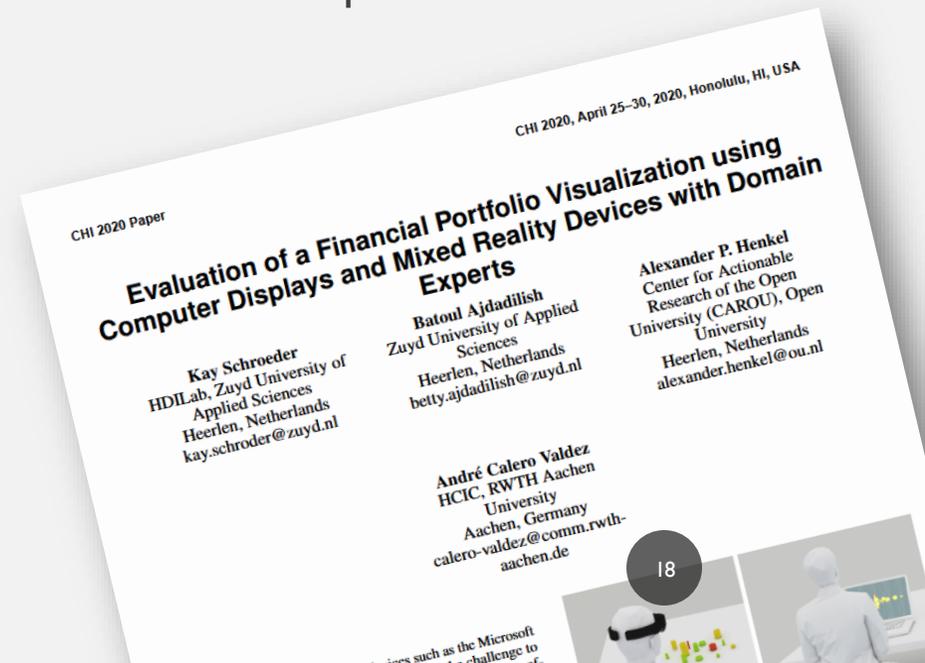
# KRITIK

- Sehr detailliert
  - Jede Komponente ausführlich beschrieben
- Anwendungsnahe Studie
- Misst nur subjektive Unterschiede

# LANGVORTRAG

06.02.2025

Evaluation of a Financial Portfolio Visualization  
using Computer Displays and Mixed Reality  
Devices with Domain Experts



VIELEN DANK





FRAGEN?

## QUELLEN - PAPER

- V. N. Chukwuani. 2022. Virtual Reality and Augmented Reality: Its Impact in the Field of Accounting
- D. Ruminski, M. Maik, K. Walczak. 2019. Visualizing Financial Stock Data within an Augmented Reality Trading Environment
- K. Schroeder, B. Ajdadilish, A. P. Henkel, A. Calero Valdez. 2020. Evaluation of a Financial Portfolio Visualization using Computer Displays and Mixed Reality Devices with Domain Experts

# QUELLEN - BILDER

- Titelbild und Fragen von PowerPoint Designer
- Aus jeweiligem Paper