



Universität der Bundeswehr München
Fakultät für
Informatik

ITIS

der Bundeswehr
Universität  München

Latest Augmented Reality and Virtual Reality prototype development supporting TCCC training

Armin Leopold PhD

Dr. Patrick Ruckdeschel

Prof. Dr. Marko Hofmann

Universität der Bundeswehr München:
Institut für Technische Informatik/
CODE E-Health/ ITIS GmbH

Agenda

- 1. Intro**
- 2. Motivation**
- 3. Mobile AR Bleeding-Wound Prototype**
- 4. *VR FAST 1 Prototype***
- 5. Prototype VR TCCC Serious Game**
- 6. *Major challenges***



Universität der Bundeswehr München

Fakultät für
Informatik

ITIS

der Bundeswehr
Universität  München

Intro

TCCC Guidelines

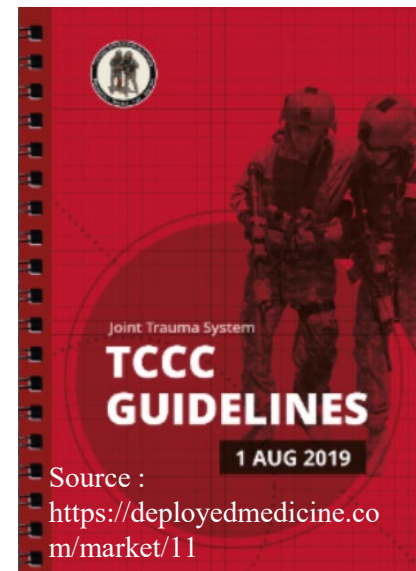


Source : <https://deployedmedicine.com/market/11>

- Result of the Battle of Mogadishu, also known as the Black Hawk Down incident
- TCCC Guidelines: Based on the publication: 1996:

Captain Frank K. Butler (USN SEAL),
Lieutenant Colonel J. Hagmann, EG Butler
„Tactical Combat Casualty Care in Special Operations“

Bundeswehr and NATO today:
Every soldier knows the TCCC



Source :
<https://deployedmedicine.com/market/11>

Some facts

	World War II	Vietnam	OIF/OEF
CFR	19.1%	15.8%	9.4%

Due to TCCC the deathrate was able to be reduced!

Characteristics of combat first responder situations

- Often „bad places“
- Often ballistic wounds
- Limited resources
- Limited rescue transport
- Long-lasting transport
- Possible conflict: mission goals and combat casualty care
- Fire superiority is the best medical on the battlefield



Universität der Bundeswehr München

Fakultät für
Informatik

ITIS

der Bundeswehr
Universität  München

Motivation

Key motivation to develop these prototype

- Combat First Responder need efficient training / learning tools
- Modern VR / AR / MR hardware and prototype are attractive, but ...
- Acceptance, usability and benefits of these tools need to be tested
- Therefore we developed three prototypes

Mobile AR bleeding-wound prototype

Mobile AR bleeding-wound prototype

ITIS





Universität der Bundeswehr München

Fakultät für
Informatik

ITIS

der Bundeswehr
Universität  **München**

VR FAST 1 Prototype

Fast 1

- is a sternal intraosseous device
- highly effective alternative
- exact placement every time
- easy to use
- Simple to learn



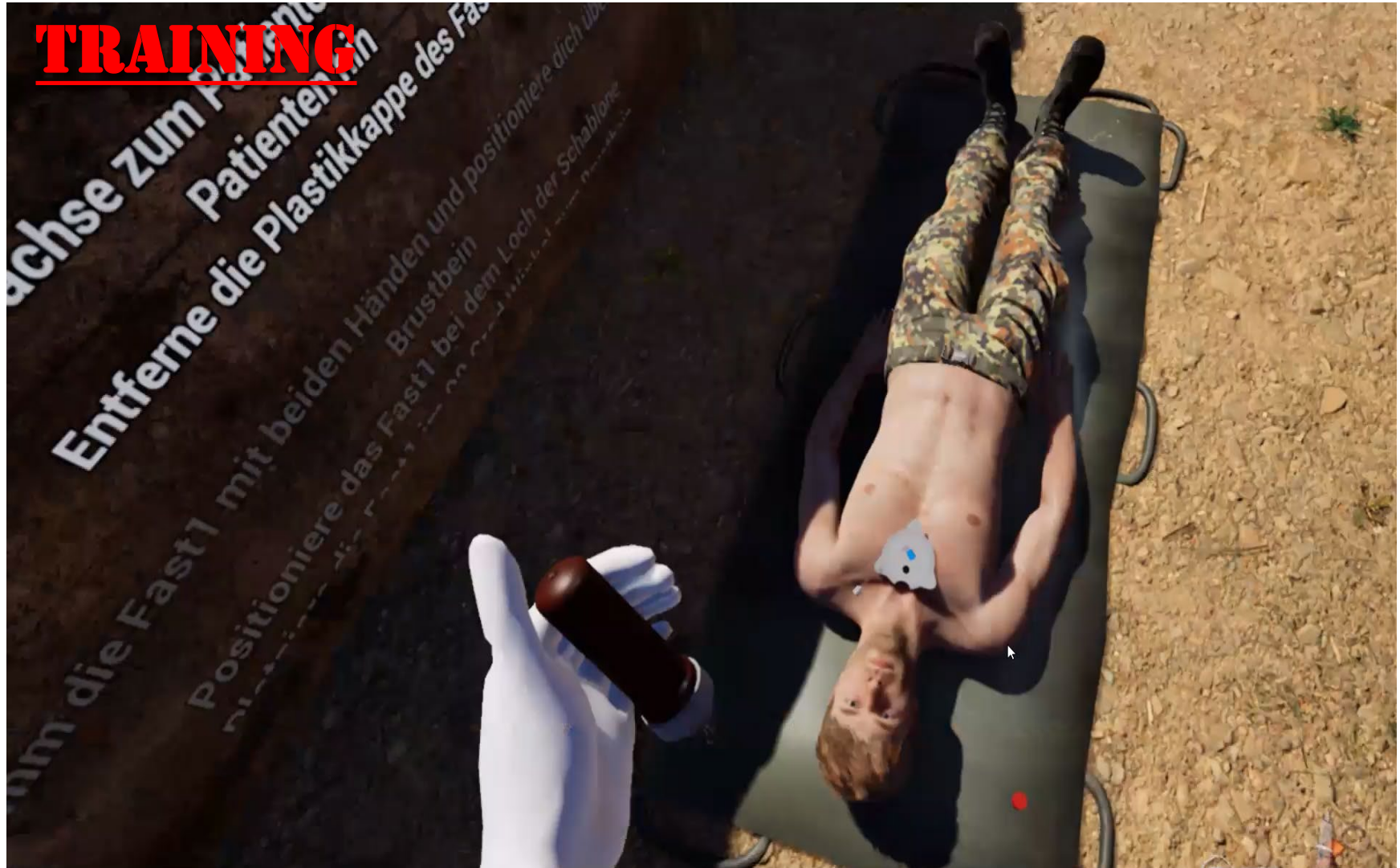
Source: <https://www.pyng.com/fast1/>

VR Fast1 Prototype

TUTORIAL



VR Fast1 Prototype





Universität der Bundeswehr München

Fakultät für
Informatik

ITIS

der Bundeswehr
Universität  München

Prototype VR TCCC Serious Game

Prototype VR TCCC Serious Game

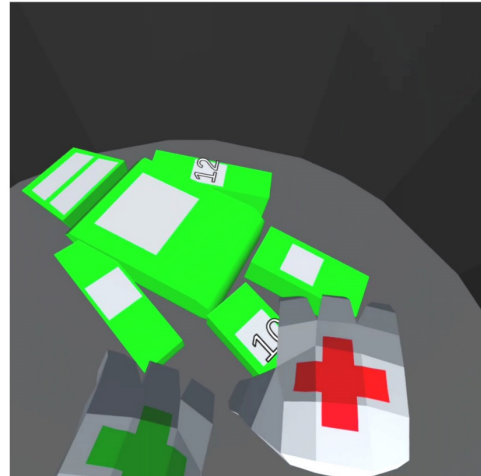
Train correct behaviour in Care Under Fire situations in an immersive VR environment.

Used with
Oculus Quest

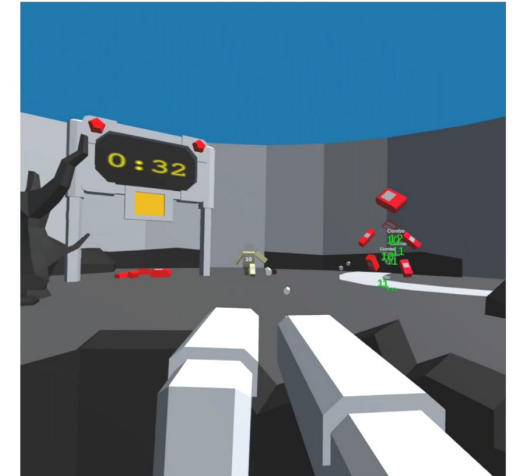


Source:

<https://www.amazon.de/Oculus-Quest-All-in-One-VR-Gaming-System/dp/B07HNW68ZC>



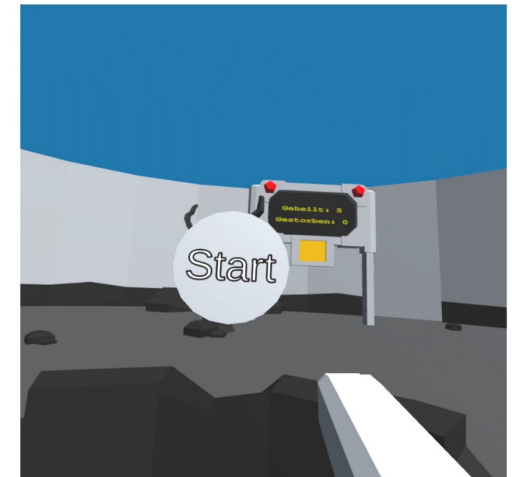
Treat wounded casualties...



OR ...defend against attackers.



Adapt your behaviour to the dynamic situations to receive bonus points.



Learn from the feedback screen at the end of each game₁₆



Universität der Bundeswehr München

Fakultät für
Informatik

ITIS

der Bundeswehr
Universität  München

Major challenges

Lessons Learned

- 🎧 Knowledge gathered
- 🎧 Meaningful scenarios identified
- 🎧 Early integration of the end user is relevant
- 🎧 Hardware supply difficulties
- 🎧 Know the limitations of the technology
- 🎧 Evaluation (also) means bureaucracy



Universität der Bundeswehr München

Fakultät für
Informatik

ITIS

der Bundeswehr
Universität  München

Questions ?

Thanks for your attention!

More info: <https://www.unibw.de/santrain>

