

AR application design for Healthcare Teams

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Introduction

The emergency department (ED) is an intense environment that requires healthcare workers (HCWs) to manage multiple simultaneous tasks with high precision [1], these tasks often involve multiple HCWs collaborating.

1. Co-create AR application interfaces for resuscitation teams
2. Design catalog showcasing AR applications and use-cases.
3. Guidelines of best practices for designing AR for HCWs in EDs

Significant work has been done on AR for surgical procedures but this work is not generalizable to acute care settings that are more fast paced with sicker patients.



Our goal is to understand AR's role in enhancing decision-making and workflows in emergency medical care. Our primary interest is interface design and hands free interaction from HCWs



Procedural



Dosage



Timers

Methods



We conducted **semi-structured interviews** with HCWs. First, the interviewer explained the study's purpose and what augmented reality can accomplish.



Conducted co-design studies of AR applications in Unity with 8 HCW participants. The, **low-fidelity prototypes** provided conversational context for understanding the interaction design.

Initial Results

Below are selected quotes from the interviews:

Visualized next steps



Procedural

- The system needs to recognize the problem and pull up the algorithm.
- An algorithm showing procedural steps based on time or user actions would be helpful.

Automatic dosage calculation



Dosage

- Auto-populate medication dose and concentration by verbalizing medication name.
- Calculate doses; age and weight (for pediatrics).

Interactive time management



Timers

- Timers for tracking ie. CPR, EPI, Shock
- The timer's color should change after a set time to indicate action is needed.

Patient records/ Remote Support



Other

- Connect with EMR for patient information, history, and medication list.
- Call doctors or surgeons from the headset for real-time communication.

Design Specifications: Microinteractions

We conceptualized the design process in terms of microinteractions, defined as small, single-focus tasks [2]. Due to the complex, time-sensitive nature of ER's, HCWs need information quickly, without cluttering their field of view. Thus, we focused on the four microinteractions digital elements.



Triggers



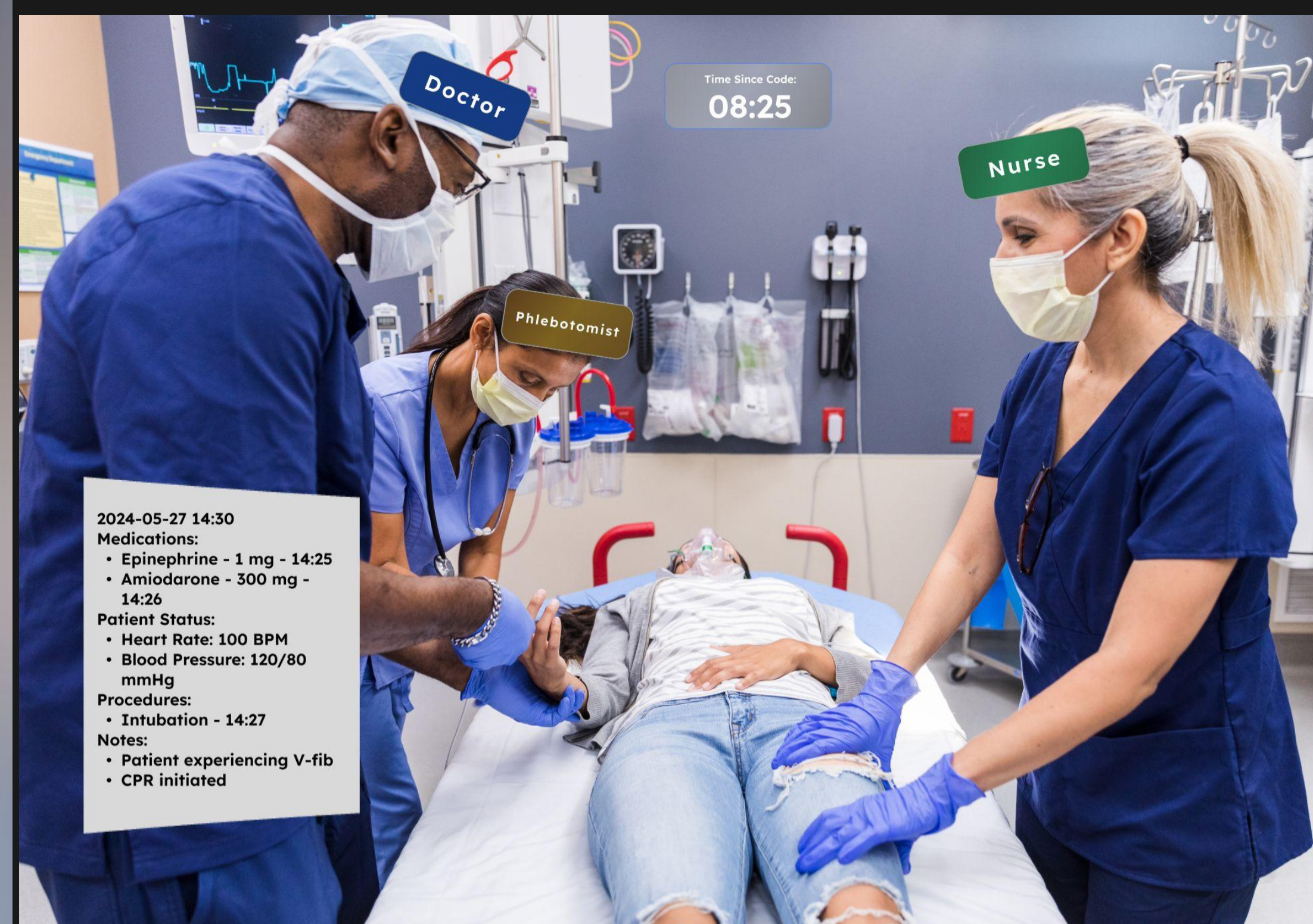
Rules



Feedback



Loops / Modes



Discussion

- We set out to understand how AR can assist HCWs in the ER with **decision-making and procedural guidance**. We have received feedback from participants illustrating the importance of practical design guidelines.
- These guidelines should ensure that applications are **functional and intuitive**, minimizing cognitive load and maximizing user engagement—essential in high-pressure environments such as acute care setting like the ED [3].
- Medical situations like resuscitations are complex. AR can help, but it risks missing crucial information or causing distractions. Our study found that **quick access to key information and proper feedback** is essential, with design guidelines varying by situation and HCW specialization.

Future Work

- After completing the interviews and using thematic analysis, the next phase is to build the applications. We plan to **test the prototypes** in medical simulations like the Base Camp event at Weill Cornell Medicine.
- While currently focused on in-hospital care, we are excited to extend our work to pre-hospital care. We envision using **AR and assistive technology** for **emergency medical services**, benefiting both field and ambulance settings.

References

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