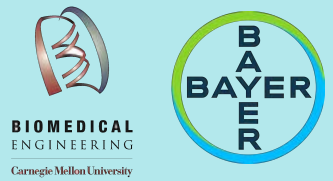


Computed Tomography Injection Monitoring System

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Problem Statement

- 8 million Americans suffer from extravasations every year. [1]
- Our proposed solution is an easy-to-use and non-contact detection method, which aims to monitor injections with the objective of detecting extravasations.

Introduction

Computed Tomography (CT)

- CT scans provide images of body structures
- Often CT contrast dye is administered intravenously (IV)

Extravasations

- Veins can become damaged during IV injection causing CT contrast to leak into surrounding tissue
- Can lead to irritation, inflammation, and tissue damage if left untreated



Figure 1: Examples of a severe case of extravasation [3]

Eulerian Video Magnification (EVM)

- Motion magnification software [2] which amplifies movement
- Created by MIT CSAIL Lab

Methods

- Take video of injector injecting fluid into artificial arm and tube in phantom
- Process videos with EVM software
- Visually inspect and determine if movement due to pressure can be seen

Solution

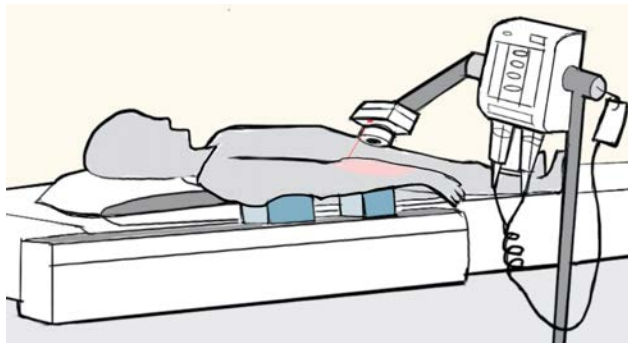


Figure 2: Picture (top) and Model (bottom) of full system to show how macro camera, flashlight, and limb rests work together

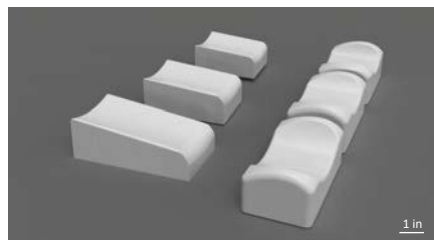


Figure 3: Picture of forearm rest (left) and upper arm rest (right)

Data

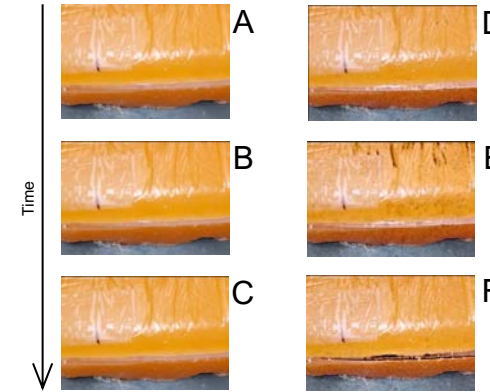


Figure 5: Before (left) and after (right) processing videos using EVM

Analysis

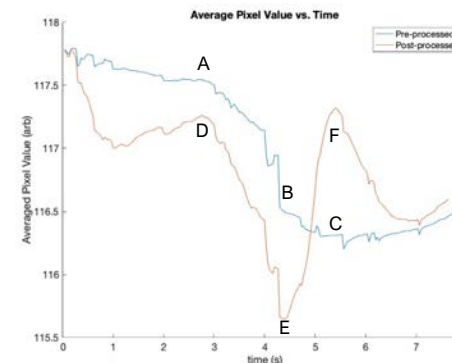


Figure 6: Plot of average pixel value in video subsection vs. time

Manufacturing Cost

Table 1: Estimated Manufacturing Cost

Item	Quantity	Cost/Unit (\$)
HD Webcam	1	\$56.99
Tripod	1	\$15.99
Tripod Mount	1	\$2.95
Acrylic Sheet	2	\$28.16

Reimbursement & Patents

Reimbursements

- If considered part of CT scan procedure, it can be covered via Medicare
- CPT code: 70491 Computed Tomography, soft tissue neck; with contrast materials

Patents

- No patent similar to our product exists

Conclusion

Given our data analysis with the motion magnification algorithm we have determined that there is validity in this approach for injection monitoring.

This serves as a proof of concept of a CT injection monitoring system that can be further developed.

Acknowledgements

We would like to thank our Bayer collaborators Ned, Brandon and Chuck for their continued guidance and support, and our sponsor Bayer for providing financial support. We would like to thank Dr. Kainerstorfer, Dr. Bossard and Dr. Flanagan for sharing their expertise with us.

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