

# Early Detection of Extravasation



## Significance

- Over 40 million radiology procedures performed annually
  - Computed Tomography (Figure 1)
  - MR



Figure 1: CT Scan<sup>1</sup>

- Over 32 million medical procedures incorporate powered injection systems
- The Bayer Stellant Injection system
  - Used in CT market
  - Completes an imaging sequence in under 15 minutes
  - Market leader in sales and

## Current Solution

- Bayer XDS: Ultrasound detection of fluid buildup
- Bayer is seeking a lower cost and equally effective solution

## What is Extravasation?

- Extravasation is the accidental injection of drugs into tissue during intravenous delivery
- Extravasation causes severe pain and potentially permanent disfiguration (Figure 2)



Figure 2: Injuries caused by extravasation<sup>1</sup>

- The consequences of extravasation:
  - Delay in imaging
  - Patient discomfort
  - Disfiguration
  - Liability: \$14,118 for moderate extravasation, \$94,056 for extreme cases<sup>1</sup>
  - Cost of reconstructive surgery
- Who is at the highest risk?
  - Elderly People
  - Children
  - Unconscious patients

## Research Interests

- Understanding the physics and biology behind this phenomenon
- Determining root causes of extravasation
- Designing and developing ideas to detect and prevent extravasation
- Integrate solution with clinical workflow
- Create a realistic engineering solution (Figure 3)



Figure 3: Injector<sup>1</sup>

## References

<sup>1</sup> Salunkhe, Bipin, and Ned Uber. "Bayer Radiology Design Opportunities." BME Design Lecture. Hammerschlag Hall, Pittsburgh. 9 Sept. 2014. Lecture.