

# Joshua J. Engelsma

## RESEARCH INTERESTS

Pattern recognition, image processing, and computer vision with applications in biometrics.

## EDUCATION

- Since 2016 **Michigan State University**, *East Lansing*, MI.  
Ph.D., [Computer Science and Engineering](#)
  - Advisor: [Anil K. Jain](#)
  - GPA: 4.00/4.00
- 2012–2016 **Grand Valley State University**, *Allendale*, Michigan.  
B.S. **Major**: Computer Science **Minor**: Mathematics
  - GPA: 3.94/4.00

## AWARDS AND SCHOLARSHIPS

- 03/2017 **Michigan State University**, *East Lansing*, Michigan.  
Honorable Mention, Computer Science and Engineering Poster Award
- 08/2016 **Michigan State University**, *East Lansing*, Michigan.  
Engineering Distinguished Fellowship, Computer Science and Engineering
- 05/2016 **Grand Valley State University**, *Allendale*, Michigan.  
Magna Cum Laude
- 04/2016 **Grand Valley State University**, *Allendale*, Michigan.  
Outstanding Computer Science Senior (Top 3 Senior)
- 04/2015 **Grand Valley State University**, *Allendale*, Michigan.  
Computer Science Academic Scholarship
- 08/2012 **Grand Valley State University**, *Allendale*, Michigan.  
Computer Science, Faculty, and Award of Excellence Academic Scholarships

## EXPERIENCE

- 08/2016–  
present **Research Assistant**, *Department of Computer Science and Engineering*, Michigan State University, Pattern Recognition and Image Processing Lab.
  - Advisor: Anil K. Jain
  - Conducting research in the area of fingerprint recognition.
- 06/2015–  
07/2016 **Undergraduate Researcher**, *Computer Science*, Grand Valley State University.
  - Advisor: Andrew Kalafut
  - Conducted research in the area of network security (typosquatting).
- 05/2014–  
05/2016 **Software Engineering Intern**, *Dematic*, Grand Rapids, Michigan.
  - Integration testing of conveyor's sorting logic.
  - UI testing using Selenium Web Driver
  - Software Build, Deploy, and Install Automation: Jenkins Build Environment, CMD, Python, C#, .NET, Maven
- 01/2014–  
05/2014 **Software Engineering Intern**, *CQL*, Grand Rapids, Michigan.
  - Web development using Microsoft Technology stack, .NET, MVC, HTML, CSS, Javascript, jQuery, SQL. Also worked with PHP (Wordpress) and MySQL

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## RESEARCH

Ph.D.

2017 **RaspiReader: Open Source Fingerprint Reader.**

In this study, I constructed a custom fingerprint reader using cost-effective, easy to access components. I open sourced the entire design of the fingerprint reader, including the STL files needed to 3D print an outer casing, and the code to capture fingerprint images. RaspiReader is unique in that it captures high-resolution fingerprint images from multiple cameras (one direct view image and one FTIR image). Using both of these images allows RaspiReader to perform better spoof detection than existing commercial readers which only output a single grayscale image. Furthermore, we have demonstrated that images output by RaspiReader are interoperable with existing commercial fingerprint readers.

2016 **Universal 3D Fingerprint Targets.**

In this study, I designed a manufacturing process for creating wearable, 3D fingerprint targets mapped with a 2D fingerprint image. These fingerprint targets are mechanically, electrically, and optically similar to the human finger tip (unlike previous 3D fingerprint targets existing in the literature), enabling them to be imaged by the major types of fingerprint readers on the market (contact-optical, contactless-optical, capacitive). As such, these more realistic fingerprint targets enable operational evaluation of commercially available fingerprint readers and are also useful for conducting objective fingerprint reader interoperability studies. Finally, these targets have been used to evaluate and break current spoof detection systems.

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## PUBLICATION

1. **Joshua J. Engelsma**, Kai Cao, Anil K. Jain, "RaspiReader: Open Source Fingerprint Reader", arXiv:1712.09392 [cs.CV], 2017
2. **Joshua J. Engelsma**, Sunpreet Arora, Anil K. Jain, Nicholas G. Paulter. "Universal 3D Wearable Fingerprint Targets: Advancing Fingerprint Reader Evaluations." **IEEE Transactions on Information Forensics and Security** (2018).

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## TRANSCRIPT

08–12/2016 **Computer Vision || Theory of Probability & Statistics I.**

○ GPA: 4.0

01–05/2017 **Pattern Recognition & Analysis || Theory of Probability & Statistics II.**

○ GPA: 4.0

08–12/2017 **Design & Theory of Algorithms || Advanced Computer Graphics.**

○ GPA: 4.0

08–12/2017 **Advanced Machine Learning || Advanced Distributed Systems.**

○ In progress

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## SERVICE

**Open Source Software: 2496 reputation, top 15% overall Stackoverflow.**

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## SKILLS

Highly Competent Python, Java, Rapid Prototyping with 3D printing and Raspberry Pi

Adept in OpenCV, Matlab, Latex, C++, C, C#, OpenGL, Git, SVN