

# Modular LED Matrix

Team GUILLED

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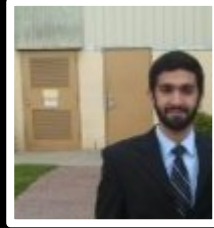
# Team **GUILED**



**Peadar Keegan**



**Adarsh Kumar  
Mani**



**Phillip Azar**



**Antonio Rohit  
de Lima  
Fernandes**

# Recall the Project Goals and Deliverables

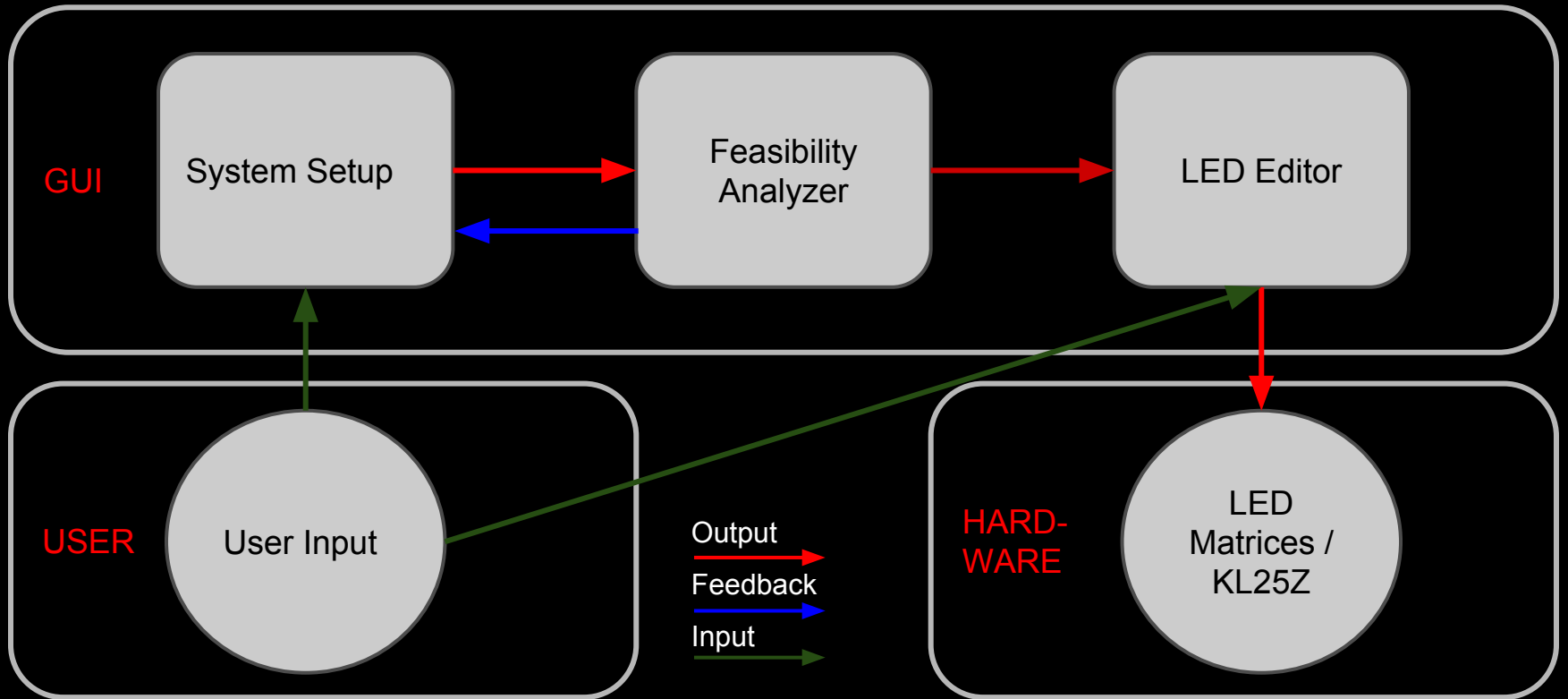
## RGB LED Matrix Display

- 1) Model-based
- 2) Modular and Scalable
- 3) Configurable

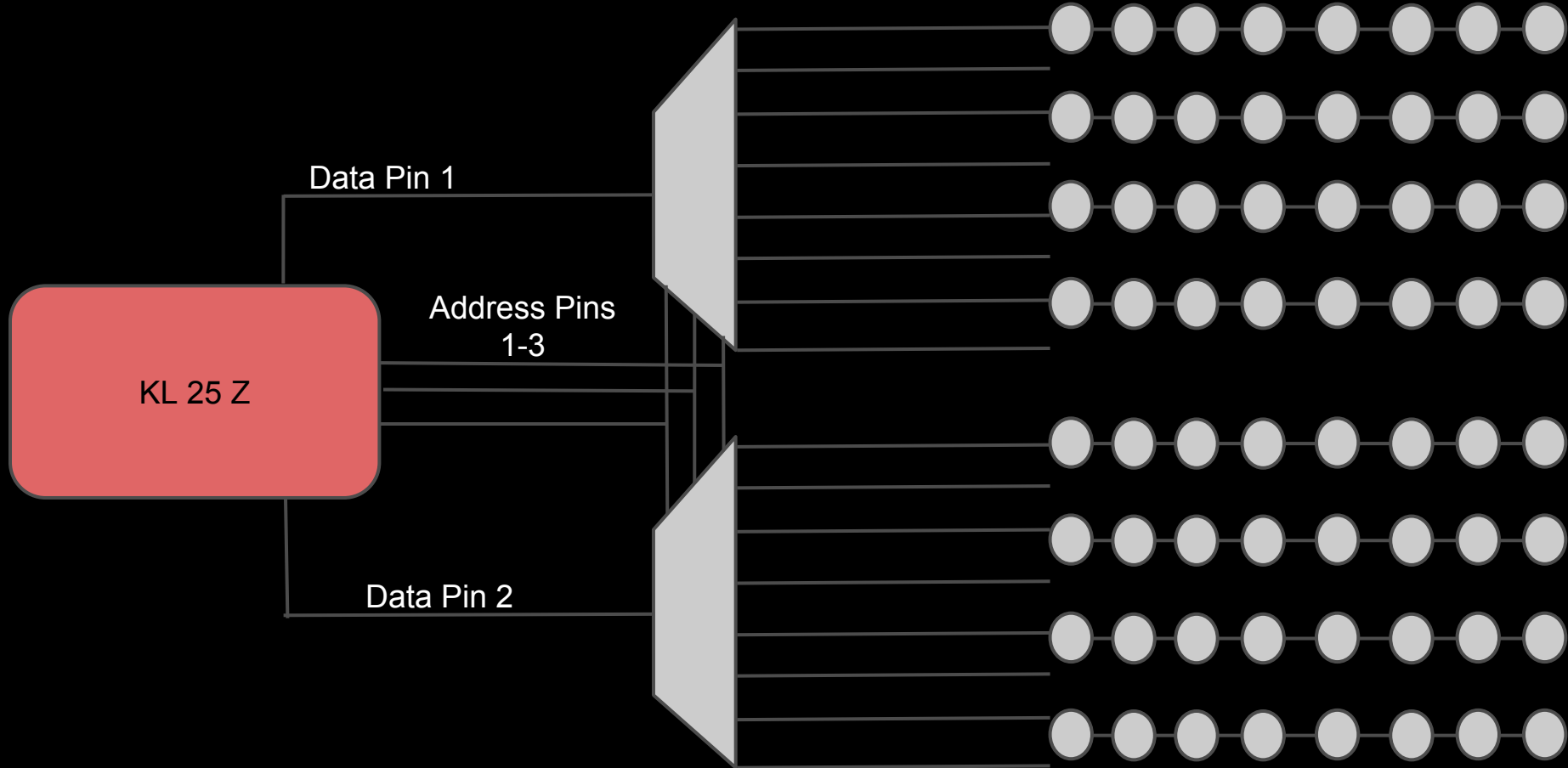
## Deliverables:

1. Matrix Display Demo: 16x16 LED matrices working in tandem.
2. PC GUI: To configure matrices
3. KL25Z Firmware: Base, Multiplexed, SPI
4. Simulator FW/GUI: Graphical WS2812B Protocol Analyzer

# Feasibility/Interactive GUI



# **Drawing Canvas on 16x16 (Multiplexing)**



# Drawing Canvas

Multiplexer challenges:

- Scalability
- Timing
- “Stale” data problem

[<Video>](#)

# **Drawing Canvas on 16x16 (SPI)**



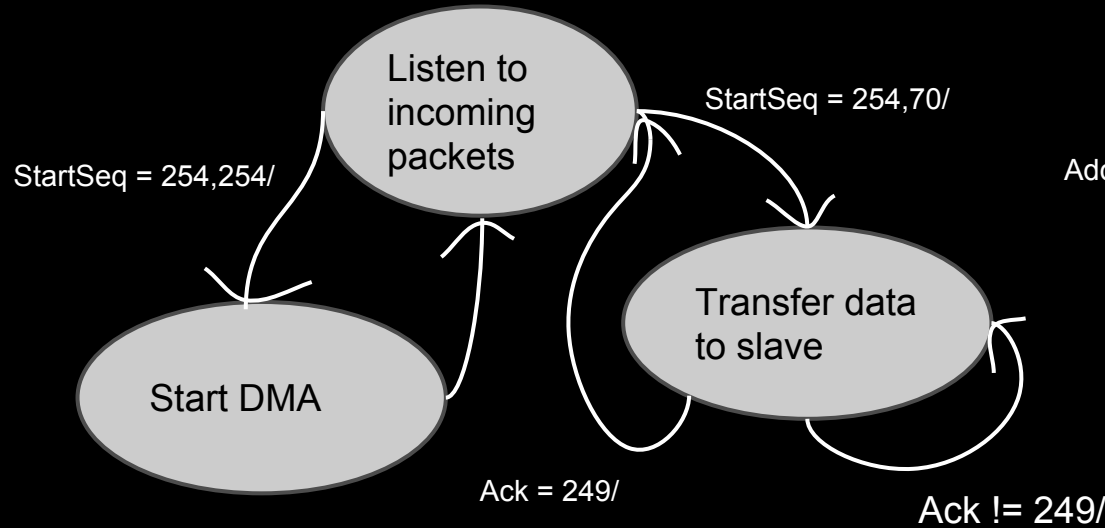
# Communication Challenges

- Timing
- Memory Constraint
- 2 Step Handshake

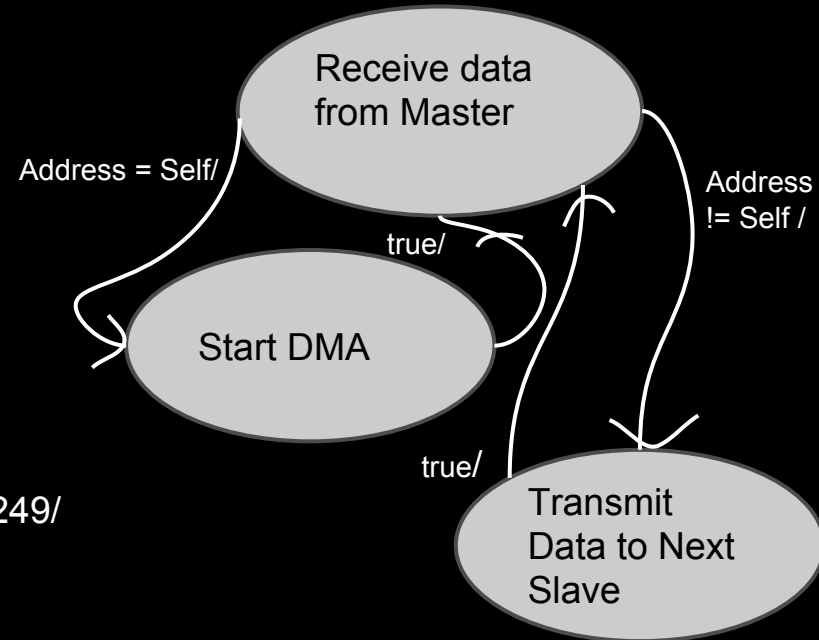
<[Video](#)>

# State Machine/Communication Protocol

## Master



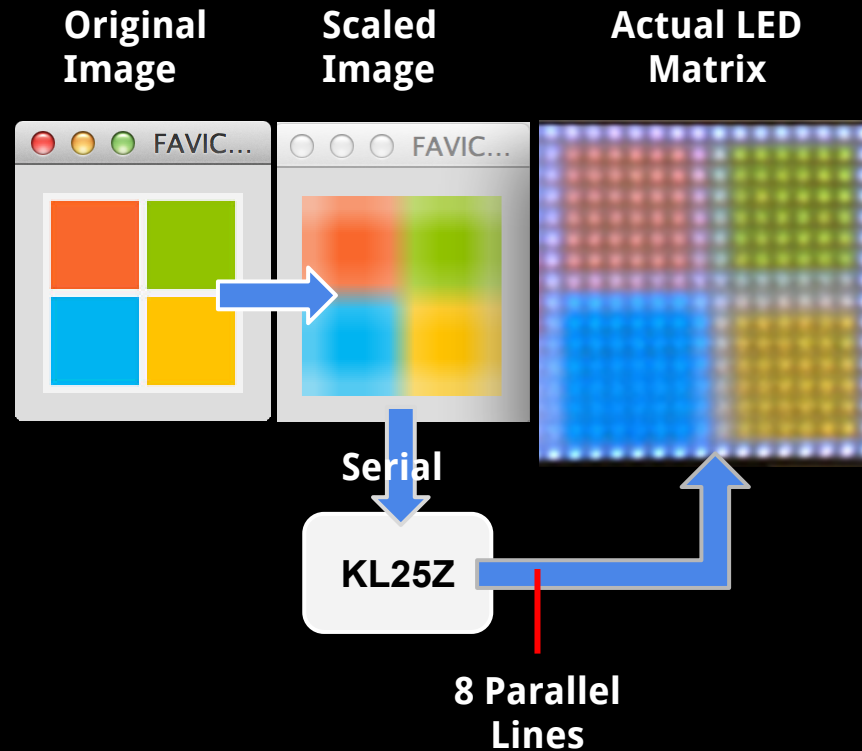
## Slave



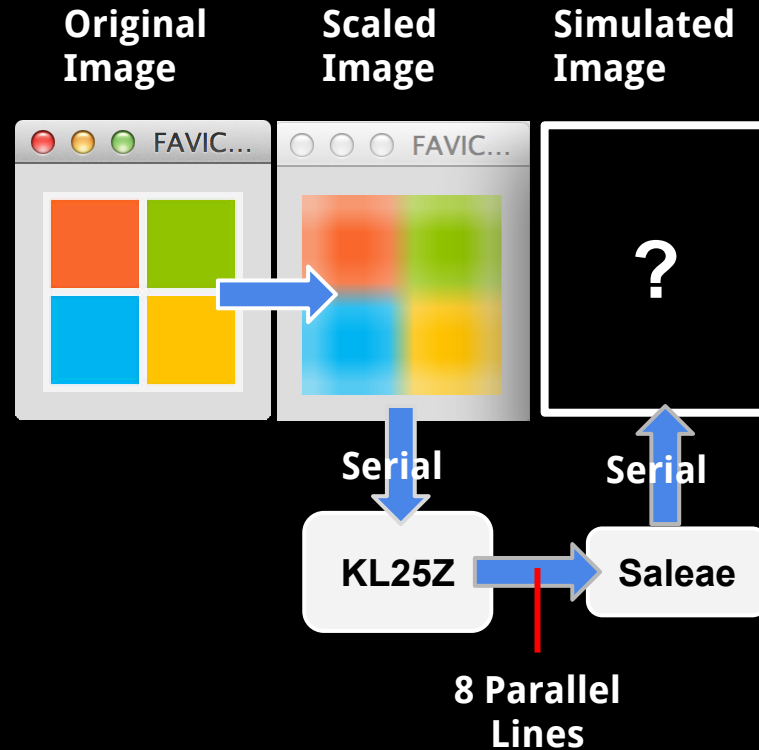
# But How To Test Without Hardware?



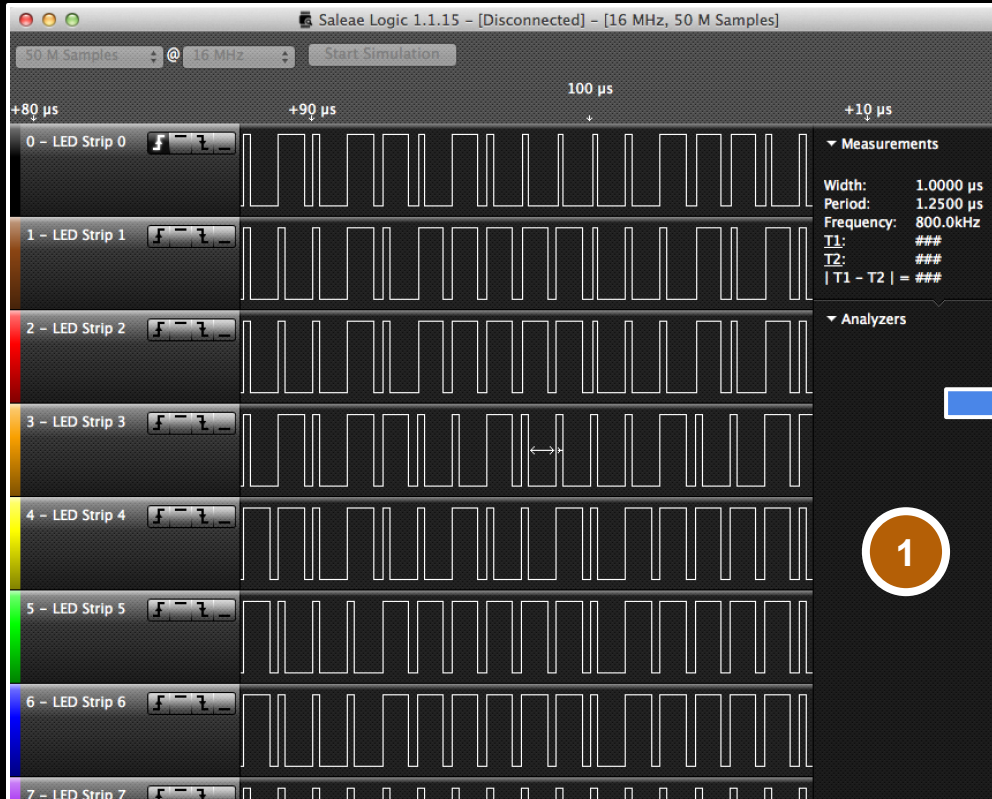
# Basic Process Flow



# Process Flow with Simulator



# WS2812B Protocol Analyzer



Export  
to CSV

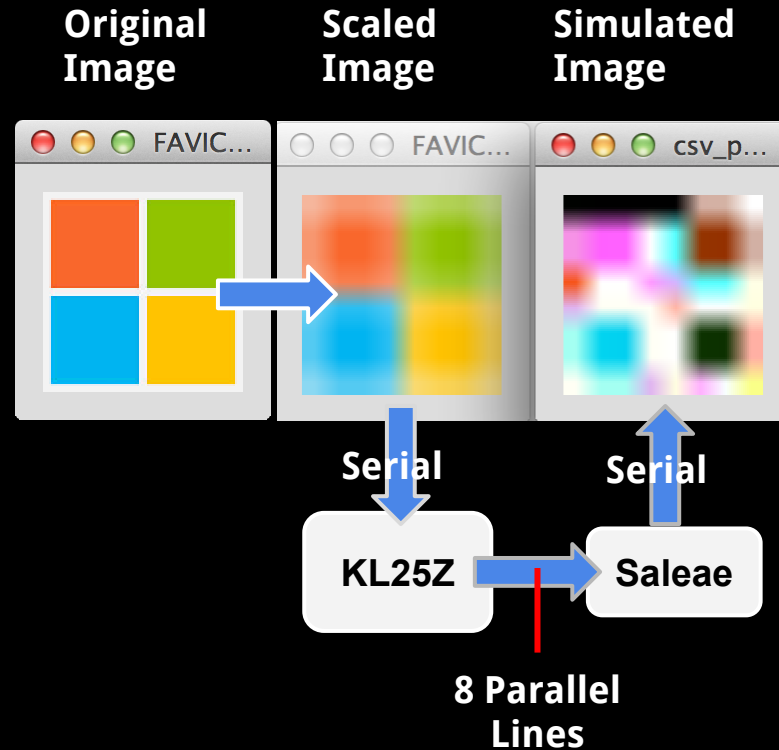
Parse and Visualize  
with Processing

1

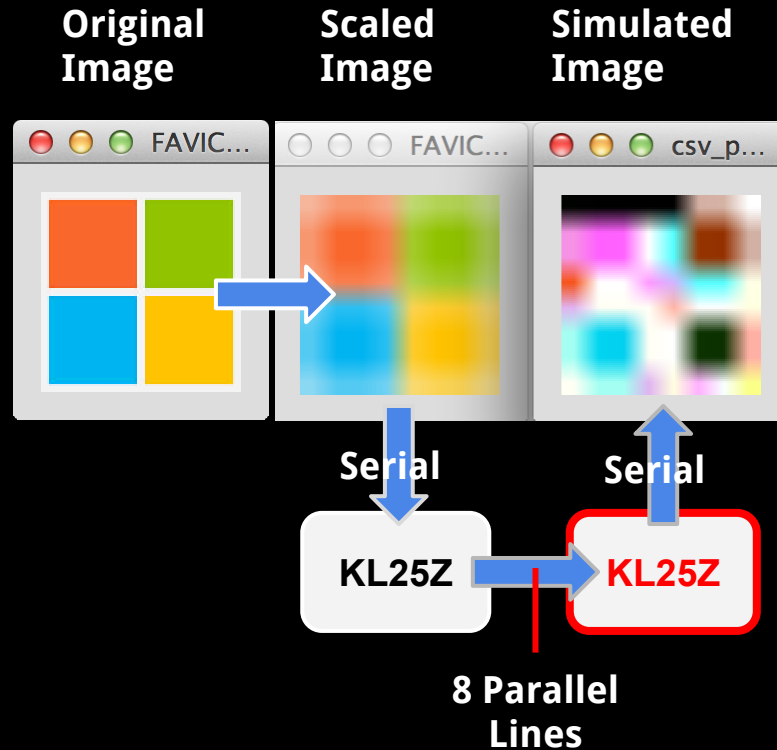
2

3

# Process Flow with Simulator



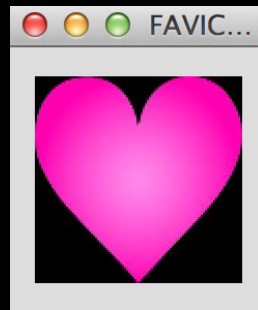
# Didn't Work with KL25Z Sniffer :(



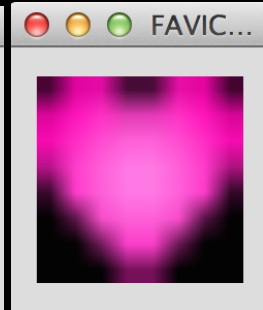


# Another Example

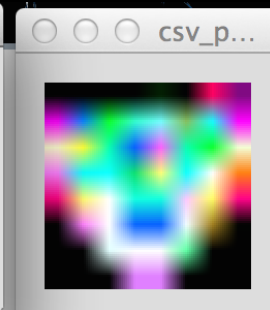
Original  
Image



Scaled  
Image



Simulated  
Image



# Challenges

- Hardware - Making the Matrices
- Model-based design in schedule constraints
- Version Control, uniform protocols
- Synchronizing communications

# Potential Next Steps

- Dynamic Feasibility
- Get the Simulator Working!

# Recall the Project Goals and Deliverables

## RGB LED Matrix Display

- 1) Model based Design
- 2) Modular and Scalable
- 3) Configurable

## Deliverables:

1. Matrix Display Demo: 16x16 LED matrices working in tandem.
2. PC GUI
3. KL25Z Firmware -> <https://github.com/antoniorohit/GUILED>
4. Simulator FW/GUI

# Acknowledgements

## Open Source SW/FW

- WS2811 library for KL25z ([Ned Konz](#)) Apache License
- Processing (<https://processing.org>) Creative Commons
- Logic sniffer ([OLS](#)) GPL v2
- KLMZ Logic Logger FW ([Erich Styger](#)) Completely Open