

EE / CprE / SE 491 – sdmay21-09

## Instruction Level Reverse Engineering through EM Side Channel

### Week 5 Report

3/16/2021 – 3/29/2021

Client: Akhilesh Tyagi

Faculty Advisor: Akhilesh Tyagi

#### Team Members:

Noah Berthusen — *Data Analysis Engineer*

Matthew Campbell — *Test Engineer*

Cristian George — *Meeting Scribe*

Jesse Knight — *Signals Processing Engineer*

Evan McKinney — *Integration Engineer*

Jacob Vaughn — *Report Manager*

#### Weekly Summary

ETG asked for the oscilloscope they had lent us back and gave us a new one. We had to spend some time reworking the matlab code to communicate with this new oscilloscope. This set back will require us to start from square one as far as data collection is concerned. Machine learning has been blocked, as we need new data to try our new classification problem.

#### Past Week Accomplishments

- New data:
  - Updated current microcontroller code to support interrupt based UART transmissions with a length of 2-bytes. This will interface with the script created from last week to allow a greater variety of data combinations.
    - Still needs to be tested with the overall system.
  - ETG has provided a new oscilloscope which requires an updated MATLAB interface. We have updated the file and can now interact and capture data with the oscilloscope.
    - Still needs to be tested with the overall system.
  - Investigated to see if the new data would be compatible with our previous machine learning models. Determined that it would be with minimal changes. Plans are continuing on the more advanced classification problem.

#### Pending Issues

- Data collection: Now that we have updated our system to support greater data collection, and a new oscilloscope we must now capture new data for the machine learning team to retrain our current models.

- We need to also test the holistic data capture system now that all individual components have been updated.
- Data Collection: Issues with the UART are still happening, and the STM board is not receiving the data intermittently
  - Lower baud rate?
  - Add delay, Matlab script might be too fast

### Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Noah Berthusen	Wrote program to dynamically generate new test cases	3	23
Matthew Campbell	Reworked matlab code to work with the new oscilloscope.	3	17
Cristian George	Updated microcontroller code to support 2-byte UART transmission	5	20
Evan McKinney	Worked to Identify changes with output from the new oscilloscope for ML purposes.	3	22
Jacob Vaughn	Updated microcontroller code to support 2-byte UART transmission	3	17
Jesse Knight	Reworked matlab code to work with the new oscilloscope.	4	30

### Plans for Coming Week

- Jesse: Cont. reworking matlab code to work with the New oscilloscope, recreating previously created output for machine learning categorization.
  - Adapting output data to match current ML requirements if possible
  - Collecting all new data from the new oscilloscope
- Cristian, Jake: Updating assembly code/ UART to function with new oscilloscope
  - Finding specifics of what needs to be updated in order to collect data from the new oscilloscope
  - Reading new documentation and making register configuration changes.
- ML Team (Evan, Noah):
  - Applying new data to existing machine learning plans
  - Tweaking hyperparameters to adjust for differences in the new data
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