Minutes ARMZTA Meeting

27 June 2024

Meeting started at 6:02 PM

Participants:

- Dr. Waleed Farag
- Dr. Soundararajan Ezekiel
- Ainsley Weidensall
- Alexander Miller
- Mohamed Abdel Hamid

Talking Points:

- Last week's minutes approved
- CML successfully working for Mohamed, current model has accuracy of around 93% on live network data
- Injection of malicious traffic into network for training purposes was interrupted today by the power outage
- Mohammed experimented with DCNN, however it's likely not a good fit for this application due to the need for fast, accurate prediction
- Discussion on specifics of maintaining CML architecture/ not allowing sharing of data between the various models at different endpoints
- Zeek and Kafka are working as intended

Tasks:

- Mohamed
    - Review CML code with Dr. Ezekiel
    - Work on separation of clients/datasets
    - Continue preprocessing work
- Alex
    - Continue work with Mohammed to finalize preprocessing script
- Ainsley
    - Work with Rebecca to find published work outlining scoring algorithms, including Drew

- Create a basic scoring script
- Look at traffic for normal vs certain attacks, use those features to elevate scoring

Meeting adjourned 6:54 PM

Next Meeting: 5 July 2024, 6:00 PM

Minutes ARMZTA Meeting

Wednesday 19 June 2024

Meeting started at 6:05 PM

Participants:

- Dr. Soundararajan Ezekiel
- Dr. Waleed Farag
- Dr. Xin-Wen Wu
- Rebecca Grandinette
- Alexander Miller
- Mohamed Abdel Hamid

Talking Points:

- Ainsley has been working on GenCyber and Autonomous Risk Mitigation System
- Dr. Ezekiel will meet with Drew and Ainsley regarding Autonomous Risk Mitigation System.
- Alex and Mohamed are working ahead of others, other students need to catch up. Include Rebecca.
- Mohamed implemented XGBoost with validation.
- Mohamed's preprocessing script needs some debugging, will work with Alex to resolve.
- Rebecca will work with Ainsley and Dr. Ezekiel to figure out tasks.
- Alex successfully captured SSH brute force attack.
- Mohamed, Alex, and Dr. Ezekiel will work with live data.

Tasks:

- Mohamed
    - Work with Alex to process live data, implement data to XGBoost
    - Continue working with CML
- Alex
    - Continue work with Zeek/Kafka
    - Work with Mohamed to fix preprocessing scripts and process live data
- Rebecca
    - Work with Ainsley and Dr. Ezekiel on scoring system

Meeting adjourned 6:27 PM

Next Meeting: Thursday 6/27/2024 6:00 PM

Minutes ARMZTA Meeting

Wednesday 12 June 2024

Meeting started at 6:32 PM

Participants:

- Dr. Soundararajan Ezekiel
- Dr. Waleed Farag
- Dr. Xin-Wen Wu
- Ainsley Weidensall
- Alexander Miller
- Mohamed Abdel Hamid

Talking Points:

- Resolving technical issues with lab machines, giving Mohamed access to lab machines via TeamViewer
- Get in contact with Rebecca and Elijah
- Alex has successfully implemented Kafka and Zeek on lab machines and created a preprocessing program to convert the datastream to CSV for XGBoost
- Need to clarify who is working, task assignments, etc
- Discussion on what new students would need to learn for ARMZTA- don't need to learn all the ML algorithms, focus on CML?
- Mohamed's SVM results are significantly better than expected for the model- Due to data simplicity? Script issue?
- XGBoost for now seems to work well regardless of explicit validation step, but we will want to add the validation step to ensure that the accuracy of XGBoost doesn't degrade with the introduction of live data

Tasks:

- Mohamed
    - Look over XGBoost and SVM results
    - Start with Collaborative Machine Learning tasks
- Ainsley
    - Look into autonomous deployment and mitigation (taking over from Drew), including risk scoring system for incoming traffic

    - Assist Alex with preprocessing and debugging
- Alex
    - Continue work with Zeek/Kafka
    - Get live data working with XGBoost

Meeting adjourned 7:32 PM

Next Meeting: 6/19/2024 6:00 PM

Minutes ARMZTA Meeting

Wednesday 5 June 2024

Meeting started at 6:00 PM

Participants:

- Ainsley Weidensall
- Alexander Miller
- Dr. Soundararajan Ezekiel
- Dr. Waleed Farag
- Mohamed Abdel Hamid
- Dr. Xin-Wen Wu

Talking Points:

- XGBoost script performance should be investigated, validation issues suspected which may have caused overfitting and thus disproportionately high accuracy for Maria and Ainsley
- No meeting in last 2 weeks due to student unavailability
- We have a new student, Mohamed, helping us with the ARMZTA project
- Alex's prior commitment has finished, and he is once again acting as technical lead for the project
- Reinstalled Zeek on lab machines

Tasks:

- Ken
    - Meet with other student workers to determine plan for summer work
- Alex
    - Continue work with Zeek/Kafka setup and configuration
- Mohamed
    - Complete onboarding
    - Continue learning Machine Learning content
    - Begin implementation for SVM
- Ainsley
    - Check XGBoost scripts, determine how validation is taking place
    - Continue GenCyber content

Meeting adjourned 6:34 PM

Next Meeting: 6/12/2024, time TBD

Minutes ARMZTA Meeting

Wednesday 15 May 2024

Meeting started 6:05 PM

Participants:

- Dr. Ezekiel
- Ainsley Weidensall
- Kenneth Marsh
- Rebecca Grandinette
- Elijah Petrill

Dr. Wu and Dr. Farag excused

Talking Points:

- Approved minutes for previous meeting
- Nick officially left ARMZTA for summer
- Sam unable to meet with team due to scheduling conflicts
- Alex determined RustDesk not viable for remote usage, deleted from all machines, encourages use of SSH instead

Tasks:

- Ainsley
  - Continue MLA's, continue documentation
- Alex
  - Busy with prior commitments right now
- Ken
  - Continue Kafka research, meet Sam
- Rebecca
  - Meet with Sam
- Elijah
  - Talk with Dr. Waleed, complete onboarding/HR, meet with other team members to catch up

Meeting adjourned 6:39 PM

Next Meeting: 22 May 2024 11:15 AM

Minutes ARMZTA Meeting

Wednesday 1 May 2024

Meeting started 11:15 AM

Participants:

- Dr. Waleed Farag
- Dr. Ezekiel
- Dr. Xin-Wen Wu
- Ainsley Weidensall
- Kenneth Marsh
- Alex Miller
- Nick Reid
- Rebecca Grandinette
- Elijah Petrill

Talking Points:

- ARMZTA = Ainsley, Ken, Alex, Rebecca Nick will be departing for summer
- Preparations for Saturday GenCyber camp, logistical considerations
- Need to officially bring Rebecca onto ARMZTA
- Need to finalize Kafka for live streaming of data
- Nick is available for DCNN questions until end of semester
- Viability of RustDesk for use on Lab machines- security? Efficacy?

Tasks:

- Ainsley
  - Continue MLA's
- Alex
  - Meet with Sam, finish RustDesk configuration on Atlas/Calypso
- Ken
  - Meet with Sam
- Rebecca
  - Meet with Sam

Meeting adjourned 11:55 AM

Next Meeting: 15 May 2024 11:15 AM

Minutes ARMZTA Meeting

Wednesday 24 April 2024

Meeting started 11:15 AM

Participants:

- Dr. Waleed Farag
- Dr. Ezekiel
- Dr. Xin-Wen Wu
- Ainsley Weidensall
- Kenneth Marsh
- Ethan Kisch
- Alex Miller

Talking Points:

- While Sam will continue helping students if asked, he will no longer be formally joining meetings
- Due to a family emergency, Oliver will not be able to join us for the foreseeable future
- Team needs to implement all relevant ML's and get results to report
- Data visualization- tableau, powerbi, qlik, d3.js
- Ken has military obligation, Alex unavailable til june
- Everyone should gain remote access to the machines
- Ainsley- paragraph describing current implementation of ARMZTA, design of models set up for data collection, explanation of architecture. Keep it simple, only 1-2 paragraphs
- Discussion on our research being for an explicit goal, not solely for research's sake

Tasks:

- Ainsley
    - Write paragraph, describe ARMZTA structure/goals to Alex and Rebecca, get results from ML's for report, train new members
- Ken
    - Continue gaining familiarity with DCNN
- Alex
    - Talk to HR about payment portal, training, track hours
- Ethan

- Complete HR paperwork, learn quickly about ARMZTA project, submit application

Meeting adjourned

Next Meeting: 1 May 2024 11:15 AM

Minutes ARMZTA Meeting

Wednesday 17 April 2024

Meeting started 11:15 AM

Participants:

- Ainsley Weidensall
- Dr. Soundararajan Ezekiel
- Nick Reid
- Kenneth Marsh
- Alexander Miller
- Dr. Xin-Wen Wu

Talking Points:

- April 3 minutes approved unanimously.
- Dr. Wu suggested creating documentation for CML during continuing work and research.
- Kenneth and Alex have their employment approved, need to complete clearances.
- If students will be absent from meetings, they should send their reports to team lead Alex and inform Dr. Waleed.
- Discussion regarding importance of communication between students and professors, especially when noting when students must focus on academics rather than work.

Tasks:

- Ainsley
    - Continue CML research, create relevant documentation, work with Alex
- Nick
    - Teach Oliver how to work with models, continue current work
- Ken
    - Complete clearances, implement algorithms
- Alex
    - Complete clearances, contact Oliver
- Oliver

- Start implementing scripts/ working hands-on with algorithms

Meeting adjourned 11:46 AM

Next meeting: 24 April 2024 11:15 AM

Minutes ARMZTA Meeting

Wednesday 3 April 2024

Meeting started at 11:15 AM

Participants:

- Ainsley Weidensall
- Alexander Miller
- Nicholas Reid
- Dr. Soundararajan Ezekiel
- Dr. Waleed Farag
- Oliver Givens
- Kenneth Marsh
- Dr. Xin-Wen Wu
- Ethan Hiester

Talking Points:

- Plan for Scholar's Forum
    - Both Nick and Ainsley's judging times are 9-10 AM
    - Will leave shortly after judging to attend classes, return later to pick up posters
- Student members' plans to work/not work summers, until graduation, etc
    - Issues involving continuity in work
    - Remote work as an option for summer continuity
    - If need remote work, get very strong understanding during school year
    - Oliver able to work summer, Nick unable due to job
    - Alexander will work remote from Philly, Kenneth will work in-person (after June)
    - Ethan can work only start of summer (thru first 2 weeks of June)
    - Ainsley may work part time or full time, contingent on status of other job
- Gencyber
    - Oliver can work in-person for camp, Ethan can not
    - Kenneth can not due to military service obligation
    - Ainsley will work in-person
    - Ken will assist with April 13th online camp
- Reassigning tasks

    - Alex will take over data streaming
    - Ainsley and Oliver will take over CML
    - Ken will likely take over Nick's tasks for summer
- Importance of coordination between new/ leaving members

Tasks:

- Ainsley
    - Gain familiarity with CML, Flower, and use of live data for XGBoost
    - Work with new members on data streaming/CML
    - Hyperparameter tuning
    - Meet with Alex
- Alex
    - Meet with Ainsley and Sam
    - Complete application/clearances
- Nick
    - Run other algorithms from OneDrive (versions of DCNN)
    - Additional documentation
- Oliver
    - Continue research/ onboarding-related activities
- Kenneth
    - Meet with Nick
    - Complete application
- Ethan
    - Continue attending meetings

Meeting adjourned 11:57 AM

Next Meeting: 17 April 2024, 11:15 AM

Minutes ARMZTA Meeting

Wednesday 27 March 2024
Meeting started at 11:15 AM

Participants:

- Ainsley Weidensall
- Nicholas Reid
- Ethan
- Samuel Moffat
- Dr. Waleed Farag
- Dr. Xin-Wen Wu
- Dr. Soundararajan Ezekiel
- Oliver

Talking Points:

- Completion/printing of Scholar's Forum Posters (Nick and Ainsley)
- Sam and Ethan's departure (Ethan temporary)
    - Sam will continue some advising/ help as needed
    - Ethan will continue attending meetings
- Oliver's onboarding (pending HR)
    - Meet with Ainsley and Nick ASAP, Sam over weekend
    - Need add account to lab machines
- Importance of continuity in work
    - Oliver and Ainsley will take over CML/ data streaming
    - Ainsley will take over recording meeting minutes

Tasks:

- Ainsley
    - Work on jupyter script, hopefully 60%+ accuracy (want 90s+)
- Nick
    - Continue work on MatLab
    - MatLab scripting
- Sam
    - Wrap up ongoing work
    - Onboarding with Oliver
    - Transfer over work with CML
- Ethan
    - can't work at moment, will continue attending meetings / stay in loop

Meeting adjourned 11:55 AM
Next meeting: 3 April 2024, 11:15 AM

Minutes ARM ZTA Meeting

Wednesday 20 March 2024

Meeting started at 11:15 am

Participants

- Dr. Soundararajan Ezekiel
- Dr. Waleed Farag
- Samuel Moffat
- Nicholas Reid
- Ainsley Weidensall
- Ethan Hiester

Talking Points

Progress Report

- Ainsley
  - Hyperparam tuning for XGBoost
  - Fixed overfitting problem
  - Working on grid search algorithm for XGBoost
- Sam
  - No progress
- Nick
  - Built DCNN Model
    - Getting low 70% accuracy
- Ethan
  - Met with Micah to find errors in RNN code

Tasks

- Ainsley
  - Work with Dr. Ezekiel on fixing hyperparameter implementation
- Nick
  - Continue trying to increase accuracy of DCNN Model
  - Sign into MatLab on Epimethius and run DCNN script
- Sam
  - Continue previous tasks of CML framework with XGBoost implementation
- Ethan

- Focusing on fixing and running RNN training script

Meeting adjourned at 11:45am

Next meeting Mar. 27th 2024 at 1115a

Minutes ARM ZTA Meeting

Wednesday 6 March 2024

Meeting started at 11:15 am

Participants

- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Dr. Waleed Farag
- Samuel Moffat
- Nicholas Reid
- Ainsley Weidensall

Talking Points

- 2 Scholars forum topics

Progress Report

- Ainsley
  - Cleaned up errors and runtime issues with XGBoost
  - Began hyperparameter tuning
- Sam
  - CML up and running
  - Most of XGBoost model/script moved over
- Nick
  - DCNN script running
  - Images are passing through

Tasks

Ainsley

Continue working on XGBoost tuning, move to SVM

- Sam
  - Finish CML
  - Begin moving to 3080 machine
- Nick
  - DCNN image training
  - Image conversion script

Meeting adjourned at 12:00 pm

Next meeting Mar. 20th 2024 at 1115a

Minutes ARM ZTA Meeting

Wednesday 28 February 2024

Meeting began at 11:15 am

Participants

- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Dr. Waleed Farag
- Samuel Moffat
- Nicholas Reid
- Ethan Hiester
- Ainsley Weidensall

Talking Points

- Ethan to send minutes earlier
- Start seeing more progress in the project over the next few weeks
- Ainsley fully onboarded

Progress Report

- Sam

  - working on cross-validation grid search for hyperparameters for both XGBoost and SVM on Calypso

  - Looking into federated learning for CML

  - Getting multiple separate data streams set up

- Nick

  - Testing with grey scale image conversion

  - DCNN not working in MATLAB

- Ethan

  - Researched more into RNN

  - Work on RNN Model

  Ainsley

  - Learning and starting to implement

Tasks

- Ainsley

- Debugging XGBoostMulti and testing different hyperparameter values

- Sam

- Fixing Model Issues with CML

- Nick

- Testing DCNN models

- Ethan

- Collaborating with Micah on RNN

The meeting adjourned at 11:50 am

The next Meeting Wednesday, 6 March at 11:15 am

Minutes ARM ZTA Meeting

Wednesday 21 February 2024

Meeting began at 11:15 am

Participants

- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Dr. Waleed Farag
- Samuel Moffat
- Nicholas Reid
- Ethan Hiester
- Ainsley Weidensall

Talking Points

- Ethan fix/add more detail to the Minutes.
- Justin is no longer working on the project.
- Ainsley to pick up work where Justin left off on SVM.
- Make more progress on the project (All work done in 305)

Progress Report

- Sam

  - Looked through old flower files to apply to the project

  - Working on Calypso to start cross-validation for XGBoost & SVM.

- Nick

  - Worked on a couple of DCNN scripts

  - Testing with grey scale image conversion

  - DCNN not working in MATLAB

- Ethan

  - Low workload due to football and class schedule.

  - DRNN Model almost complete (Need to put 3-4 more hours into finishing the model)

- Ainsley

  - Finished Onboarding

  - Started research on XGBoost & SVM

Tasks

- Ainsley

- Getting Trained by Sam and Nick

- Start research on SVM & XGBoost

- Sam

- Onboarding Ainsley

- Training Ainsley on XGBoost & SVM

- Continue exploring using the CML Model

- Nick

- Working on image conversion

- Fixing MatLab issues

- Ethan

- Finishing DRNN Model (Having complications with transferring NumPy Array to Tensor)

The meeting adjourned at 11:46 am

The next Meeting Wednesday, 28 February at 11:15 am

Minutes ARM ZTA Meeting

Wednesday 14 February 2024

Meeting begun at 11:15 am

Participants

- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Dr. Waleed Farag
- Samuel Moffat
- Nicholas Reid
- Ethan Hiester

Talking Points

- Defined each position on the project.

(Sam – CML) (Nick – DCNN) (Ethan – RNN) (Justin – SVM & XGBoost)

- All work must be done in 305
- More production and results

Progress Report

- Justin
  - No current progress to report
- Sam
  - Low workload due to schedule
- Nick
  - Worked on nDPI but decided to drop it after more research
- Ethan
  - Low workload due to schedule

Tasks

- Justin
  - SVM (Working Results)
- Sam
  - XGBoost (Live feed), CML (Working on Model)

- Nick
  - DCNN (Working on Model)
- Ethan
  - DRNN (Model 80%) -> Start Results

The meeting adjourned at 12:00 pm

Next Meeting Wednesday, 28 February at 11:15 am

ZTA DEBRIEF (2/7)

Sam

This past week I have been working on finding a suitable DCNN model for network threat detection. I found a model called Deep Packet Inspection (DPI) that is tailored to analyzing live network traffic. I am working on an implementation of nDPI, an open-source DPI toolkit.

nDPI Notes

• Can work with live network data from our network tap

• Unsupervised machine learning models using nDPI can identify new, unknown threat patterns in network traffic.

• Reinforcement learning with nDPI can optimize threat detection and response strategies in distributed networks.

Ethan

I am doing research and working on implementing an RNN/LSTM.

Working on:

- Imports
    - Ignore warnings
    - Import dataset
    - Preprocessing
    - Trainer function
        - Define hyperparameters
            - Define/train model
            - Predict/test model
            - Generate/print metrics
    - Visualization?

RNN Notes:

Architecture of Recurrent Neural Networks

1. **Basic Structure:**
    - RNNs have an internal state or hidden state that is updated at each time step.

- The hidden state at time t is a function of the input at time t and the hidden state at time $-1t-1$.

2. **Formulas:**
    - The hidden state update equation can be represented as: $h=(hhh-1+h+h)ht=f(Whhht-1+Wxhxt+bh)$, where hht is the hidden state at time t, xt is the input at time t, $hhWhh$ and $hWxh$ are weight matrices, hbh is the bias term, and f is an activation function.
    -
3. **Vanishing and Exploding Gradients:**
    - RNNs are prone to vanishing or exploding gradient problems, making it challenging to capture long-term dependencies.
    - Techniques like gradient clipping, weight initialization, and more advanced architectures like Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU) have been introduced to address these issues.
4. **Long Short-Term Memory (LSTM) Networks:**
    - LSTMs are a type of RNN designed to overcome the vanishing gradient problem.
    - They have a more complex structure with memory cells, input, forget, and output gates, allowing them to capture long-range dependencies in data.

Implementing Recurrent Neural Networks

1. **Choose a Framework:**
    - Popular deep learning frameworks like TensorFlow and PyTorch provide tools for implementing RNNs.
2. **Data Preprocessing:**
    - Sequence data often needs special preprocessing, including normalization and padding.
3. **Model Design:**
    - Define the architecture, specifying the type of RNN (vanilla, LSTM, or GRU), the number of layers, and the size of the hidden state.
4. **Training:**
    - Train the model using appropriate optimization algorithms and loss functions.
    - Monitor performance on validation data to avoid overfitting.
5. **Hyperparameter Tuning:**
    - Experiment with hyperparameters like learning rate, batch size, and architecture to optimize performance.

Implementing a Recurrent Neural Network within a Zero Trust Architecture involves considering security measures and principles to protect the neural network and associated data. Zero Trust Architecture is a security concept that assumes no implicit trust in any entity, inside or outside the organization's network.

Data Encryption:

Implement end-to-end encryption for data at rest and in transit to ensure that sensitive information, including training and model data, is securely handled.

Secure Model Deployment:

Ensure that the deployment environment for the RNN model follows Zero Trust principles. Authenticate and authorize every interaction with the model, and encrypt model weights and parameters.

Access Controls:

Apply strict access controls to limit who can access the RNN model and associated resources. Use identity verification mechanisms and adhere to the principle of least privilege.

Multi-Factor Authentication (MFA):

Enforce multi-factor authentication for accessing and managing the RNN model. This adds an extra layer of security by requiring multiple forms of identification.

Continuous Monitoring:

Implement continuous monitoring of the RNN model and its environment. This includes monitoring for unusual patterns, unauthorized access attempts, and any other potential security threats.

Network Segmentation:

Employ network segmentation to isolate the RNN model from other systems and applications. This prevents lateral movement of attackers in case one part of the system is compromised.

Behavior Analytics:

Incorporate behavior analytics to detect anomalous activities related to the RNN model. Analyze patterns of usage and trigger alerts for any deviations from the expected behavior.

Secure Training Data Handling:

Apply secure data handling practices during the training phase. Ensure that training data is anonymized if necessary and access to it is restricted to authorized personnel.

Secure APIs:

If the RNN model is exposed through APIs, secure the APIs using authentication and authorization mechanisms. Regularly audit and update API security measures.

Secure Data Exfiltration Prevention:

Implement measures to prevent unauthorized data exfiltration. Monitor and control the flow of data both into and out of the RNN model to prevent leakage of sensitive information.

Regular Security Audits and Assessments:

Conduct regular security audits and assessments of the RNN model and its infrastructure. Identify and address vulnerabilities promptly to maintain a robust security posture.

LSTM Research

LSTM

Long Short-Term Memory (LSTM) networks, a specific type of recurrent neural network (RNN) designed to overcome the vanishing gradient problem and capture long-term dependencies in sequential data:

1. **Basic LSTM Structure:**
    - LSTM networks have a more complex structure compared to traditional RNNs. They include memory cells, input gates, forget gates, and output gates, allowing them to selectively retain and update information over time.
2. **Memory Cells:**
    - The key component of LSTM is the memory cell, which can store information for long durations. The cell state (*Ct*) carries information from previous time steps.
3. **Input Gate:**
    - The input gate (*it*) regulates how much new information should be stored in the memory cell.
4. **Forget Gate:**
    - The forget gate (*ft*) decides what information from the previous cell state should be discarded.
5. **Output Gate:**
    - The output gate (*ot*) determines the next hidden state (*ht*) based on the current input and the memory cell content.
6. **LSTM Unrolling:**
    - Similar to traditional RNNs, LSTMs can be unrolled in time to visualize the flow of information through different time steps.
7. **Gating Mechanisms:**
    - The gating mechanisms in LSTMs enable them to control the flow of information, selectively updating and retaining information based on the context.
8. **Applications:**
    - LSTMs are widely used in natural language processing tasks such as language modeling, machine translation, and sentiment analysis. They are also applied in time series analysis, speech recognition, and many other sequential data tasks.
9. **Training Process:**
    - LSTMs are trained using backpropagation through time (BPTT), similar to traditional RNNs. The gradients are calculated, and the weights are updated to minimize the error.

10. **Stacked LSTMs:**
    - Multiple LSTM layers can be stacked on top of each other to form a deep LSTM network, allowing for hierarchical representation of sequential data.
11. **Variants:**
    - Various LSTM variants have been proposed, such as peephole connections and coupled forget and input gates, to enhance the capabilities of the original LSTM architecture.

Giovanni

Collaborative Machine Learning (CML) Research:

- CML is a type of machine learning that allows multiple entities to collaborate on training and improving machine learning models.

- Also referred to as federated machine learning.

- Federated machine learning is CML without centralized training data.

- The big difference is that central machine learning "moves data to the computation" and federated machine learning "moves the computation to the data."

- Currently using a research blog from Google Research that focuses on Federated Learning.

- A possible framework that we can use to implement CML is Flower, listed as "a friendly federated learning framework."

- Flower offers a great tutorial with visuals that help aid the understanding of both machine learning and federated machine learning.

- Federated machine learning allows the use of machine learning where it wasn't possible before.

- Other possible CML frameworks are NVFlare, FATE, and TensorFlow. I am still looking into these frameworks more in-depth.

Nick

This past week I have been working on finding a suitable DCNN model for network threat detection. I found a model called Deep Packet Inspection (DPI) that is tailored to analyzing live network traffic. I am working on an implementation of nDPI, an open-source DPI toolkit.

nDPI Notes

• Can work with live network data from our network tap

• Unsupervised machine learning models using nDPI can identify new, unknown threat patterns in network traffic.

• Reinforcement learning with nDPI can optimize threat detection and response strategies in distributed networks.

Justin

XGBoost (Extreme Gradient Boosting) is a machine learning algorithm that excels in classification and can easily and quickly train both binary and multiclass classification algorithms. It differs from other machine learning algorithms through its use of Decision Trees, Gradient Boosting, and Boosting rounds instead of standard machine learning processes such as epochs. The tree splits the data through binary decisions into more manageable pieces for the algorithm and the gradient boosting constructs new trees to get better results from the last session. The number of boosting rounds is the number of times this process is completed.

In our algorithm, we first take the large data set we've been working with and slim it down to just the information that we will be getting from the Zeek-Kafka live stream so that we can train our model with the same information that we will be getting in practice. We then split the data into x and y, where x is the raw data, and y is the test results on whether or not the data was an attack or not, and what type of attack it was. The attack type data is then fed into an ordinal encoder which converts the different categories of attack into numerical representations that we can train the model on. We then do something similar with the non-numeric x data by classifying it as the type "category". The next thing we do is split the data into train and test groups, with 70 percent of the data being used to train the model and then 30 percent of the data being used to test the model after training. The data is then put into a classification matrix and trained. The parameters we use when training are a multi:softprob as the objective, gpu_hist as the tree method, 15 different classifications, and 25 boosting rounds. After that, we can predict the test cases and measure the accuracy and precision of the model.

Minutes ARM ZTA Meeting

Monday 22 January 2024

Meeting begun at 11:25 am

Participants

- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Dr. Waleed Farag
- Samuel Moffat
- Nicholas Reid

Talking Points

- Meeting with Ezekiel during the week
- Find common time for all

Progress Report

- Justin
  - Visualization – too much data, looking into tsne
  - Cleaning up unnecessary fields for cleaner models
  - SVM based on linear/planar data, not classifying -> not much improvement
  - Successfully saved and loaded models from XGBoost and SVM
- Sam
  - HR paperwork being taken care of today
  - Tutorials added to documentation folder
  - Weekly slides started (content explanation for next week)
  - .edu account set up for MatLab (thank you Dr. Farag!)
  - Zeek & Kafka servers set up on Calypso
  - Consumer w/basic visualization runs fine
  - Parameters matched between dataset and Zeek log files
  - Working on preprocessor script to format data from Zeek logs

Tasks

- Justin
  - Visualizing models using TSNE
  - DCNN Modeling
  - Passing new data through saved models
  - Re-training models with new data
  - Messing with hyper-parameters to optimize for live data
- Sam
  - Finish preprocessing script to format data for analysis & re-training models
  - Linking different entries via Zeek UID

- Re-configure tap in computer lab
- Issue with Calypso screen?
- Consider adding more params from Zeek in the future
- Weekly content explanation docs

Meeting adjourned at 12:10 pm

Next Meeting Wednesday, 7 February at 11:15 am

Minutes ARM ZTA Meeting

Tuesday 9 January 2024

Meeting begun at 11 am

Participants

- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Dr. Waleed Farag
- Samuel Moffat
- Micah Sherry
- Justin Benedict
- Nicholas Reid

Progress Report

- Micah
  - Working on Matlab acct. transfer
  - Folder with code, classifications and graphics for all tests on OneDrive
- Sam
  - Got data livestreaming on Kafka
- Justin
  - Finished SVM algorithm (mid-80s accuracy)
  - Finished documentation for XGBoost
- Nick
  - Working with Sam on Zeek/Kafka
  - SSH issues fixed

Talking Points

- Request @iup.edu acct for armzta for Matlab license
- Need to begin communicating better amongst students and with faculty
- Start creating deadlines 2-7 days at a time
- Fans put in 306 to cool off Calypso, Atlas
- Update meeting with Dr. Ezekiel on Friday
- Payday/time due monday

Tasks

- Micah
  - Renaming folders, adding readmes, general clean up of OneDrive folder
- Sam
  - Take care of HR paperwork
  - Get .edu account to move Matlab over from Micah's account (work with Dr. Farag)

  - Consumer scripts for Kafka data to MLAs due Friday night w/Dr. Ezekiel
  - Delegate creating meeting progress/explanation documents, visualization for future meetings
- Justin
  - Visualize/document results from XGBoost/SVM
  - Clean up data to get SVM working better (converting data types)
  - Begin testing DCNN, code from Micah (modify/train/run/document, no re-writing!!!)
  - Working with Sam and Nick on testing live data against existing models, automated reworking of models
    - Sub-tasks to be determined in subsequent student meeting
- Nick
  - Working with Sam and Justin on testing live data against existing models, automated reworking of models
    - Sub-tasks to be determined in subsequent student meeting

Meeting adjourned at 12 pm

Next Meeting Friday, 19 January 2024 at 10 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

1-2-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Nicholas Reid
- Sam Moffat
- Micah Sherry
- Justin Benedict

Progress Report

- Sam
  - Working on getting data livestreamed
  - Lots of SVM research
- Justin
  - Rebuilt XGBoost python script
  - Got XGBoost working at over 98% accuracy
- Nicholas
  - Working on documenting about Zeek/Kafka

Power will be out Wednesday evening till Thursday morning
IoT paper to be passed on?
New recruits to join soon

Tasks

- Sam
  - Gain access to matlab account
  - Get livestreaming up and running
- Justin
  - Work on SVM algorithm
  - Continue documenting XGBoost
- Nicholas
  - Work with Sam on livestreaming kafka data
- Micah
  - Meeting with Sam and discuss any outstanding tasks and progress
  - Working on getting Matlab transferred to another student

Next meeting will be held on Tuesday Jan. 9th at 11:00 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

12-20-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Jared Giesen
- Micah Sherry
- Nicholas Reid
- Sam Moffat

Meeting started at 12:00 pm

Progress Report

- Sam
  - Has completed on-boarding with HR.
  - Worked on organizing the student effort.
- Jared
  - Busy with another project.
- Micah
  - Ran three additional DCNN architectures. Garnering similar results to the previous trial at around 84% for 15 classifications.
- Justin
  - Still working on troubleshooting XGBoost.
- Nicholas
  - Reading assigned sources regarding machine learning and Kafka.

Discussion Points

- Two posters will be needed for the next scholar's forum.
- Be sure to update Dr. Ezekiel on progress ahead of meetings.
- Collaborative Learning and its role in integration must be explored soon.

Tasks

- Team
  - Implement a static dataset model.
  - Work towards a detection algorithm for live feed data.
- Sam
  - Work with Nicholas in the Kafka implementation to begin feeding and testing algorithms off the live feed data.
- Jared
  - Implement a simulated federated algorithm using Flower on the static model.

- Drew
    - Prepare all current students for handover, especially Micah for the Zeek-Kafka server.
    - Continue to finalize the IoT paper.
- Micah
    - Help with any on boarding for Nicholas and new members.
    - Ensure the Matlab license is generalized for anyone's use.
- Justin
    - Troubleshoot the XGBoost algorithm for the static dataset and begin developing the SVM algorithm with the help of Maria, etc.
- Nicholas
    - Work with Sam on running algorithms off the Kafka data.

Adjournment at 12:55 pm

Next meeting will be held on Tuesday Jan. 2nd at 12:00 pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

12-06-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Jared Giesen
- Micah Sherry
- Justin Benedict
- Nicholas Reid
- Drew Rado

Meeting started at 4:00 pm

Progress Report

- Jared
  - Worked on edits and additions to the ARMZTA 6 month report
- Drew
  - Transitioning off project.
  - Working on IoT paper edits and waiting for feedback.
- Micah
  - Set up the network tap and is working on integrating it to Kafka.
  - Worked on running other variants of DCNN as well as tuning.
- Justin
  - Was out sick for the week.
- Nicholas
  - Added some additions to the ARMZTA documentations.

Discussion Points

- Two posters will be needed for the next scholar's forum
- Be sure to update Dr. Ezekiel on progress ahead of meetings

Tasks

- Team
  - Implement a static dataset model
  - Work towards a detection algorithm for live feed data
- Jared
  - Assist with on-boarding
  - Implement a simulated federated algorithm using Flower on the static model.
- Drew
  - Prepare all current students for handover, especially Micah for the Zeek-Kafka server.
  - Continue to finalize the IoT paper.

- Micah
    - Continue to run the various implementations of DCNN, and run them with varying test/train splits.
    - Help with any on boarding for Nicholas and new members.
- Justin
    - Troubleshoot the XGBoost algorithm for the static dataset and begin developing the SVM algorithm.
- Nicholas
    - Learn more about the Kafka Integration.

Adjournment at 4:55 pm

Next meeting will be held on Wednesday, Dec. 20th at 12:00 pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

11-29-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Jared Giesen
- Micah Sherry
- Justin Benedict
- Nicholas Reid
- Drew Rado

Meeting started at 4:00 pm

Progress Report

- Jared
  - Working on 6 month report summary for Dr. Wu.
- Drew
  - Editing and revising the Iot latest IoT paper.
- Micah
  - Ran multiple versions of DCNN on the static dataset, including Googlenet, VGG16, VGG19, and ResNet50 in progress, with up to an 84% accuracy at 15 classifications.
  - Received and began setting up the Network Tap for the live data feed.
- Justin
  - Applied an XGBoost algorithm to the static set and is troubleshooting its performance.
- Nicholas
  - All HR steps are complete.

Discussion Points

- Two posters will be needed for the next scholar's forum
- Be sure to update Dr. Ezekiel on progress ahead of meetings

Tasks

- Team
  - Implement a static dataset model
  - Work towards a detection algorithm for live feed data
- Jared
  - Finish and edit the ARMZTA summary for Dr. Wu.
- Drew
  - Prepare all current students for handover, especially Micah for the Zeek-Kafka server.
  - Continue to finalize the IoT paper.

- Micah
    - Continue to run the various implementations of DCNN, and run them with varying test/train splits.
- Justin
    - Troubleshoot the XGBoost algorithm for the static dataset and begin developing the SVM algorithm.
- Nicholas
    - Update the testbed documentation pdf with Drew.
    - Learn more about the Kafka Integration.

Adjournment at 4:55 pm

Next meeting will be held on Wednesday, Dec. 6th at 4:00 pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

11-22-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Xin-Wen Wu
- Jared Giesen
- Micah Sherry
- Justin Benedict

Meeting started at 12:00 pm

Progress Report

- Jared
  - Working on the 1-year report summary for Dr. Wu
- Drew
  - Provided the ip table for remote connections.
- Micah
  - Is improving the results of the current DCNN trials.
- Justin
  - Beginning work on improving the DNN algorithm and starting SVM/XGBoost
- Nicholas
  - Completed all required processes for HR and waiting for the report to send to HR.

Discussion Points

- Two posters will be needed for the next scholar's forum
- Be sure to update Dr. Ezekiel on progress ahead of meetings
- Consider adding a router tap to capture and feed the network data from the rest of the lab machines etc. more efficiently to the server machine.

Tasks

- Team
  - Be ready to report on individual ARMZTA work for the one-year report if and when called upon
  - Implement a static data set model
  - Work towards a detection algorithm for live feed data
- Jared
  - Assist Dr. Wu with the ARMZTA one year report.
- Drew
  - Prepare all current students for handover, especially Micah for the Zeek-Kafka server.
- Micah
  - Finish the DCNN algorithm in MatLab

- Justin
    - Work on improving the python DCNN algorithm and implementing SVM/XGBoost
- Nicholas
    - Work alongside Justin and Micah

Adjournment at 12:50 pm

Next meeting will be held on Wednesday, Nov. 29th at 4:00 pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

11-15-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Jared Giesen
- Drew Rado
- Micah Sherry
- Justin Benedict
- Nicholas Reid

Meeting started at 4:00 pm

Progress Report

- Jared
    - Added additional graphics to summary report for Dr. Wu
    - Cleaned up the tutorial/documentation folder
    - Worked with Drew in the lab in getting data collection running
- Drew
    - Was able to troubleshoot the data collection scheme and begin collecting some data
    - Began data visualization
    - Documented the zeek-kafka implementation
- Micah
    - Finished troubleshooting the MatLab license issue
    - Sat in with Drew and Jared for the Zeek-Kafka implementation
    - Worked on a Matlab implementation of DCNN on the static dataset.
- Justin
    - Got a model of DCNN running on python for the static dataset.
- Nicholas
    - Completed all tasks for HR except for fingerprinting.

Discussion Points

- Two posters will be needed for the next scholar's forum
- Be sure to update Dr. Ezekiel on progress ahead of meetings
- Consider adding a router tap to capture and feed the network data from the rest of the lab machines etc. more efficiently to the server machine.

Tasks

- Team
    - Be ready to report on individual ARMZTA work for the one-year report when called upon
    - Implement a static data set model

    - Work towards a detection algorithm for live feed data
- Jared
    - Ensure the ssh table is re-shared with the team for remote connections.
    - Be ready to assist Dr. Wu in ARMZTA one year report.
- Drew
    - Prepare all current students for handover, especially Micah for the Zeek-Kafka server.
    - Ensure the ssh table is re-shared with the team for remote connections.
- Micah
    - Finish running the DCNN algorithm in MatLab
- Justin
    - Work on improving the python DNN algorithm.
- Nicholas
    - Work with HR to finish hiring process
    - Work alongside Justin and Micah

Adjournment at 5:00 pm

Next meeting will be held on Wednesday, Nov. 22nd at 12:00 pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

11-08-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Jared Giesen
- Drew Rado
- Micah Sherry
- Justin Benedict
- Nicholas Reid

Meeting started at 4:00 pm

Progress Report

- Jared
    - Finished Test-bed summary report for Dr. Wu
    - Worked with Drew briefly in the lab to troubleshoot data collection
- Drew
    - Worked on troubleshooting the plugins for data collection
- Micah
    - Worked on resolving the Matlab license with Kurtis.
    - Worked with Justin on developing a DCNN algorithm in Python
- Justin
    - Worked with Micah on developing a DCNN algorithm in Python
- Nicholas
    - Finished converting Drew's Test-bed documentations to PDF

Discussion Points

- Two posters will be needed for the next scholar's forum
- Be sure to update Dr. Ezekiel on progress ahead of meetings
- The Matlab license is now under Micah's account, but a new activation and toolboxes may be necessary.

Tasks

- Team
    - Implement a live feed data capture
    - Implement a static data set model
    - Work towards a detection algorithm for live feed data
- Jared
    - Continue work with Drew on implementing Zeek into Kafka for data capture, capturing, and visualizing data
    - Learn about the test-bed from Drew and documentation

    - Clean up the documentation and tutorial folders.
- Drew
    - Continue work with Jared on implementing Zeek into Kafka for data capture, capturing, and visualizing data
- Micah
    - Work with Justin on implementing the algorithms for the static dataset model starting with DCNN
    - Try to resolve the Matlab license issue to be tied to a general account.
- Justin
    - Work with Micah on implementing the algorithms for the static dataset model starting with DCNN
- Nicholas
    - Work with HR to finish hiring process
    - Work alongside Justin and Micah

Adjournment at 5:00 pm

Next meeting will be held on Wednesday, Nov. 15th at 4:00 pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

11-01-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Jared Giesen
- Drew Rado
- Micah Sherry
- Justin Benedict
- Nicholas Reid

Meeting started at 4:00 pm

Progress Report

- Jared
  - Finished Statement of Research report for Dr. Wu
  - Working on Test-bed summary report for Dr. Wu
  - Worked with Drew in the lab to troubleshoot the Zeek module installation
- Drew
  - Completed troubleshooting the Zeek plugin for Kafka
  - Began a data capture using the Kafka stream server
- Micah
  - Worked on modifying previously used DCNN scripts in IoT
  - Worked on a python version of the script in case of changing from Matlab
- Justin
  - Out sick.
- Nicholas
  - Met with Drew for initial on-boarding

Discussion Points

- Two posters will be needed for the next scholar's forum
- Be sure to update Dr. Ezekiel on progress ahead of meetings

Tasks

- Team
  - Implement a live feed data capture
  - Work towards a detection algorithm for live feed data
- Jared
  - Continue work with Drew on implementing Zeek into Kafka for data capture, capturing, and visualizing data
  - Learn about the test-bed from Drew and documentation
  - Finish helping Dr. Wu with drafting testbed report

- Drew
    - Continue work with Jared on implementing Zeek into Kafka for data capture, capturing, and visualizing data
    - Finish helping Dr. Wu with drafting testbed report

- Micah
    - Work with Justin on implementing the algorithms for the static dataset model starting with DCNN
- Justin
    - Work with Micah on implementing the algorithms for the static dataset model starting with DCNN
- Nicholas
    - Work with HR to finish hiring process

Adjournment at 5:00 pm

Next meeting will be held on Wednesday, Nov. 8th at 4:00 pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

10-25-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Jared Giesen
- Drew Rado
- Micah Sherry
- Justin Benedict

Meeting started at 4:00 pm

Progress Report

- Jared
  - Reviewed documentations on the IoT testbed
- Drew
  - Troubleshooted issues with the Zeek plugin for the Kafka Server, possibly resolving the issue
  - Met with Nicholas for initial on-boarding
- Micah
  - Met with Drew and Justin on steps moving forward
  - Completed preprocessing algorithm
- Justin
  - Met with Drew and Micah on steps moving forward
  - Completed preprocessing algorithm

Discussion Points

- Making progress on implementing an initial data stream detection system is top priority
- In parallel a static model will be implemented
- Two posters will be needed for the next scholar's forum
- Be sure to update Dr. Ezekiel on progress ahead of meetings

Tasks

- Team
  - Implement a live feed data capture
  - Work towards a detection algorithm for live feed data
- Jared
  - Continue work with Drew on implementing Zeek into Kafka for data capture, capturing, and visualizing data
  - Learn about the test-bed from Drew and documentation
  - Assist Dr. Wu with drafting team report

- Drew
    - Continue work with Jared on implementing Zeek into Kafka for data capture, capturing, and visualizing data
- Micah
    - Work with Justin on implementing the algorithms for the static dataset model starting with DCNN
- Justin
    - Work with Micah on implementing the algorithms for the static dataset model starting with DCNN

Adjournment at 4:40 pm

Next meeting will be held on Wednesday, Nov. 1st at 4:00 pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

10-18-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Jared Giesen
- Drew Rado
- Micah Sherry
- Justin Benedict

Meeting started at 4:00 pm

Progress Report

- Jared
  - Worked with Drew to implement the Kafka server
- Drew
  - Implemented the Kafka server
- Micah
  - Created and configured lab machine accounts for him and Micah
  - Further reviewed project documents
- Justin
  - Planned out forward work
  - Further reviewed project documents

Discussion Points

- Making progress on implementing an initial data stream detection system is top priority
- In parallel a static model will be implemented
- We will need two posters for the upcoming scholar's forum

Tasks

- Team
  - Implement a live feed data capture
  - Work towards a detection algorithm for live feed data
- Jared
  - Continue work with Drew on implementing Zeek into Kafka for data capture
  - Learn about the test-bed from Drew and documentation
- Drew
  - Continue work with Jared on implementing Zeek into Kafka for data capture
- Micah
  - Work with Justin on starting the model for static datasets
- Justin
  - Work with Micah on starting the model for static datasets

Adjournment at 4:45 pm

Next meeting will be held on Wednesday, Oct. 25th at 4:00 pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

10-11-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Jared Giesen
- Drew Rado
- Micah Sherry
- Justin Benedict

Meeting started at 4:00 pm

Progress Report

- Jared
  - Along with Drew met Micah and Justin for on-boarding (305 access, Lab machine familiarity, Usage of the payroll portal, One-drive organization, Location of tutorials, documentation, and resources)
  - Created a central folder for copies of all documentation and video tutorials
  - Shared One-Drive to new students
  - Reorganized One-Drive folders to reduce clutter
  - Delivered notes and thoughts on methods utilized in the Pitt papers.
- Drew
  - Along with Jared met Micah and Justin for on-boarding (305 access, Lab machine familiarity, Usage of the payroll portal, One-drive organization, Location of tutorials, documentation, and resources)
  - Continued research into real time data analysis
  - Developed a possible model for live data collection
- Micah
  - Attended on-boarding
- Justin
  - Attended on-boarding
  - Worked on becoming familiar with Notion, the team One-Drive organization, lab machines, and previous project materials.

Discussion Points

- Making progress on implementing an initial data stream detection system is top priority
- In parallel a static model will be implemented

Tasks

- Team
  - Implement a live feed data capture
  - Work towards a detection algorithm for live feed data

- Jared
    - Work with Drew on implementing Zeek & Kafka for data capture
- Drew
    - Work with Jared on implementing Zeek & Kafka for data capture
- Micah
    - Work with Justin on starting the model for static datasets
- Justin
    - Work with Micah on starting the model for static datasets

Adjournment at 5:00 pm

Next meeting will be held on Wednesday, Oct. 18th at 4:00 pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

10-04-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Drew Rado
- Justin Benedict
- Micah Sherry

Meeting started at 4:00 pm

Progress Report

- Jared
  - Limited time due to coursework and remaining midterms, briefly continued reading papers on anomaly detection in real-time data streams
- Drew
  - Limited time due to travel obligations and move.
  - Uploaded updated IoT Documentation: https://iup0-my.sharepoint.com/personal/farag_iup_edu/Documents/2020-CAE-C-Research-Project/Drew/Main%20Documentation/Extracted
  - Uploaded updated IoT paper: https://iup0-my.sharepoint.com/personal/farag_iup_edu/Documents/2020-CAE-C-Research-Project/Drew/IoT-Paper-Doscs/Drew%20IOT%20Paper%20V4.docx
  - Uploaded updated ARMZTA paper: https://iup0-my.sharepoint.com/personal/farag_iup_edu/Documents/!!!!!!!!!!!!-Autonomous-Mitigation-ZTS-Project/Student-Folders/Literature%20Review%20Drafts/IEEE%20Zero%20Trust%20Paper%20(Drew).docx
  - Kurtis DCNN video path: https://iup0-my.sharepoint.com/personal/farag_iup_edu/Documents/!!!!!!!!!!!!-Autonomous-Mitigation-ZTS-Project/Student-Folders/Kurtis/DCNN%20Tutorial.mp4

Discussion Points

- Important that we take large strides into researching live data streams and getting our first detection system implemented
- Important that Justin and Micah get onboarded as soon as possible so they are able to continue the research without pause over the semesters

Tasks

- Jared
    - Onboard Micah and Justin
    - Implement live feed data captures
    - Work on detection algorithm for live feed data
- Drew
    - Onboard Micah and Justin
    - Implement live feed data captures
    - Work on detection algorithm for live feed data
- Micah
    - Contact Drew and Jared for onboarding
- Justin
    - Contact Drew and Jared for onboarding

Adjournment 4:45 pm

Next meeting will be held on Wednesday, Oct. 11th at 4:00 pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

09-29-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Jared Giesen
- Drew Rado
- Shari Hoch
- Micah Sherry

Meeting started at 4:00 pm

Progress Report

- Jared
    - Limited time due to midterms, briefly continued reading papers on anomaly detection in real-time data streams
- Drew
    - Began research into data input streams
    - Made some progress in revising the reflection section of his paper
    - Path to IoT paper progress: 2020-CAE-C-Research-Project/Drew/IoT-Paper-Doscs
- Shari
    - Looked into given resources on XGBoost, machine learning theory, and will include these notes to assist in on-boarding other students

Discussion Points

- Possibly the team should be focused on working on each component in order together to ensure better cohesive components
- The data input stream will likely be network packets but the nature of such must be discussed in order to design the implementation of the next phases
- Kurtis has provided a new tutorial video to the One-Drive for algorithm usage Path: !!!!!!!!!!-Autonomous-Mitigation-ZTS-Project/Student-Folders/Kurtis

Tasks

- Jared
    - Provide a specific recommendation based on the new concept
    - Finish reviewing the Pitt papers Dr. Wu recommended
- Drew
    - Revise Lit review to include a more extensive reflection/recommendation section
    - Research into data input streams

- Shari
    - Continue to review project materials and the resources provided in on-boarding
- Micah
    - Schedule and attend on-boarding with Jared and Drew specifically, possibly Kurtis.

Adjournment 4:50 pm

Next meeting will be held on Wednesday, Oct. 4th at 4:00 pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

09-22-2023

Participants

- Dr. Waleed Farag (PI) (Absent)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Jared Giesen
- Drew Rado
- Shari Hoch

Meeting started at 4:00 pm

Progress Report

- Jared
  - Assisted with on-boarding sessions with Shari
  - Reviewed old sources and literature reviews with new concept in mind
  - Began reviewing new papers for automated detection and assessment as recommended by Dr. Wu
- Drew
  - Met with Shari for on-boarding
  - Worked on ARMZTA documentations and file organization
  - Researched further into automated risk response architectures
  - Began revising the reflection section of the literature review
  - Met with Kurtis to discuss work done on projects over summer
- Shari
  - Met with Drew, Kurtis, and Jared for on-boarding.

Discussion Points

- Possibly the team should be focused on working on each component in order together to ensure better cohesive components
- The data input stream will likely be network packets but the nature of such must be discussed to design the implementation of the next phases

Tasks

- Jared
  - Provide a specific recommendation based on the new concept
  - Finish reviewing the Pitt papers Dr. Wu recommended
- Drew
  - Revise Lit review to include a more extensive reflection/recommendation section
  - Start figuring out what type of data to be used as input to the proposed system
- Shari

- Continue to review project materials and the resources provided in on-boarding

Adjournment 5:00 pm

Next meeting will be held on Tuesday, Sept. 26th at 4:00 pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

09-11-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Jared Giesen
- Drew Rado
- Kurtis Johnson (Absent)
- Samuel Rocco (Absent)
- Shari Hoch

Meeting started at 11:20 am

Progress Report

- Jared
  - Improved the presentation of the new high level diagram concept
- Drew
  - Began reviewing ARMZTA documents from summer to catch up
  - Started a unified documentation for ARMZTA
  - Reviewed papers and videos on Zero Trust Architecture
  - Scheduled an on-boarding day with Shari
- Shari
  - Scheduled on-boarding with Drew

Discussion Points

- All students should assist with Shari's on-boarding sessions

Tasks

- Jared
  - Provide a specific recommendation based on the new concept
  - Review Pitt paper Dr. Wu recommended
- Drew
  - Assist with on-boarding new students
  - Revise Lit review to include a more extensive reflection/recommendation section.
- Kurtis
  - Assist with on-boarding new students
- Shari

- Meet with Drew and Kurtis for on-boarding

Adjournment 12:40 pm

Next meeting will be held on Tuesday, Sept. 19th at 4:00pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

08-22-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundararajan Ezekiel
  - Dr. Xin-Wen Wu
  - Jared Giesen
  - Kurtis Johnson
  - Samuel Rocco
  - Nathan Metzger

- Meeting started at 10:00 am
- Unanimously approved minutes for meeting on August 16th, 2023

Main Points:

- **Progress report**
  - Jared –
    - Updated the unified architecture diagram.
  - Kurtis –
    - Spent additional time revising their project recommendation paper.
  - Samuel –
    - Started some unified documentations for ARMZTA.
    - Assisted with new diagram brainstorming.
  - Nathan –
    - Continued work on project recommendation paper.

  Discussion points
  - Need to expand on ZTA diagram to go deeper into each component.
  - Need to finalize all diagrams quickly to include them in poster for CAE conference.
  - Literature reviews should be focused on providing recommendations and implementations.

- **Tasks:**
  - Kurtis
    - Continue researching Flower and implementations of CML into our proposed model; work with Jared on this matter.
  - Samuel
    - Continue working on the overall diagram and Maria's paper.
  - Jared
    - Work on new diagrams that dig deeper into the 3 major autonomous components: detection, assessment, and mitigation with sub-components.

Adjournment at 11:35 am
Next meeting will be held on Wednesday, Sept 6th at 11:20am

Zero Trust Research Project (ARMZTA) Meeting Minutes

08-16-2023

- Participants
    - Dr. Waleed Farag (PI)
    - Dr. Soundararajan Ezekiel
    - Dr. Xin-Wen Wu
    - Jared Giesen (absent, excused)
    - Kurtis Johnson
    - Samuel Rocco
    - Nathan Metzger

- Meeting started at 1:45 pm
- Unanimously approved minutes for meeting on August 10th, 2023

Main Points:

- **Progress report**
    - All—
        - Met with Dr. Ezekiel for discussion of literature review structure.
        - Discussed what goes into each major section (abstract, introduction, discussion, conclusion, etc.)
    - Jared –
        - Gained experience with implementing Flower FL as part of USOAR project.
        - Completed high-level ZTA diagram.
        - Received recommendations for paper from Dr. Ezekiel.
    - Kurtis –
        - Reviewing and taking notes on paper references.
        - Currently writing literature review.
    - Samuel –
        - Worked on revisions of Maria's paper.
    - Nathan –
        - Worked with Dr. Ezekiel to review Zaryn's paper.
        - Zaryn's paper is inadequate and will require significant revisions.

    Discussion points
    - Continue to document all work going forward.
    - We will need a strong poster prepared by Sept. 12th for an upcoming CAE conference.
    - Need to expand on ZTA diagram to go deeper into each component.
    - Need to finalize all diagrams quickly to include in poster for CAE conference.
    - Literature reviews should be focused on providing recommendations and possible implementations.

- **Tasks:**
    - Team
        - Continue providing recommendations moving forward in the development of our new model.
    - Kurtis
        - Continue writing literature review and work closely with PI's.

        - Continue researching Flower and possible implementations of CML into our proposed model; work with Jared.
    - Samuel
        - Finish the edits of Maria's phase one paper.
        - Research Graph Neural Networks for application.
        - Work with Jared on ZTA diagrams.
    - Nathan
        - Revise Zaryn's phase one paper.
        - Research AI rule-based systems and scoring systems.
    - Jared
        - Finalize overall diagram and change colors for better readability.
        - Work on new diagrams that dig deeper into each major component with sub-components.

Adjournment at 2:15 pm
Next meeting will be held on Wednesday, August 22nd at 10:00am

Zero Trust Research Project (ARMZTA) Meeting Minutes

08-10-2023

- Participants
    - Dr. Waleed Farag (PI)
    - Dr. Soundararajan Ezekiel
    - Dr. Xin-Wen Wu
    - Jared Giesen
    - Kurtis Johnson
    - Samuel Rocco
    - Nathan Metzger

- Meeting started at 11:00 am
- Unanimously approved minutes for meeting on August 3rd, 2023

Main Points:

- **Progress report**
    - Jared – Explored an implementation of federated learning using Flower
    - Kurtis – Working on revisions of Sky's paper, gathered supplemental resources for this task.
    - Samuel – Worked on revisions of Maria's paper.
    - Nathan – Began work on revising Zaryn's work.

  Discussion points
    - Continue to document all work going forward.
    - We will refocus our current ideas and initial documentation to better align with our initial five areas of research from phase one.
    - We will need a strong poster prepared by Sept. 12th for an upcoming CAE conference.

- **Tasks:**
    - Team
        - Continue providing recommendations moving forward in the development of our new model.
    - Kurtis
        - Finish the edits of Sky's phase one paper.
        - Continue researching Flower and possible implementations of CML into our proposed model.
    - Samuel
        - Finish the edits of Maria's phase one paper.
        - Research Graph Neural Networks for application.
    - Nathan
        - Finish the edits of Zaryn's phase one paper.
        - Research A.I. rule-based systems and scoring systems.
    - Jared
        - Gather all diagrams and brainstormed materials to create a more uniform architecture proposal.

Adjournment at 12:00 pm
Next meeting will be held on Wednesday, August 16th at 1:00pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

08-03-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundararajan Ezekiel
  - Dr. Xin-Wen Wu
  - Jared Giesen
  - Kurtis Johnson
  - Samuel Rocco
  - Nathan Metzger

- Meeting started at 11:00 am
- Unanimously approved minutes for meeting on July 27th, 2023

Main Points:

- **Progress report**
  - Jared – Revised the assigned phase one paper and collected resources on LSTM algorithms.
  - Kurtis – Worked on revisions of Sky's phase one paper.
  - Samuel – Continued basic research into GNN and worked on edits to Maria's original phase one paper.
  - Nathan – Began research into rule-based systems.

  Discussion points
  - Ensure all current materials remain on OneDrive.
  - We will refocus our current ideas and initial documentation to better align with our initial five areas of research from phase one.
  - We will need a strong poster prepared by Sept. 12th for an upcoming CAE conference.

- **Tasks:**
  - Team
    - Continue providing recommendations moving forward in the development of our new model.
    - Students should attend the recommended ZTA conference on August 7th. Dr. Ezekiel can provide the details.
  - Kurtis
    - Finish the edits of Sky's phase one paper.
    - Continue researching Flower and possible implementations of CML into our proposed model.
  - Samuel
    - Finish the edits of Maria's phase one paper.
    - Research Graph Neural Networks for application.
  - Nathan
    - Finish the edits of Zaryn's phase one paper.
    - Research A.I. rule-based systems and scoring systems.
    - Research into Big Data and whether/how it applies.
  - Jared
    - Finish translating the 2nd phase of the initial framework.

- Look into Long Short-Term Memory.

Adjournment at 12:40 pm
Next meeting will be held on Thursday, August 10th at 11:00am

Zero Trust Research Project (ARMZTA) Meeting Minutes

07-27-2023

- Participants
    - Dr. Waleed Farag (PI)
    - Dr. Soundararajan Ezekiel
    - Dr. Xin-Wen Wu
    - Jared Giesen
    - Kurtis Johnson
    - Samuel Rocco
    - Nathan Metzger

- Meeting started at 11:00 am
- Unanimously approved minutes for meeting on July 20th, 2023

Main Points:

- **Progress report**
    - Jared – Worked on further translating into the soft copy and creating diagrams.
    - Kurtis – Time limited due to assignments in IoT.
    - Samuel – Studied our initial ideas further while looking into GNN.
    - Nathan – Time limited due to assignments in IoT.

  Discussion points
    - Ensure all current materials remain on OneDrive.
    - We will refocus our current ideas and initial documentation to better align with our initial five areas of research from phase one.

- **Tasks:**
    - Team
        - Complete final revisions of the phase one papers by next meeting.
    - Kurtis
        - Continue researching Flower and possible implementations of CML into our proposed model.
    - Samuel
        - Research Graph Neural Networks for application.
    - Nathan
        - Research A.I. rule-based systems and scoring systems.
        - Research into Big Data and whether/how it applies.
    - Jared
        - Finish translating the 2nd phase of the initial framework.
        - Look into Long Short-Term Memory.

Adjournment at 12:50 pm
Next meeting will be held on Thursday, August 3rd at 11:00am

Zero Trust Research Project (ARMZTA) Meeting Minutes

07-20-2023

- Participants
  - ~~Dr. Waleed Farag (PI)~~ (Excused Absence)
  - Dr. Soundararajan Ezekiel
  - Dr. Xin-Wen Wu
  - Jared Giesen
  - Kurtis Johnson
  - Samuel Rocco
  - Nathan Metzger

- Meeting started at 11:00 am
- Unanimously approved minutes for meeting on July 13th, 2023

Main Points:

- **Progress report**
  - Jared – Worked on translating our brainstorm further into a digital document and created supporting figures.
  - Kurtis – Began setting up and testing Flower. Began researching Packet Tracer for possible use in our future simulations.
  - Samuel – Researching Graph Neural Networks for use in the ARMZTA model.
  - Nathan – Focused on IoT.

  Discussion points
  - The students with Dr. Ezekiel are developing ideas for a Zero Trust architecture for the ARMZTA model.
  - We have discussed the possibility of combining our small literature reviews into a stronger single review paper.

- **Tasks:**
  - Team
    - Work towards completing final revisions of the phase one papers.
  - Kurtis
    - Continue researching Flower and possible implementations of CML into our proposed model.
  - Samuel
    - Research Graph Neural Networks for application.
  - Nathan
    - Research A.I. rule-based systems and scoring systems.
    - Research into Big Data and whether/how it applies.
  - Jared
    - Finish translating the 2nd phase of the initial framework.
    - Look into Long Short-Term Memory.

Adjournment at 12:20pm
Next meeting will be held on Thursday, July 27th at 11:00am

Zero Trust Research Project (ARMZTA) Meeting Minutes

07-05-2023

- Participants
    - Dr. Soundararajan Ezekiel
    - Dr. Xin-Wen Wu
    - Jared Giesen
    - Kurtis Johnson
    - Samuel Rocco
    - Nathan Metzger
    - Shari Hoch
- Meeting started at 11:00 am
- Unanimously approved minutes for meeting on June 28th, 2023

Main Points:

- **Progress report**
    - Jared – Met with Dr. Ezekiel to brainstorm an initial framework and conducted research on existing Zero Trust applications.
    - Kurtis – Occupied with completing DCNN for IoT.
    - Samuel – Working on DCNN for IoT and met with Dr. Ezekiel to brainstorm an initial framework.
    - Nathan – Occupied with completing IoT and fixing remote access issues.

    Discussion points
    - Bring visual aids such as a document or slideshow with a few talking points to meetings to assist with your progress report. Include achievements, challenges and future work.
    - The students with Dr. Ezekiel are developing ideas for a Zero Trust architecture for the ARMZTA model.
    - Dr. Ezekiel has developed framework plans to discuss and expand upon with the students.

- **Tasks:**
    - Continue researching and developing recommendations to assist in designing a Zero-Trust framework for the ARMZTA model.
    - Everyone needs to read and study our initial brainstorm framework to discuss and expand upon it.

Adjournment at 12:00pm
Next meeting will be held on Thursday, July 13th at 11:00am

Zero Trust Research Project (ARMZTA) Meeting Minutes

06-28-2023

- Participants
    - Dr. Soundarajan Ezekiel
    - Dr. Xin-Wen Wu
    - Jared Giesen
    - Kurtis Johnson
    - Samuel Rocco
    - Nathan Metzger
- Meeting started at 11:30 am
- Unanimously approved minutes for meeting on June 19th, 2023

Main Points:

- **Progress report**
    - Jared – Researching implementations on Zero-Trust for our initial use case.
    - Kurtis – Focused on running IoT algorithms.
    - Samuel – Performed editing on the Zero-Trust literature review.
    - Nathan – Worked on providing groundwork for remote connections to the lab machines for use in both IoT and ARMZTA.
    - Drew – Focused on completing the IoT paper.

  Discussion points
    - Agreed on the project starting scope of a small to medium sized corporate style LAN.
    - We have received 15 machines for constructing our own test LAN.
    - Bring visual aids such as a document or slideshow with a few talking points to meetings to assist with your progress report. Include achievements, challenges and future work.
    - The students with Dr. Ezekiel are developing ideas for a Zero Trust architecture for the ARMZTA model.

- **Tasks:**
    - Continue researching and developing recommendations to assist in designing a Zero-Trust framework for the ARMZTA model.

Adjournment at 12:20 pm
Next meeting will be held on Wednesday July 5th at 11:00am

Zero Trust Research Project (ARMZTA) Meeting Minutes

06-19-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundarajan Ezekiel
  - Dr. Xin-Wen Wu
  - Jared Giesen
  - Kurtis Johnson
  - Samuel Rocco
  - Nathan Metzger
- Meeting started at 9:00 am
- Unanimously approved minutes for meeting on June 6th, 2023

Main Points:

- **Progress report**
  - Jared – No updates due to preparation and delivery of GenCyber.
  - Kurtis – No updates due to preparation and delivery of GenCyber.
  - Samuel – No updates due to preparation and delivery of GenCyber.
  - Nathan – No updates due to preparation and delivery of GenCyber.

  Discussion points
  - Agreed on the project starting scope of a small to medium sized corporate style LAN.
  - Bring visual aids such as a document or slideshow with a few talking points to meetings to assist with your progress report. Include achievements, challenges and future work.
  - We have received 15 machines for constructing our own test LAN.

- **Tasks:**
  - Continue researching and developing recommendations to assist in designing a Zero-Trust framework for the ARMZTA model.

Adjournment at 9:45 am
Next meeting will be held on Wednesday, June 28th at 11:30am

Zero Trust Research Project (ARMZTA) Meeting Minutes

06-06-2023

- Participants
    - Dr. Waleed Farag (PI)
    - Dr. Soundarajan Ezekiel
    - Dr. Xin-Wen Wu
    - Jared Giesen
    - Kurtis Johnson
    - Samuel Rocco
    - Nathan Metzger
- Meeting started at 10:00 am
- Unanimously approved minutes for meeting on May 31st, 2023

Main Points:

- **Progress report**
    - Jared – Limited time due to GenCyber module preparations.
    - Kurtis – Time limited to develop GenCyber modules.
    - Samuel – Received machines for developing a test LAN and is working on GenCyber modules.
    - Nathan – No official assignment and time limited due to GenCyber preparations.

  Discussion points
    - Students should update Dr. Ezekiel on any progressions before the meetings.
    - Agreed on the project starting scope of a small to medium sized corporate style LAN.
    - Bring visual aids such as a document or slideshow with a few talking points to meetings to assist with your progress report. Include achievements, challenges and future work.
    - Lynn will be leaving this and related projects.
    - We have received 15 machines for constructing our own test LAN.

- **Tasks:**
    - Finish revisions to your papers as soon as possible.

Adjournment at 11:00am
Next meeting will be held on Monday, June 19th at 9:00am

Zero Trust Research Project (ARMZTA) Meeting Minutes

05-31-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundarajan Ezekiel
  - Dr. Xin-Wen Wu
  - Drew Rado
  - Jared Giesen
  - Kurtis Johnson
  - Samuel Rocco
  - Lynn Munro
  - Nathan Metzger
- Meeting started at 11:00 am
- Unanimously approved minutes for meeting on May 25th, 2023

Main Points:

- **Progress report**
  - Drew – Continuing work on finalizing the paper and finalizing reflections.
  - Jared – Provided answers to the assigned questions on risk assessment and is finishing revisions to the literature review and reflection.
  - Kurtis – Discussed assigned questions on collaborative machine learning and some reflections on applying collaborative machine learning to our model.
  - Samuel – Provided answers and reflections toward his first two assigned questions in zero–trust architecture.
  - Lynn – Provided initial reflections on the literature review on risk detection.
  - Nathan – No assignments in this project.

  Discussion points
  - Students should update Dr. Ezekiel on any progressions before the meetings.
  - Agreed on the project starting scope of a small to medium sized corporate style LAN.
  - Bring visual aids such as a document or slideshow with a few talking points to meetings to assist with your progress report.

- **Tasks:**
  - Finish revisions to your papers as soon as possible.
  - Explore the possibility and viability of securing additional machines and setting up a LAN network in 305.

Adjournment at 1:00 pm
Next meeting will be held on Tuesday, June 6th at 10:00am

Zero Trust Research Project (ARMZTA) Meeting Minutes

05-25-2023

- Participants
    - Dr. Waleed Farag (PI)
    - Dr. Soundarajan Ezekiel
    - Drew Rado
    - Jared Giesen
    - Kurtis Johnson
    - Samuel Rocco
    - Lynn Munro
- Meeting started at 11:00 am
- Unanimously approved minutes for meeting on May 19th, 2023

Main Points:

- **Progress report**
    - Drew – Began brainstorming ideas for automated authentication systems for use in ZTA. Met with Ezekiel for technical discussions and for brainstorming revisions for his paper.
    - Jared – Met with Dr. Ezekiel to brainstorm paper revisions and concepts of how to apply risk assessments to ZTA.
    - Kurtis – Has been busy with running algorithms for the IoT project.
    - Samuel – Studied the project questions on ZTA and researched beyond Maria's findings.
    - Lynn – Began researching papers on similar projects especially on large scale continuous systems.

  Discussion points
    - Ensure that your papers fully answer your assigned questions with technical details and include a reflection that recommends future implementation ideas.
    - Students should update Dr. Ezekiel on any progressions before the meetings.

- **Tasks:**
    - Analyze the literature reviews to begin devising ideas for the ARMZTA model.
    - Prepare full and complete technical answers to the assigned questions by the next meeting so the team can move forward to the next phase.

Adjournment at 12:20 pm
Next meeting will be held on Wednesday, May 31st at 11:00am

Zero Trust Research Project (ARMZTA) Meeting Minutes

05-19-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundarajan Ezekiel
  - Drew Rado
  - Jared Giesen
  - Kurtis Johnson
  - Samuel Rocco
  - Nathan Metzger
  - Lynn Munro
- Meeting started at 9:00 am
- Unanimously approved minutes for meeting on May 9th, 2023

Main Points:

- **Progress report**
  - Drew – Presented reflection of literature review covering challenges in autonomous risk mitigation, current techniques, and possible methods to implement.
  - Jared – Continued ironing and fleshing out literature review including reflection.
  - Kurtis – Began reading the literature reviews from the previous team members to better acquaint themselves with the project, especially Skye's literature review.
  - Samuel – Began learning about zero-trust architectures, including Maria's literature review.
  - Nathan – No current specific tasks on this project, and busy with the GenCyber assignment.
  - Lynn – Read Zaryn's literature review to familiarize themselves with the project.

  Discussion points
  - Ensure that your papers fully answer your assigned questions with technical details and include a reflection that recommends future implementation ideas.
  - Students should update Dr. Ezekiel on any progressions before the meetings.

- **Tasks:**
  - New students should continue to familiarize themselves with the project and results of the literature review.
  - Analyze the literature reviews to begin devising ideas for the ARMZTA model.
  - Sam should further explore the literature reviews to familiarize themselves and contribute to developing ideas to move forward.
  - Jared should add more technical detail to their literature review.

Adjournment at 10:30am
Next meeting will be held on Thursday, May 25th at 11:00am

Zero Trust Research Project (ARMZTA) Meeting Minutes

05-09-2023

- Participants
    - Dr. Waleed Farag (PI)
    - Dr. Soundarajan Ezekiel
    - Dr. Xin-Wen Wu
    - Drew Rado
    - Jared Giesen
    - Kurtis Johnson
    - Samuel Rocco
    - Lynn Munro
- Meeting started at 2:00 pm
- Unanimously approved minutes for meeting on April 26th, 2023

Main Points:

- **Progress report**
    - Drew – Working on preparing a reflection report for the next meeting.
    - Jared – Working on preparing a reflection report for the next meeting.

  Discussion points
    - Include a reflection section of your findings throughout the entire review and add your recommendations for going forward at the end of the report.

- **Tasks:**
    - New students should continue to familiarize themselves with the project and results of the literature review.
    - Analyze the literature reviews to begin devising ideas for the ARMZTA model.
    - Prepare to present your reflections/suggestions at the next meeting.

Adjournment at 3:15pm
Next meeting will be held on Friday, May 19th at 9:00am

Zero Trust Research Project (ARMZTA) Meeting Minutes

04-26-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundarajan Ezekiel
  - Dr. Xin-Wen Wu
  - Maria Belaga
  - Zaryn Good
  - Drew Rado
  - Sky Semone
  - Jared Giesen
  - Kurtis Johnson
  - Samuel Rocco
  - Lynn Munro
- Meeting started at 12:00 pm
- Unanimously approved minutes for meeting on April 19th, 2023

Main Points:

- **Progress report**
  - Zaryn – Turned in draft of paper and is adding a reflection section.
  - Maria – Turned in draft of paper and is adding a reflection section.
  - Drew – Turned in draft of paper and is adding a reflection section.
  - Sky – Turned in draft of paper and is adding a reflection section.
  - Jared – Turned in draft of paper and is finishing the conclusion sections of the paper to be added, including a reflection section.
  - Kurtis – Has been reading papers on Federated Machine Learning.
  - Samuel – Has been meeting with Maria for training.
  - Lynn – Has been learning about PyTorch and Flower ML.

  Discussion points
  - Be sure to incorporate and train students new to the project.
  - Be sure that all project materials have their current versions uploaded to OneDrive.
  - We will not meet in the week of May 1st due to student finals.
  - Include a reflection section of your findings throughout the entire review and add your recommendations for going forward at the end of the report.
  - Remember to claim all remaining hours for the Spring Semester by Friday May 5th.
- **Tasks:**
  - Everyone should investigate Flower and other similar projects.
  - Everyone should work on refining their draft.

Adjournment at 12:15pm
Next meeting will be held on Wednesday, May 10th at 12:15pm

Zero Trust Research Project (ARMZTA) Meeting Minutes

04-19-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundarajan Ezekiel
  - Maria Belaga
  - Drew Rado
  - Sky Semone
  - Jared Giesen
  - Kurtis Johnson
  - Samuel Rocco
  - Lynn Munro
- Meeting started at 11:45 am
- Unanimously approved minutes for meeting on April 14th, 2023

Main Points:

- **Progress report**
  - Zaryn – Working on the completion of his final version.
  - Maria – Met with Sam for training and is refining her paper.
  - Drew – Finished abstract and introduction moving into the rest of the paper.
  - Sky – Continued researching the Flower Framework and training Kurtis.
  - Jared – Continued work of combining findings into final report.

  Discussion points
  - Continue testing the Flower ML Framework.
  - Be sure to incorporate and train students new to the project.
  - Be sure that all project materials have their current versions uploaded to OneDrive.
  - We will not meet in the week of May 1st due to student finals.
  - Ensure you are documenting your research thoroughly.
  - Include a reflection section of your findings throughout the entire review and add your recommendations for going forward at the end of the report.
- **Tasks:**
  - ***Finish*** your research reports by April 22nd.
  - Everyone should investigate Flower and other similar projects.
  - Kurtis should work closely with Sky to learn as much as possible.
  - Samuel should work closely with Maria and Zaryn to learn as much as possible.

Adjournment at 12:10 pm
Next meeting will be held on Wednesday, April 26th at 11:45 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

04-14-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Xin-Wen Wu
  - Maria Belaga
  - Drew Rado
  - Sky Semone
  - Jared Giesen
  - Kurtis Johnson
  - Samuel Rocco
- Meeting started at 11:55 am
- Unanimously approved minutes for meeting on April 7th, 2023

Main Points:

- **Progress report**
  - Zaryn – Working on finishing his literature review
  - Maria – Continued work on finishing paper and sorting sources.
  - Drew – Moved past outline and began drafting the final copy.
  - Sky – Time limited but has made steady progress on paper.
  - Jared – Worked on sorting sources to finish paper.

  Discussion points
  - Continue testing the Flower ML Framework.
  - Be sure to incorporate and train students new to the project.
  - Be sure that all project materials have their current versions uploaded to OneDrive.
  - We will not meet in the week of May 1st due to student finals.
- **Tasks:**
  - ***Finish*** your research reports by April 22nd.
  - Everyone should investigate Flower and other similar projects.
  - Kurtis should work closely with Sky to learn as much as possible.
  - Samuel should work closely with Maria and Zaryn to learn as much as possible.

Adjournment at 12:10 pm
Next meeting will be held on Wednesday, April 19th at 11:45 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

04-07-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundararajan Ezekiel
  - Dr. Xin-Wen Wu
  - Zaryn Good
  - Drew Rado
  - Sky Semone
  - Jared Giesen
  - Kurtis Johnson
  - Samuel Rocco
- Meeting started at 11:45 am
- Unanimously approved minutes for meeting on March 31st, 2023

Main Points:

- **Progress report**
  - Zaryn – Sorted through papers and began a search for papers more focused on applications in zero-trust environments.
  - Maria – Found a few new papers to summarize in the report.
  - Drew – Continued work on his structured outline.
  - Sky – Continued testing flower and sorting through sources gathered.
  - Jared – Spent time cleaning and reorganizing notes on sources.

  Discussion points
  - Many students shared that they plan on spending more time on the project once the IoT project is done.
  - Continue testing the Flower ML Framework.
  - Be sure to incorporate and train students new to the project.
  - Be sure that all project materials have their current versions uploaded to OneDrive.
- **Tasks:**
  - ***Finish*** your research reports by April 22nd.
  - Everyone should investigate Flower and other similar projects.

Adjournment at 12:00 pm
Next meeting will be held on Wednesday, April 12th at 11:45 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

03-31-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundararajan Ezekiel
  - Dr. Xin-Wen Wu
  - Zaryn Good
  - Drew Rado
  - Sky Semone
  - Jared Giesen
  - Kurtis Johnson
  - Samuel Rocco
- Meeting started at 11:45 am
- Unanimously approved minutes for meeting on March 22nd, 2023

Main Points:

- **Progress report**
  - Zaryn – Assisted Jared with poster section and is nearing completion of literature review.
  - Maria – Assisted Jared with poster section and completed section on securing zero-trust sections.
  - Drew – Assisted Jared with poster section and continued work on compiling resource results for paper.
  - Sky – Got Flower running on Titan and continued work on writing paper.
  - Jared – Completed the scholars forum poster and finished reading new paper.

  Discussion points
  - Many students shared that they plan on spending more time on the project once the IoT project is done.
  - Continue testing the Flower ML Framework.
  - Be sure to incorporate and train students new to the project.
- **Tasks:**
  - Finish your research reports.
  - Everyone should investigate Flower and other similar projects.
  - Look into setting up Flower on Titan.

Adjournment at 12:20 pm
Next meeting will be held on Friday, April 7th at 11:45 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

03-22-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundararajan Ezekiel
  - Zaryn Good
  - Maria Balega
  - Drew Rado
  - Sky Semone
  - Jared Giesen
  - Kurtis Johnson
  - Samuel Rocco
  - Bryce Salyers
- Meeting started at 11:45 am
- Unanimously approved minutes for meeting on March 8th, 2023

Main Points:

- **Progress report**
  - Zaryn – Time limited from other projects.
  - Maria – Time limited from other projects.
  - Drew – Time limited from other projects.
  - Sky – Began testing the Flower ML Framework and taking steps to install it onto Titan.
  - Jared – Began work on poster presentation.

  Discussion points
  - Many students shared that they plan on spending more time on the project once the IoT project is done.
  - More time should be spent researching and testing the Flower ML Framework.
  - Dr. Ezekiel has approved the request to introduce a specific user login system for Titan to track changes from different users.
  - Be sure to incorporate and train students new to the project.
- **Tasks:**
  - Finish your research reports.
  - Everyone should investigate Flower and other similar projects.
  - Look into setting up Flower on Titan.
  - Create and send research summaries to Jared for the scholar forum poster.

Adjournment at 12:10 pm
Next meeting will be held on Wednesday, March 29th at 11:45 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

03-08-2023

- Participants
  - Dr. Soundararajan Ezekiel
  - Dr. Xin-Wen Wu
  - Maria Balega
  - Drew Rado
  - Sky Semone
  - Jared Giesen
- Meeting started at 11:45 am
- Unanimously approved minutes for meeting on March 1st, 2023

Main Points:

- **Progress report**
  - Zaryn – Time limited due to IoT project.
  - Maria – Time limited due to IoT project.
  - Drew – Time limited due to IoT project.
  - Sky – Time limited due to IoT project.
  - Jared – Submitted proposal for scholar forum and continued work on paper.

  Discussion points
  - Many students shared that they plan on spending more time on the project once the IoT project is done.
  - More time should be spent researching and testing the Flower ML Framework.
  - Dr. Ezekiel has approved the request to introduce a specific user login system for Titan to track who makes what changes.
  - Faculty and students recommended to meet next on March 22nd.
  - Our poster presentation for at the scholar's forum has been approved.
- **Tasks:**
  - Finish your research reports.
  - Everyone should investigate Flower and other similar projects.
  - Look into setting up Flower on Titan.

Adjournment at 12:05 pm
Next meeting will be held on Wednesday, March 22nd at 11:45 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

3-01-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundararajan Ezekiel
  - Dr. Xin-Wen Wu
  - Maria Balega
  - Sky Semone
  - Jared Giesen
- Meeting started at 11:55 am
- Unanimously approved minutes for meeting on February 22nd, 2023

Main Points:

- **Progress report**
  - Zaryn – Time limited due to IoT project
  - Maria – Time limited due to IoT project
  - Drew – Time limited due to IoT project
  - Sky – Time limited due to IoT project
  - Jared – Continued work on finishing up research report.

  Discussion points
  - Dr. Wu shared Flower Collaborative ML framework which may be helpful to those researching on the topic
  - Many students shared that they plan on spending more time on the project once IoT project is done.
- **Tasks:**
  - Everyone should investigate Flower and other similar projects and ask questions next meeting.
  - Jared will submit an abstract for a poster presentation of the project at the Scholar Forum

Adjournment at 12:15 pm
Next meeting will be held on Wednesday, March 8th at 11:45 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

2-22-2023

- Participants
  - Dr. Soundararajan Ezekiel
  - Dr. Xin-Wen Wu
  - Zaryn Good
  - Maria Balega
  - Drew Rado
  - Sky Semone
- Meeting started at 11:50 am
- Unanimously approved minutes for meeting on February 15th, 2023

Main Points:

- **Progress report**
  - Zaryn – Time limited due to IoT project but plans to spend more time on the project in the future as IoT finished up
  - Maria – Time limited due to IoT project.
  - Drew – Time limited due to IoT project.
  - Sky – Time limited due to IoT project.
  - Jared – Finished introduction and now working on body of paper.

  Discussion points
  - Dr. Wu shared Flower Collaborative ML framework which may be helpful to those researching on the topic
  - Many students shared that they plan on spending more time on the project once IoT project is done.
- **Tasks:**
  - Work on finishing your research reports by the end of the month.
  - Everyone should investigate Flower and other similar projects and ask questions next meeting.

Adjournment at 12:03 pm
Next meeting will be held on Wednesday, February 22nd at 11:45 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

2-15-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundararajan Ezekiel
  - Dr. Xin-Wen Wu
  - Zaryn Good
  - Drew Rado
  - Jared Giesen
- Meeting started at 11:55 am
- Unanimously approved minutes for meeting on February 8th, 2023

Main Points:

- **Progress report**
  - Zaryn – Time limited due to IoT project but is chipping away at the paper draft.
  - Maria – Time limited due to IoT project.
  - Drew – Time limited due to IoT project.
  - Sky – Time limited due to IoT project.
  - Jared – Working on introduction and body of paper.

  Discussion points
  - In future think about creating a poster for advertising the project at the scholar forum on April 5th (Submissions due by March 3rd).
  - Remember to thoroughly address your assigned questions in your paper.

- **Tasks:**
  - Work on finishing your research reports by the end of the month.

Adjournment at 12:10 pm
Next meeting will be held on Wednesday, February 22nd at 11:45 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

02-08-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundararajan Ezekiel
  - Dr. Xin-Wen Wu
  - Zaryn Good
  - Maria Balega
  - Drew Rado
  - Sky Semone
  - Jared Giesen
- Meeting started at 12:00 pm
- Unanimously approved minutes for meeting on February 1st, 2023

Main Points:

- **Progress report**
  - Zaryn – Worked on drafting the paper further, but time was limited by the IoT project.
  - Maria – Worked on some diagrams for the paper and wrote on issues involved with Zero Trust.
  - Drew – Time limited due to IoT project.
  - Sky – Worked on a summary of federated algorithms.
  - Jared – Finished reading remaining papers on methods of automated risk assessment.

  Discussion points
  - In future think about creating a poster for advertising the project at the scholar forum on April 5th (Submissions due by March 3rd).
  - Remember to thoroughly address your assigned questions in your paper.

- **Tasks:**
  - Work on finishing your research reports.

Adjournment at 12:10 pm
Next meeting will be held on Wednesday, February 15th at 11:45 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

02-01-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundararajan Ezekiel
  - Dr. Xin-Wen Wu
  - Zaryn Good
  - Maria Balega
  - Drew Rado
  - Sky Semone
  - Jared Giesen
- Meeting started at 11:50 am
- Unanimously approved minutes for meeting on January 25th, 2023

Main Points:

- **Progress report**
  - Zaryn – Continued progress on lit review section of the paper and is planned to complete it very soon.
  - Maria – Time limited due to IoT project.
  - Drew – Worked on reading a few new papers on automatic mitigation and another paper shifting risk management from the often-standard monetary metric for evaluation to system vulnerability-based evaluation metrics.
  - Sky – Time limited due to IoT project.
  - Jared – Read and noted a paper on automated vulnerability prediction for Linux and began reading a paper on machine learning for automated risk assessments in large dynamic systems such as smart cities.

  Discussion points
  - In future think about creating a poster for advertising the project at the scholar forum on April 5th (Submissions due by March 3rd).
  - Remember to thoroughly address your assigned questions in your paper.

- **Tasks:**
  - Work on finishing your research reports.

Adjournment at 12:15 pm
Next meeting will be held on Wednesday, February 8th at 11:45 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

01-25-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundararajan Ezekiel
  - Dr. Xin-Wen Wu
  - Zaryn Good
  - Maria Balega
  - Drew Rado
  - Sky Semone
  - Jared Giesen
- Meeting started at 11:45 am
- Unanimously approved minutes for meeting on January 18th, 2023

Main Points:

- **Progress report**
  - Zaryn – Continued work on his lit review and found two new sources on efficient intrusion detection.
  - Maria – Continued adding to sections and organizing the paper.
  - Drew – Limited time due to IoT project.
  - Sky – Continued research on implementations of CML in risk mitigation.
  - Jared – Found a group of papers to read focusing on automated quantitative risk assessment and management.

  Discussion points
  - Stay on track to wrap up the lit review phase in the next few weeks.
  - In future think about creating a poster for advertising the project at the scholar forum on April 5th (Submissions due by March 3rd).
  - Remember to thoroughly address your assigned questions in your paper.

- **Tasks:**
  - Work on finishing your research reports.

Adjournment at 12:15 pm
Next meeting will be held on Wednesday, February 1st at 11:45 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

01-18-2023

- Participants
  - Dr. Waleed Farag (PI)
  - Dr. Soundararajan Ezekiel
  - Dr. Xin-Wen Wu
  - Zaryn Good
  - Drew Rado
  - Sky Semone
  - Jared Giesen
- Meeting started at 11:45 am
- Unanimously approved minutes for meeting on January 11th, 2023

Main Points:

- **Progress report**
  - Zaryn – Found some more papers and began writing the lit review section of his paper.
  - Maria – Edited draft of paper further.
  - Drew – Continued reading and documenting papers.
  - Sky – Started running through references of the large paper mentioned last week.
  - Jared – Found and began reading some new sources.

  Discussion points
  - Stay on track to wrap up the lit review phase in the next few weeks.
  - In future think about creating a poster for advertising the project at the scholar forum on April 5th (Submissions due by March 3rd).

- **Tasks:**
  - Work on finishing your research reports.

Adjournment at 12:15 pm
Next meeting will be held on Wednesday, January 25th at 11:45 am

Zero Trust Research Project (ARMZTA) Meeting Minutes

01-11-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Zaryn Good
- Drew Rado
- Sky Semone
- Jared Giesen

Main Points:

- Meeting started at 11:45 am.
- Unanimously approved minutes for meeting on January 5th, 2023.
- **Progress report**
    - Zaryn – Found and read new sources focusing on efficiency.
    - Drew – Worked on draft of paper.
    - Sky – Working on reading and documenting a large paper.
    - Jared – Started draft of paper and is searching for a few more detailed papers.

  Discussion points
    - Stay on track to wrap up the lit review phase soon.
    - Project is now under the acronym of ARMZTA.

- **Tasks:**
    - Work on finishing your research reports.

Adjournment at 12:10 pm.
Next meeting will be held on Wednesday, January 18th at 11:45 am.

Zero Trust Research Project (ARMZTA) Meeting Minutes

01-05-2023

Participants

- Dr. Waleed Farag (PI)
- Dr. Soundararajan Ezekiel
- Dr. Xin-Wen Wu
- Zaryn Good
- Drew Rado
- Maria Balega
- Sky Semone
- Jared Giesen

Main Points:

- Meeting started at 2:35 pm
- Unanimously approved minutes for meeting on December 22nd, 2022
- **Progress report**
    - Maria – Continued work and showed progress on paper.
    - Zaryn – Focused on compiling the writeup and is Still searching for a few more papers.
    - Drew – Working on draft of paper.
    - Sky – Continued work on paper and research.
    - Jared – Read remaining collected papers and created basic outline for draft.

  Discussion points
    - Stay on track to complete the lit review phase during winter break.
    - Starting on Jan 11th Meetings will be held in the common hour on Wednesdays
    - Project is now under the acronym of ARMZTA

- **Tasks:**
    - Work on finishing your research reports.

Adjournment at 3:00 pm
Next meeting will be held on Wednesday, January 11th at 11:45 am

Zero Trust Research Project Meeting Minutes

12-22-2022

Participants

- Dr. Xin-Wen Wu
- Dr. Waleed Farag
- Dr. Soundararajan Ezekiel
- Zaryn Good
- Drew Rado
- Maria Balega
- Sky Semone
- Jared Giesen

Main Points:

- Meeting started at 3:30 pm
- Unanimously approved minutes for meeting on December 15th, 2022
- **Progress report**
    - Maria – Began draft of paper.
    - Zaryn – Worked on outline.
    - Drew – Worked on structuring his outline.
    - Sky – Worked on draft of paper and read/documented more papers.
    - Jared – Read and documented 5 papers.
- **Discussion points**
    - Stay on track to complete the lit review phase during winter break.
    - Starting on Jan 11th Meetings will be held in the common hour at 11:10 on Wednesdays
- **Tasks:**
    - Everyone should continue researching, documenting, and outlining.

Adjournment at 4:00 pm.
Next meeting will be held on Thursday, January 5th at 2:00 pm.

Zero Trust Research Project Meeting Minutes

12-15-2022

Participants

- Dr. Xin-Wen Wu
- Dr. Waleed Farag
- Dr. Soundararajan Ezekiel
- Drew Rado
- Maria Balega
- Jared Giesen

Main Points:

- Meeting started at 2:35 pm.
- Unanimously approved minutes for meeting on December 9th, 2022.
- **Progress report**
    - Maria – Read a paper on continuous access, and shared progress on paper outline.
    - Drew – Continued work on notes and loose outline for paper.
    - Jared – Compiled new set of recent papers to review.

- **Discussion points**
    - Stay on track to complete the lit review phase during winter break.
    - We will not meet on December 29th

- **Tasks:**
    - Everyone should continue researching, documenting, and outlining.

Adjournment at 3:05 pm.
Next meeting will be held on Thursday, December 22nd at 3:00 pm.

Zero Trust Research Project Meeting Minutes

12-09-2022

Participants

- Dr. Xin-Wen Wu
- Dr. Waleed Farag
- Dr. Soundararajan Ezekiel
- Zaryn Good
- Drew Rado
- Maria Balega
- Jared Giesen

Main Points:

- Meeting started at 6:35 pm
- Unanimously approved minutes for meeting on December 2nd, 2022
- **Progress report**
    - Maria – Found some more sources on continuous authentication.
    - Zaryn – Read a paper on managed/unmanaged blockchains for detection and comparing it to traditional machine learning methods.
    - Drew – Cleared three more papers, including different use cases of Zero Trust, use in mobile devices, and automated threat hunting.
    - Jared – Read a paper on quantifying likelihood using a proposed hazard metric. Searching for newer sources.

- **Discussion points**
    - The OneDrive is live for file sharing.
    - Stay on track to complete the lit review phase during winter break.

- **Tasks:**
    - Everyone should continue researching, documenting and outlining.

Adjournment at 7:00 pm.
Next meeting will be held on Friday, December 16th at 6:35 pm.

Zero Trust Research Project Meeting Minutes

12-02-2022

Participants

- Dr. Xin-Wen Wu
- Dr. Waleed Farag
- Dr. Soundararajan Ezekiel
- Zaryn Good
- Drew Rado
- Maria Balega
- Sky Semone
- Jared Giesen

Main Points:

- Meeting started at 6:35 pm
- Unanimously approved minutes for meeting on November 25th, 2022
- **Progress report**
    - Maria - Read and noted a paper on deploying a model of ZTA using AI.
    - Zaryn – Read another paper and has begun to outline. Found a paper on the use of blockchains in zero-trust risk detection.
    - Drew – Read and noted another paper with Focus on mathematical model for vulnerability analysis.
    - Sky – Continued research on collaborative machine learning, in search of more comprehensive papers.
    - Jared - Received and began reviewing Meghan's work on Risk Assessment.

- **Discussion points**
    - Jared will continue Meghan's work on Risk Assessment.
    - OneDrive will be set up ASAP.

- **Tasks:**
    - Everyone should continue researching, documenting and outlining.

Adjournment at 7:00 pm.
Next meeting will be held on Friday, December 9th at 6:35 pm.

Zero Trust Research Project Meeting Minutes

11-25-2022

Participants

- Dr. Farag (PI)
- Dr. S. Ezekiel
- Dr. Wu
- Drew Rado
- Sky Semone

Main Points:

- Meeting started at 6:35 pm
- Unanimously approved minutes for meeting on November 18th, 2022
- **Progress report**
    - Drew showed his progress and outline, continued to read papers.
        - Reviewed papers on risk evaluation and implementing vulnerability detecting measures with AI in datacenters.
    - Sky is also continuing research and writing
        - Has focused on collaborative ML, but will now look at implementation problems, and other points

- **Discussion points**
    - Megan is no longer working on the project, so someone else should continue her work.
    - Dr Farag mentioned that we should create short summaries of each paper's highlighted concepts and key points of the author's research.
    - Dr. Farag will make a shared OneDrive for this project where we can share resources.
    - We will continue writing down findings through the break.

- **Tasks:**
    - Everyone – continue progress and set a reasonable pace to have a completed work during winter break.

Adjournment at 6:50 pm.
Next meeting will be held on Friday, December 2nd at 6:30 PM, following the I.o.T. meeting.

Zero Trust Research Project Meeting Minutes

11-18-2022

Participants

- Dr. Xin-Wen Wu
- Dr. Soundararajan Ezekiel
- Zaryn Good
- Drew Rado
- Maria Balega
- Sky Semone
- Jared Giesen

Main Points:

- Meeting started at 6:35 pm
- Unanimously approved minutes for meeting on November 18th, 2022
- **Progress report**
    - Maria continued research and documentation on the question of "Why Zero Trust?" Two papers analyzed and documented. Working on the machine learning details of zero trust architectures.
    - Zaryn continued research and documentation on risk detection procedures. Read and documented two papers. One with a focus on modern risk detection and correction systems. The second on Smart Irrigation that included IOT systems with automated anomaly detection systems.
    - Drew continued research and documentation on automated risk responses. Provided a detailed document in response to the key questions created from analyzed papers.
    - Sky continued research with a focus on researching implementation strategies.
    - Jared continued research into machine learning models used in IOT, using resources provided by Maria and Zaryn.

- **Discussion Points**
    - Went over everyone's research progress including their documentations.
    - Continue research
        - Bolster responses to key questions.
        - Research implementation details for found concepts.
- **Tasks:**
    - Maria
        - Continue research to answer the remaining key questions on zero-trust.
        - Continue documenting findings.
    - Zaryn
        - Research requirements and viability of implementing similar systems found in the papers analyzed.
        - Continue documenting findings.
    - Drew
        - Further research modern examples and implementations of autonomous risk detection.
        - Continue documenting findings.
    - Sky
        - Continue researching implementation details.
        - Continue documenting findings.

- Jared
  - Record meeting minutes for meetings.
  - Continue getting up to speed on previous machine learning methods used.
  - Assist where needed.

Adjournment at 7:15 pm.
Next meeting will be held on Friday, November 25th at 6:35 pm.

Zero Trust Research Project Meeting Minutes

11-11-2022

Participants

- Dr. Waleed Farag (PI)
- Dr. Xin-Wen Wu
- Dr. Soundararajan Ezekiel
- Zaryn Good
- Drew Rado
- Meghan Schilpp
- Maria Balega
- Sky Semone
- Jared Giesen

Main Points:

- Meeting started at 6:35 pm.
- Unanimously approved minutes for meeting on November 11th, 2022.
- **Progress report**
    - Maria has begun research on the objectives and benefits of implementing zero-trust models. Met with Jared to assist with introductions to the project.
    - Meghan began research into the details of risk assessment.
    - Zaryn gathered various papers on risk detection and has begun researching the topic further. Met with Jared to assist with introductions to the project.
    - Drew has compiled many papers on automated risk response and has begun reading through them.
    - Sky has gathered various papers and works on building automated risk detection and response systems.
    - Jared has joined the team and has met with Zaryn and Maria to be introduced to some of the machine learning models implemented in previous IOT iterations. Furthermore, to learn about access and etiquette of using Titan.

    Discussion points
    - Went over everyone's initial progress on the assigned research.
    - Begin documenting all research findings in preparation for the following meetings.
        - Use the template provided to document findings.
    - Dr. Wu can assist with full access to specific locked IEEE papers.
        - Email him for assistance.
    - There will be a OneDrive for sharing documents etc.
    - Begin thinking and researching implementations for future stages of the project.

- **Tasks:**
    - Maria
        - Continue researching zero-trust models.
        - Document findings.
    - Meghan
        - Continue researching risk assessment.
        - Document findings.
    - Zaryn
        - Continue researching risk detection.

        - Document findings.
    - Drew
        - Continue researching automated risk response.
        - Document findings.
    - Sky
        - Continue researching applications of machine learning for automated risk detection and response systems.
        - Document findings.
    - Jared
        - Record meeting minutes for meetings.
        - Assist where needed.

Adjournment at 7:20 pm.
Next meeting will be held on Friday, November 18th at 6:35 pm.