

U.S. Department of Homeland Security

SCIENCE AND TECHNOLOGY DIRECTORATE

Remote Identity Validation Tech Demo Challenge



Science and
Technology

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Outline

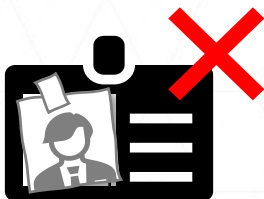
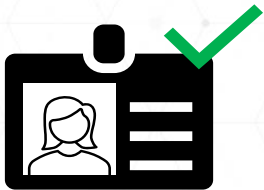
- Congratulations on your conditional acceptance to participate in RIVTD Track 3 as a Passive Presentation Attack Detection (PAD) System
- Technology Test Overview
- VIP Day
- Final Acceptance Requirements
 - Software & Application Programming Interface (API)
 - Cooperative Research and Development Agreement (CRADA) & Communication



RIVTD Tracks

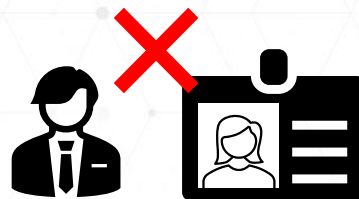
Track 1: ID Validation

- Information Check
- Tamper Check
- Security Check



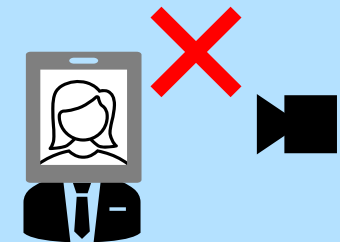
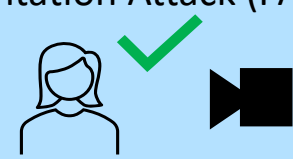
Track 2: Match to ID

- 1:1 Verification



Track 3: Liveness and Presentation Attack Detection (PAD)

- Reject screens and printouts
- Reject masks and other Presentation Attack (PAs)

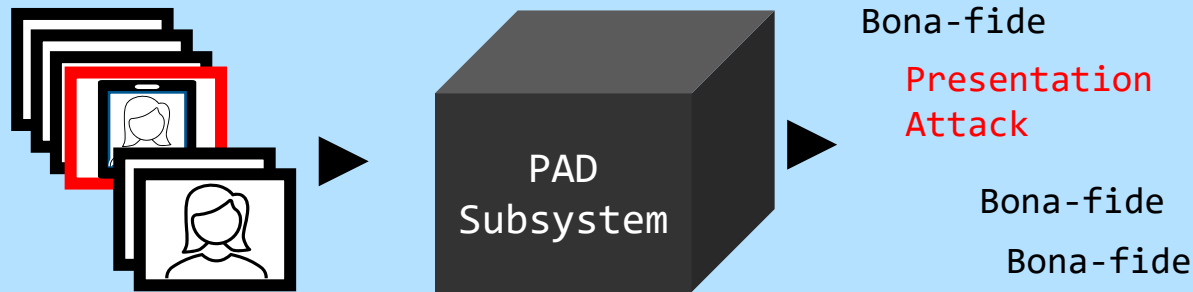


Current focus is Track 3: Liveness and Presentation Attack Detection

Technology Tests vs. Scenario Tests

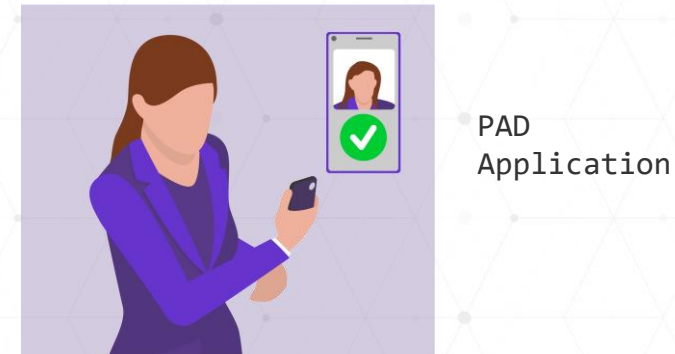
- Technology Testing:

- Focus on performance of a multiple presentation attack detection subsystems (e.g., bona fide biometric samples, masks, replay videos)
- Passive PAD Subsystems
- Easily repeatable



- Scenario Testing:

- Assess performance of PAD application in the context of use
- Real people interact with the system
- Active PAD subsystems
- Costly to repeat



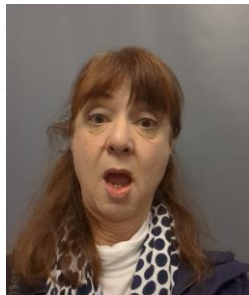
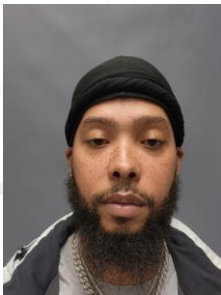
Passive PAD systems will be tested using technology testing.

Data Collection

- Bona-fide “Selfie” Images and Video
- Presentation Attack Instruments

Bona-fide “Selfie” Images and Video

- Dataset of “selfie” images and videos
- Imagery will be captured in a standard environment at MdTF in front of a gray background
 - Selfie images may include variation in pose and expression
 - Selfie video will be 10 seconds long – no special actions requested from user
- Images and video will be acquired using a selection of mobile phones
 - Images will be JPEG or PNG
 - Videos will be MOV or MP4
- Images and videos will be provided as base64 encoded strings



All volunteers shown here consented to have their images used in government presentations.



Apple iPhone 14



Google Pixel 7

Presentation Attack Instruments

Level A	Level B	Level C
<ul style="list-style-type: none">• Printout on Paper• Display on Screen	<ul style="list-style-type: none">• Paper Masks• Video Replay on Screen	<ul style="list-style-type: none">• Attacks requiring special hardware and significant effort/cost to perform

- The number and specific species of PAIs will not be disclosed
- PAD performance will be assessed per PAI species

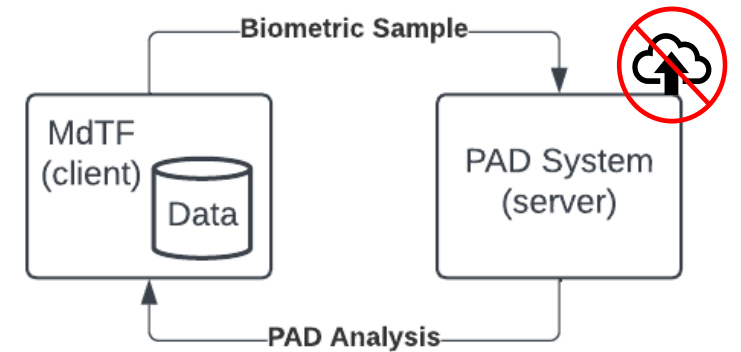
System Requirements

- Passive PAD System Requirements
- Passive PAD System API
- Docker Submission Portal

Passive PAD System Requirements

Passive PAD Subsystem Requirements (1)

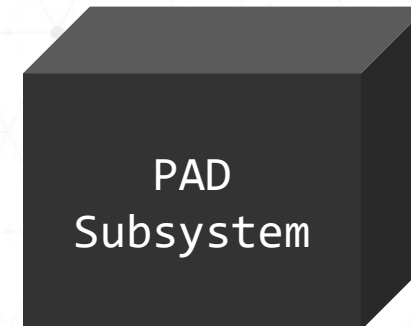
- Subsystems shall consist of a **single** docker container, started via a docker run command
- Subsystems shall be **Linux** based docker containers
- HTTP servers shall be hosted on **port 8080**
- Subsystems shall be less than **5 GB** in size
- Subsystems shall operate on previously acquired biometric samples
- Subsystems shall implement the RIVTD Passive PAD System API
- Subsystems shall require **no outside functionality** and will be run on internal machines without access to the internet
- If subsystems require a **license to operate**, that license shall be time bounded to operate, without restrictions (usage, machine portability, etc.) for 1 year from the RIVTD Track 3 submission deadline



Passive PAD Subsystem Requirements (2)

- Subsystem Docker images shall be saved as a **.tgz** file
- Subsystem Docker images shall be tagged with a version
 - Increment the version number for each re-submission (e.g., 1.0.0 → 1.0.1)
- Subsystems shall be uploaded through Docker Portal on mdtf.org

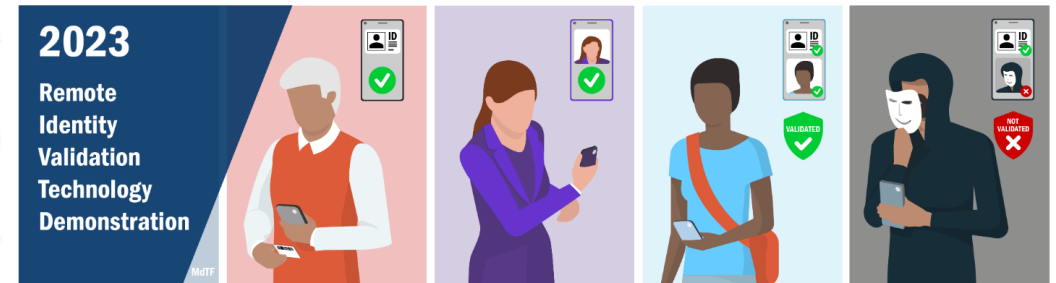
```
docker save ${COMPANY_NAME}-rivtd-track3-  
system:1.0.0 |  
gzip > ${COMPANY_NAME}-rivtd-system.tgz
```



Automated checks for API conformance will have to pass prior to acceptance of the submitted Docker image.

Docker Submission Portal

- Submission Requirements:
 - Docker image .tgz file
 - Systems larger than 5 GB will not be accepted
 - Sample **bona fide image / video**
 - Sample **presentation attack image / video**
- Automated API conformance testing:
 - Systems failing to conform to the API will not be accepted
 - (1) Info endpoint response
 - (2) PA Not Detected response using **bona fide image / video (jpg, png, mov, mp4)**
 - (3) PA Detected response using **presentation attack image / video (jpg, png, mov, mp4)**
- Automated results e-mail will be generated and sent to you:
 - Pass / Fail (including step)
- Security (CVE) scans will also be performed



Track 3 Passive PAD API Vendor Docker Submission

In order to participate in the upcoming technology demonstration you are required to upload the following files:

1. Docker image (tar, tgz), 5GB maximum file size

BROWSE FILES

track3-passive-api-simulator.tgz

2a. Presentation Attack Present Image (jpg, png, mov, mp4)

BROWSE FILES

pad_attack_present.jpg

2b. Presentation Attack Not Present Image (jpg, png, mov, mp4)

BROWSE FILES

pad_attack_not_present.jpg

SUBMIT


PAD API

RIVTD Track 3 – Passive PAD API


The Maryland Test Facility Passive Presentation Attack Detection System Interface

2.0.0 OAS 3.0

Data Analysis

POST /v1/analyze-data-for-pad Analyze biometric capture data for a presentation attack. 

Algorithm Information

GET /v1/info Returns basic information for the algorithm. 

- MdTF systems will send:
 - Biometric Sample
- Passive PAD subsystems reply with:
 - PAD Outcome (true or false)
 - PAD Score (0-1)
 - PAD Properties (key value pairs)



The biometric sample can be a still image or a short video clip (<10 seconds).

Passive PAD API, Algorithm Info

- `/v1/info` (GET)

GET

`/v1/info` Returns basic information for the algorithm.



```
{
  "AlgorithmName": "EyeDetector",
  "AlgorithmVersion": "1.0.1",
  "AlgorithmModality": "Face",
  "CompanyName": "MdtF",
  "TechnicalContactEmail": "john@mdtf.org",
  "RecommendedCPUs": 0.5,
  "RecommendedMem": 512,
  "Test": "MDTF_RIVTD_TRACK3",
  "Thresholds": {
    "1:ten": "0.75",
    "1:1e2": "0.87",
    "1:1e3": "0.93",
    "1:1e4": "0.98"
  }
}
```



Thresholds will be used in the evaluation of your algorithm, set them appropriately.

Passive PAD API, Analyze Data

- `/v1/analyze-data-for-pad` (POST)

- Accepts: Individual (single) base64 encoded PNG or JPG image or a short (<10s) video, encoded as a MOV or MP4.
- Returns: The result of an analysis of a biometric sample for a presentation attack.

```
{  "BiometricSample":  "iVBORw0KGgoAAAANSUhEUgAAAAEAAAABCAIAAACQd1PeAAAAEE1EQVR4nGJiYGAABAAA/8ADAADcZGLFwAAAABJRU5ErkJggg=="}
```

POST

`/v1/analyze-data-for-pad`

Analyze biometric capture data for a presentation attack.

```
{  "PADOutcome": true,  "PADScore": 0.8,  "PADProperties": [    {      "Property": "EyesMoving",      "Value": true    },    {      "Property": "MouthMoving",      "Value": true    },    {      "Property": "PupilsResponsive",      "Value": true    }  ],}
```

```
{  {    "Property": "NonconformantIlluminationDetected",    "Value": true  },  {    "Property": "MoirePatternDetected",    "Value": true  },  {    "Property": "ObscurationDetected",    "Value": true  }  ]}
```


PAD Outcome and Properties

- The system shall return PAD Analysis results for each Biometric Sample
- **PADOutcome** must specify whether the biometric sample is bone-fide (False) or a presentation attack (True)
- **PADScore** indicates level of confidence on whether the biometric sample is a PA:
 - 1 means 100% certain it's a PA
 - 0 means 0% certain it's a PA (i.e., its bona-fide)
- **PADProperties** are key value pairs indicating any properties used by the PAD subsystem to determine PAD outcome and the values of those properties

```
PADAnalysis ▾ {  
  description: Data transfer object for presentation attack information.  
  
  PADOutcome* boolean  
    example: true  
    Whether a presentation attack was determined to be detected (True) or not detected (False).  
  
  PADScore* number($double)  
    example: 0.8  
    A score corresponding to the level of confidence that a presentation attack was detected  
    ranging between 0 and 1.  
  
  PADProperties  
    ▾ [  
    example: List [ OrderedMap { "Property": "EyesMoving", "Value": true }, OrderedMap {  
    "Property": "MouthMoving", "Value": true }, OrderedMap { "Property": "PupilsResponsive",  
    "Value": true }, OrderedMap { "Property": "NonconformantIlluminationDetected", "Value":  
    true }, OrderedMap { "Property": "MoirePatternDetected", "Value": true }, OrderedMap {  
    "Property": "ObscurationDetected", "Value": true } ]  
    Key value pairs describing presentation attack properties and their relationship to the  
    presentation attack outcome/score. There are no strictly defined properties. The inclusion  
    of descriptive properties is encouraged to provide more context. (optional)  
  
    PADProperty > {...}]  
}
```

Final Acceptance Requirements

- Staff List
- CRADA
- Communications
- API Integration
- PAD System Delivery & Installation

System Provider Staff List

- PAD system providers must email a list of staff members who will participate in RIVTD Track 3 activities rivtd@mdtf.org and peoplescreening@hq.dhs.gov with the subject line of “<Company Name> RIVTD Track 3 Staff”
- PAD system providers additionally need to list:
 - Slack channel staff (people to be given access to Slack)
 - Docker portal staff (one individual to be given access to the docker submission portal)
 - People that will come to the MdTF for the RIVTD Track 3 VIP Day
 - Include citizenship information
- List due by **10am ET April 29, 2024**

Slack Channel Access

- Identify up to three (3) individuals from your company to serve as **Slack Channel Staff** to communicate with the MdTF Technical team
- Technical POC should send the list to rivtd@mdtf.org with the subject line of **“<Company Name> RIVTD Track 3 Slack Channel Staff”**
 - To ensure timely access, this list is due by **10am ET May 23, 2024**
- Each **Slack Channel Staff** must email rivtd@mdtf.org with the subject line of **“<Company Name> RIVTD Track 3 Account Request”**
- Originating e-mail must be listed in a prior e-mail from the technical POC

Cooperative Research and Development Agreement (CRADA)

- Agreement between each System Provider (COLLABORATOR) and DHS S&T (SPONSOR)
 - Defines the roles and contributions of the COLLABORATOR and SPONSOR
 - Provides the basis for involvement in RIVTD Track 3 activities
 - Exempt from Freedom of Information Act (FOIA) process
- Must be signed by Corporate Officer
- Submission instructions will be provided when the CRADA is emailed. Signed CRADA is due by **10am ET May 23, 2024**

PAD System Docker Submission

- PAD system providers are required to demonstrate that they have integrated their system with the MdTF Passive PAD API
 - <http://github.mdtf.org>
- PAD systems shall demonstrate API integration by successfully submitting their Docker image to mdtf.org
 - To request portal access, each **Portal Staff** must email rivtd@mdtf.org with the subject line of **“<Company Name> RIVTD Track 3 Portal Account Request”**
- Initial Docker submission is a prerequisite for final acceptance:
 - Deadline: **10am ET June 3, 2024**
- Final Docker submission will be expected by:
 - Deadline: **10am ET June 17, 2024**

Additional Information

- VIP Day
- Docker Image Support

VIP Day

- VIP day will be held at MdTF on **May 7, 2024**
- VIP day is an opportunity for your organization to pitch your system to stakeholders from DHS, other federal and international government agencies, and various trade associations that may attend
- You will have ~5 minutes to brief VIPs about your company and PAD system
 - You may bring promotional materials with you for distribution
- You may bring up to **two** personnel to the MdTF on VIP day, as long as you have provided the required information for those personnel to come to the MdTF
- To participate, send the following materials to rivtd@mdtf.org by **10am ET April 29, 2024**:
 - People that will come to the MdTF for the RIVTD Track 3 VIP Day (including citizenship)
 - If you are unable to attend, you may send a video link describing your system capabilities to be shared with the VIPs

Docker Image Support

- System provider shall make staff available and will be solely responsible for addressing any issues encountered with their system during testing
- Your Docker container will be required to run in a variety of environments
- If an issue is encountered with your system during testing, we will send an e-mail request for a revised system to be uploaded within 10 business days
- Failing to address system issues will result in lower measured system performance

Resources & Where to Ask Questions

- A detailed Statement of Work (SOW) will be provided in the CRADA
- All legal and logistics questions should be directed to peoplescreening@hq.dhs.gov
- Technical communication pertaining to RIVTD Track 3 should be handled via Slack (chatroom):
 - API Integration and Implementation, Metrics
- Technical questions can be sent to rivtd@mdtf.org, but Slack is preferred
- These slides will be available on <http://mdtf.org/rivtd>

