CMU Security Specialist Course

Team Project: Phase 1

Team 6 a.k.a. six senses

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Define security goal

Define assets to protect

Do threat modeling

Do risk assessment to prioritize items

Define security requirements

Derive mitigations

Construct architecture

Implement the mitigations

Verify the mitigations

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Requirements of Secure Coding Training Program, Project Description-1,2,3 The user display and system control application is responsible for the following: Establishing secure and authenticated communication with the camera and image analysis application and user interface when secure mode is selected or

Provides the user interface to control the system. User Interface shall support the REQ-D-02

REQ-D-04 REQ-D-05

Provides the user interface to control the system. User interface shall support the following prodes of operation:

Secure or hon secure mode of communication and the image database. In this mode the control of samples to be collected.

Run Mode – System utilizes camera to identify faces and perform facial recognitive faces and perform facial recognition.

It is a supplied to identify faces and perform facial recognition. REQ-D-06

Communicating with the camera and image analysis application as specified. 3. Communicating with the camera and image analysis application as specified.

REQ-D-07 Display image frames and any accompanying amplifying analysis information received from the camera and image analysis application in the format specified.

Implementing the specified enhancements to the applications additional consideration

REQ-D-09

REQ-Q-01 Ensuring that all software in both applications are architected

REQ-Q-02 and coded to be secure and free of vulnerabilities. REG-D-08 Modifying the implementation so the applications support two modes of communications: 1) a secure mode with all data properly encrypted (including authentication) and 2) a plain text

REQ-Q-03 Proper fault/error detection, recovery, and reporting.

REQ-Q-05 and developing solutions to mitigal e.

REQ-Q-MAnalyzing the provided initial implementation for vulnerabilities Analyze another team's implementation assigned to you for

* reference : LG May 2021 Lecture Secure Coding Project Intro V1.1.pptx.pdf

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The proposed system has the Arthur Market Barrier Application The proposed system has the following basic functional requirements. Note

LD-10◆ A user should be able to initiate a video feed, end a feed. 0.11 A user should be able to end a video feed

10-12 • A user should be able to save a video feed for offline review Q-0-13 • A user should be able to tune image analysis.

The system also has the following architectural concerns (i.e. quality attributes)

EQQ:06 • Performance: The system must deliver video as close to real time as possible. especially in real-time mode.

REQ-D-14 • Authentication:The system must use two factor authentication for sign on and user credentials must be protected Lost or compromised credentials must be handled in a reasonable way.

REQ-D-17 • Communication privacy: When in the desired mode the system must ensure that data sent to a user remains private while in transit. No intermediary should be able to snoop or spy on an ongoing video feed.

REQ-D-18 • Proof of identity (nonrepudiation): Users should be confident that the camera they are using is the one that they believe it is.

REQ-D-19 • Multi-user privacy: The system must ensure that multiple video feeds remain private between the intended users.

REQ-D-20 • reliability: The system must ensure that video is reliably delivered. The system REQ.D-21 should recover from networking errors as soon as possible. The goal is to maintain a secure, performant connection at all costs.

Aside from these requirements, there are a number of basic quality concerns that must be addressed during development.

REQ-Q-07 1. Ensuring that all software in both applications are architected and coded to be secure and free of vulnerabilities

REQ-Q-08 2. Conduct proper fault/error detection, recovery and reporting.

REC-C-09 3 Ensure the developed software adheres to the company coding standard and

quality standards

REQ-Q-11 4. Ensure the developed software is adequately tested.

ments of Secure Coding Training Program, Project Description-1,2,3 ser display and system control application is responsible for the following: set display and system control application is responsible for the following stablishing secure and authenticated communication with the camera and application and user interface when secure mode is selected

stablishing secure and authenticated communication with the camera and hage analysis application and user interface when secure mode is selected or ovides the user interface to control the system. User interface shall support the

Secure or han secure mode of communication of the camera and the number of un Mode – System utilizes camera to identify faces and perform facial recognitive and perform facial recognitive desired and perform facial recognition.

unicating with the camera and image analysis application as specified.

unicating with the camera and image analysis application as specified.

Image frames and any accompanying amplifying analysis information in the camera and image analysis application in the format specified.

enting the specified enhancements to the applications additional consideration

the implementation so the applications support two the implementation so the applications support two communications: 1) a secure mode with all data ncrypted (including authentication) and 2) a plain text

Verror detection, recovery, and reporting.

ne provided initial implementation for vulnerabilities ther team's implementation assigned to you for

* reference : LG May 2021 Lecture Secure Coding Project Intro V1.1.pptx.pdf

REQ-D-09

* reference : LG Security Class Project Description.pdf

					3 Week	M T W	+++	5 Tartan Secure Camera Applicatio	11	
			1 Week	2 Week	F M T W		Requirements	of Tartan Secure Camera Applications the following basic functional requirements	s. Note	
			MTWTF	II M2	H	The pro	oposed system has	the following basic faritations		
		Artifacts 20	xdsx 0 1 1				to and he a	ble to initiate a video feed, end a feed.		
	II Criteria	Schedulexisx, requirements_V2.0		2 2 4		oro D 11	A LICET SHOULD	a video feed to office	review.	ser display and system control application is responsible for the following mage analysis application and user interface when secure with the camera covides the user interface to accommodistic to the commodistic to the commodistic to the commodistic to the user interface to accommodistic to the commodistic to the co
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spal/Si5	A Pri	JetsonNano_pjt.tm7		TH		The sy	ystem also has the	following around the real	time as possible.	stablishing sees control
Context Arison Risk Management Risk Management	A	- PnG.docx - JetsonNano_STRIDE.xlsx	1	###	1		The	system must deliver video as close to rea	i tillio do pos	rage analysis application is response to the state of the
Asset Identified Threat Modeling Threat Modeling Threat Modeling	A	- ThreatModern - Thre	anagement.xisx	1111					d - sign on and	Ovides in and user intermediate for the four
POG(MILLER CONTROL CON		tocurity requirements but		HH			No. No. Th	ne system must use two factor authentication must be protected Lost or compromised or REQ-D-16	on for sign on and	Ser display and system control application is responsible for the following: Stablishing secure and authenticated communication with the camera and user interface when secure mode is selected or control the system. User Interface shall support the large should duery for the name of the persons.
4-3 Brainstorming	A	Second & Presentation		HH		REQ-D-14 •	Authentication: IT	must be protected Lost or compromised Ci	Edelitian	Secure or non-secure of operation. Control the system
4-5 FEE RISK Assessment OWASP	D&/	p Dello		TH#	HH	REQ-D-15	handled in a reas	sonable way.	-t ensure that	at Interface Mode - User Interface
seculrement		7		HH	7		Harras	privacy: When in the desired mode the sys ser remains private while in transit. No inter	mediany should be	
Mitigation Server(Jetson Nano) Architect Doc	ent	7	-d ylex	111		REO-D-17	Communication	privacy: When in the desired mode the sys ser remains private while in transit. No inter reny on an ongoing video feed.	illeulary one	un Mode - System are of the person of the pe
Code mir.	Doc	100%	200.0.1 reviewed.	1111	HIL		able to snoop or	r spy on an ongoing video feed.		Run Mode utilizes compared in front of tabase. In the
Cilentifus Developmen	ment	100% static_analysis_202 100% static_analysis_202 100% - flawfinder_20210607 - flawfinder_20210608	v0.5.0.bd		1			" then I lears should be coming	nt that the camera	Unicating with utilizes a video flex faces and so definer and the number
8-2 Code Review		100% - flawfinder 20210608 100% - cppcheck 20210618 100% - cppcheck 2021061	0 v0.5.0.csv	HH	HHH	REQ-D-18	 Proof of identity 	s the one that they believe it is.		Image framera and interest of identify faces and interest of identify faces
radel		100% - cppcheck 2021001		##	###		they are using i	acy: The system must ensure that multiple on the intended users.	video feeds remain	from the came and any accessmage analysis
Static Analysis Flaw Finnes		#		1	1111	PER D 10	 Multi-user priva 	acy: The system must ensure that managers		Sponsibility and image analying amplication as
9 9-1 COPCINECTO		100%				REQ-D-19	private better		-livered The system	unicating with the camera and image analysis application as specified. Sponsibilities enting the specified enhancements to the camera and the number of the camera and the number of the camera and image analysis application as specified.
9-4 - Yesting				1			reliability. The	system must ensure that video is reliably d r from networking errors as soon as possib	e The goal is to	that the specified and the formation
Penetration Test Penetration Doc						REQ-D-20	should recover	r from networking errors as soon as possible from networking errors as soon as possible as possible from networking errors as soon as possible from the fro	_	d to Software in enhancement
11 Documents Review						REQ-D-21	maintain a sec	r from networking errors as soon as perceive, performant connection at all costs.	ality concerns that mu	nust to be secure applied to the applied
week 12 12-1 presentation							Aside from these re	equirements, there are a name		the implementations are applications additions
13 Fuzz Testing						t	Aside from these to be addressed durin	at <u>all software</u> in both applications are archi	tected and coded to b	ponsibilities enting the specified enhancements to the applications are architected that all software in both applications are architected the implementation so the applications support two authorized (including authentication) and 2) a plaint to
Phases Penetration Test 14 Penetration Integrator)							· No.	at all software in both applications are archi-	(COICS SILE	communication so the applications support two authors in the control of the contr
4 week 15.						REQ-Q-0				STORE STUDING STORE STOR
week and the second								and repo	rting.	verror detection) and 21 data
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						REO-O-	-09 3 Ensure the	oper fault/error detection, to the companded by the compa		ing solutions to make the property of the solutions to make the so
										Verror detection, recovery, and reporting. REQ-D-09 The provided initial implementation for the provided initial implementation in
Requirements from CMU documents on left						100,00	Ala O	developed software is adequately tested.		ned 2) a plain text REQ-D-09 Ing solutions to mitigale. Iner team's implementation assigned to you for and vulnerabilities.
			Re-define R	equirement	from 'REO ::	REQ-Q-	4. Ensure the	ecurity Class Project Description.pdf *		vulnerabilities assigned
DEVELOPMENT			Merged the dupli	cated 'REQ-	" to 'CMU-REQ-*		Finalize PEO I G Se	acurity Class Project Description *	rof-	and signed to you to
D Reference								PAN	elerence :	LG May 2021 Lecture Secure Coding Project Intro V1.1.pptx.pdf
D-01 REQ-D-02 Establish		ID	U	EVELOPMEN	Т		To Do (excluding req of	f Tan		Phase 2
D-01 REQ-D-03 Establishing connection between Client and Serve		10		Des	cription		an Architecure Doc)			Lecture Secure C
2-03	rver	CMU-REQ-D-01	Establishing							Coding Pro:
9-03 Support New Co.			l saming conn	nection betwe	een Client and Se	rver	Mandatory			Billect Intro V1
-0.4 Support Non Secure Mode -0.4 Support Learning Mode		CMU-REQ-D-02	A user should be able to				- Additiony			1.1.pptx.nds
-04 Support Learning Mode - Register new person to the S -05 Support Run Mode - System identifies faces and performs facial rec -06 Support Test Run Mode	e Server	CMU-REQ-D-03	A user should be able to in Support Learning	nitiate a video feed.	and a feed in Support Se	cure Mode N	Mandatory			0901
Support Test Rup Mode	recognition	CMU-REO-D-05	Support Learning I Support Run Mode - Sy	Mode - Regis	ster new person to	on Secure Mode M	Mandatory			
07 Display Result - Face-recognized images						cial recognition	Mandatory			
09 REQ-D-03	/////	CMU-REQ-D-07	Support Test Run Mode : A Display Result - Fac	ce-recon-	e to tune image analysis w	with local file Ma	landatory landatory			
0 REQ-D-02 A user should be able to initiate		//	140	recognized	i images		andatory			
REO-D 02	d a feed						,			
REQ-D-03 A user should be able to end a video feed		→								
	view //									
The system must use 254	//	CMU-REQ-D-09 Th	user should be ab	le to save						
User credentials must be produced		CMU-REQ-D-09 Th	dDI	to save a v	ideo feed for offli	ine review Exclu	uded			
Lost or compromised credentials must be begulied	/	CMU BEG-D-09 Th	e system must use	2FA						

Lost or compromised credentials must be handled in a reasonable way

Multi-user Privacy , multiple video feeds remain private between the users

REQ-D-02 data send to a user remains private while in transit No intermediary to be stoop or spy

CMU-REQ-D-09 The system must use 2FA

CMU-REQ-D-12 Nonrepudiation, Users should be confide

CMU-REQ-D-10 User credentials must be protected

CMU-REQ-D-11 Lost or compromised credentials must be handled in a reasonable way

Mandatory

	3 Week	Tarran Secure Camera Application	
	Week	The proposed system has the following basic functional requirements. Note	
	MT WI M	The proposed system has the following basis to the system has the	
	Artifacts at y2 0 xlox	REO-D-10 A user should be able to initiate a video feed, end a feed. REO-D-10 A user should be able to end a video feed.	
Criteria	Teamb Schedule xlsx, requirements	REQ.D-10 A user should be able to introduce the end a video feed REQ.D-11 A user should be able to save a video feed for offline review. REQ.D-12 A user should be able to save a video feed for offline review. A user should be able to tune image analysis.	ser display and system control application is responsible for the following: ser display and system control application is responsible for the following: ovides the user interface to assert interface when secure and authenticated communication with the camera
Schedule Criteria	system/Sec REQ III team6.docx		Secure Coding
A	Ohare Occurrence State Charles	REQ-0-12 • A user should be able to tune image analysis. REQ-0-13 • A user should be able to tune image analysis. The system also has the following architectural concerns (i.e. quality attributes)	display and such
context Analysis	Prissonano pituri	The system also has the following	nage and secure a control application of the secure and secure as a secure as
Risk Management Risk Management	A - jetonnano STRIDE MA	The system also has the following architecture. The system must deliver video as close to real time as possible, especially in real-time mode.	Secure Coding Training Program, Project Description: Set display and system control application is responsible for the following: Stablishing secure and authenticated communication with the camera and quested. Ovides the user interface to control the system. User interface on the secure mode is selected or secure or hon secure mode of communication. User interface and secure or hon secure mode of communication.
Asset rown Threat Modeling Threat Modeling Threat Modeling Threat Modeling	A risk management xixx risk management	REQ-Q-06 Performance: This system mode. especially in real-time mode.	ovides the user interference of the following the followin
A-1 STRIDE	A security requirements on	especially in real-time mode. REQ-D-14 • Authentication:The system must use two factor authentication for sign on and lost or compromised credentials must be protected lost or compromised credentials must be proposed.	nodes of contract to come when secure with the camera and
4-3	OSP Demo & Presentation	REQ-D-15 user credentials must be protected REQ-D-15 user credentials must be protected REQ-D-16	Learning to hon secure or the system of the system of the secure or the secure or the system of the system of the secure or the system of the
4-5 SEC Risk Assessment OWASP	Dav.	handled in a reasonable way.	hat terrace shode - User indee of communication of the state of the st
SEC Requirement		handled in a reasonable way. handled in a reasonable way. REQ-D-17 Communication privacy: When in the desired mode the system must ensure the data sent to a user remains private while in transit. No intermediary should be data sent to a user sent on a spy on an ongoing video feed.	ovides the user interface and user interface when secure mode is selected or secure or hon secure mode of communication system. User interface shall support the secure or hon secure mode of communication secure mode is selected or secure or hon secure mode of communication secure mode is selected or learning Mode - User images can be added to the image database. In this mode the secure of the collected of the person in front of the camera and the number of the collected in the image database in this mode the secure of the collected in the image database in this mode the secure of the collected in the image database in this mode the secure of the collected in the image database in this mode the secure of the collected in the camera and the number of the collected in the camera and the number of the camera and the numb
Code Impl Code Impl Code Impl Development Development	O S reviewed visx	data sent to a user remains private while in transit. The data sent to a user remains private while in transit.	un Mode – System utilizes camera to identify faces and perform facial recognition. System utilizes camera to identify faces and perform facial recognition. Junicating with the camera and image analysis application. If the person in front of the camera and the number of the person in front of the camera and the number of the person in facial recognition.
8-1 Cilent(PC) Architect Doc	100% 10	data sent to a user remains private white data sent to a user remains private white and the data sent to a user remains private white sent dent that the camera able to snoop or spy on an ongoing video feed.	conition System utilizers to identify to
Developmen	10079 (2002 na)h/h 22 (2007 x 0) 12 (2007 x	able to snoop or spy on an ongoing was able to snoop or spy on an ongoing was able to snoop or spy on an ongoing was should be confident that the camera stopped in the one that they believe it is.	unicating with the camera and image analysis application as specified. Sponsibilities and samera and image analysis application as specified. Sponsibilities
8-2 Code Review	100% - <u>Rawfinder 200:</u> - cpched 20210600 v0 5.1 CM 100% - cpched 20210610 v0 5.0 CM	REQ-D-18 • Proof of identity (nonrepudiation). Osorres they are using is the one that they believe it is.	Image frames and image from the camera and i
Flaw Finder		The system must ensure that multiple video to	special and accompany analysis application
G 0-11 Copchecker	100%	Multi-user privatey. The system private between the intended users.	Ponsibilities analysis and infinitying analysis analysis analysis and infinitying analysis and infinitying analysis ana
9.4	1007	private series and the systematical series and the systema	anting the species
Fuzz Testing Exception Test		private between the intended discision. REQ-D-20 reliability: The system must ensure that video is reliably delivered. The system	that all software enhances
10 Documentation Doc Review		REQ-D-21 Should recover from networking errors as soon at all costs. maintain a secure, performant connection at all costs.	must to be secure in both a ments to the
12 12-1 12-1		those requirements, there are a number	the implementations and free of applications are applications
Presenting 7 setting		Aside from trese requirement. be addressed during development.	communication so the communica
Phases II Fuzz Lesson Test Penetration Test Penetration (Integrator)		that all software in both applications are architected	ponsibilities enting the specified enhancements to the applications additional considerable that all software in both applications are architected to be secure and free of vulnerabilities. The implementation so the applications are architected communications so the applications are architected communications.
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Torreck 10		detection recovery and reporting.	Verror detection, recovery, and reporting solutions to provide implementation and 2) a plain text REQ-D-09
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Requirements from CMU documents on left		Secure the developed software is adequately tested.	and unit
	Re-define Requirement from 'REO. **	REC-0-11 4. Ensure the details and Description.pdf	
DEVELOPMENT	Merged the duplicated 'REQ-*' to 'CMU-REQ-	Finalize REQs with DAN	
D Reference Description	DEVELOPMENT		Machine Trust Boundary
REO D 03	ID	To Do (excluding req of Ta	Macrime Mountain Rounda
REQ-D-03 Establishing connection between Client and Server	Description	an Architecure Doc)	DP3.1 Camera Ctrl Jetson Trust Border Bounda hase 2
-02 Support Segue M.	CMU-REQ-D-01 Establishing connection between Client and Science		
Support Non Secure Mode	CMI pro	Server Mandatory	OF3.2 Sensor Data
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05 Support Run Mode - System identifies faces and performs facial recognition 06 Support Test Run Mode	//// CMU-REO-D. 04 Ic		DF4.1 Store Login Credential / Learning-Data S1. User Credential Data
Support Test Run Mode Display Regult Test	CMU-REO-D-05 Superior Register new person	to the c	DF2.1 Regest (Login / Mode Chi.) DF4.1 Store Login Credential / Leaning St. User Credential Data File System
77 Display Result - Face-recognized images 8 REQ-D-02 9 REQ-D-03	CMU-REQ-D-05 Support Run Mode - Register new person i CMU-REQ-D-05 Support Run Mode - System identifies faces and performs fa CMU-REQ-D-06 Support Run Mode - A user should be able to ture image analysis CMU-REQ-D-07 Display Result - Face-recognized limits.	to the Server Mandatory facial recognition Mandatory is with local Sie Mandatory DF1.1 User Input (Login Credential St Mode Control Input)	2.1 Server (Jetson)
REO D 00	CMU-REQ-D-07 Display Result - Face-recognized Images		Detail / Learning Data
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REQ-D-03 A user should be able to end a video feed			andeo Stream.)
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		Гуре	nternal Engineer	Tortan Secure Camera Application	
PnG 1		Goal	nternal Engineer Ruin the administrator's reputation	the proposed system has the following basic functional requirements. Note proposed system has the following basic functional requirements. Note proposed system has the following basic functional requirements. Note proposed system has the following basic functional requirements. Note proposed system has the following basic functional requirements.	
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1		Chill	manipulate the user credential strong the previous one that is u	JS90 Video feed, end a feed.	
	Tables.	Skill	administrator's password from the provides	A user should be able to initiate a rivideo feed	
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		Minuse cose	to other system (TR-56) Change the image data not to recognize regist	A user should be able to tune image analysis.	Secure Coding
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	1		employees in the company.	The system must deliver the	quested ysis application is respect to the state of the s
-			VIII-	especially in real-time mode.	ovides the user interface to communication with the camera and user be communication with the camera and user interface to control the system. User interface shall support the unit of the communication and user interface shall support the unit of the communication and user interface shall support the unit of the communication and user interface when secure mode is selected or learning for the following:
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11-11	17	Skill		data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while in the data sent to a user remains private while it is a sent to be a sen	ist Run Boystem utilized
37	A CHAR	Misuse case	(TR-58) Stear the chart and	data sent to a user remains private thin a sent to a user remains private thin able to snoop or spy on an ongoing video feed.	mera System utilization of the camera and the camer
				tistion): Users should be confident that the said	Secure or long secure mode of control the system. User Interface shall support the sure that build be supported by the secure of long secure mode of communication of the system. User Interface shall support the system that support the system that support the system that support the system that support the long secure mode of communication of the system utilizes camera to identify faces and perform facial recognition. Image frames and any accordance when secure when secure mode is selected or long secure or long secure mode of communication of the system. User Interface shall support the system that support the system that support the system is supported by the system of the person in front of the camera and the number system utilizes a video file to identify faces and perform facial recognition.
	72 74-1			Proof of identity (nonrepudiation). Satisfaction is they are using is the one that they believe it is.	mage frames and in dentity faces and recognitude
				they did damy	amera Strain Mode – System utilizes camera to identify faces and perform facial recognition. Image frames and any accompanying analysis application.
FE 0.0	2	Type	Post the achievements of hacking on the internet	they are using is the one that they be a superior that multiple video feeds re Multi-user privacy: The system must ensure that multiple video feeds re	mera Junicating with the camera and image analysis application as specified. Sponsibilities enting the specified enhancements to the format specified.
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1/00	100	SKIII	program. experience channel between ser	should recover from networking errors as sooned; should recover from networking errors	s that must
work F	The state of the s	Misuse cas	program. 2 (TR-59) Sniff the communication channel between server content and the communication channel between server channel c	these requirements, there are a number	the implementation so the applications are architected communications: 1) a secure mode with applications support two support two support data.
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Chief	\penetratio	n Tes		be addressed during development. 1. Ensuring that all software in both applications are architected and cool and the software in both applications are arch	ncrypted (ations: 1) so the applications
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16				cacure and lies of the	Verra gauthentication with all dot two
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				REC-Q-08 2. Conduct proper faultverror detection. REC-Q-09 3. Ensure the developed software adheres to the company coding standards.	
0.					Tier team
Re	quirements from C	MU documents on left		Traves the developed software is adequately tested.	and with single
			Re-define Requirement from 'REO **	Finalize REQs with DAN	
	DEVELO	PMENT	Merged the duplicated 'REQ-*' to 'CMU-REQ-*'	Finalizacia LG Security Class Project Described	
Reference	e l			Finalize REQs with DAN	pauntary
		Description	DEVELOPMENT	To Do (excluding req of Ta	Machine frust Boundary Machine frust Boundary Machine frust Boundary
0-01 REQ-D-02 REQ-D-03	Establishing conne	ection between Client and	ID Description	an Architecure Doc)	Dy3.1 Camera Ctrl Jetson Trust Border Boundarhase 2
		detween Client and	Server CMU-REO D 04		
-02	Support Secure Mo	ode	Server CMU-REQ-D-01 Establishing connection between Client and Server		- And
03	Support Non Secur	e Mode	CMU-REO-D-03		DF3.2 Sensor Data
-	Support Learning Mo	de Desir	CMU-RFO-D-03		X.pdf
06	Support Run Mode - Syste	em identifies faces and performs forces	CIVIU-REO-D-04 Ic.		DE2.1 Regest (Login / Mode Chical Store Login Credential / Learning Data St. User Credential Data
7	Support Test Run M	lode			Of Input) DF2.1 Regest (Login / Mode Ctri) DF4.1 Store Login Credential / Leanning S1. User Credential Data File System
8 REQ-D-02	ाञ्चावप्र Result - Face	e-recognized images	CMU-REQ-D-06 Support Test Run Mode - System identifies faces and performs facial rec	cognition Mandatory	ol Input) 2.1 Server File System
9 REQ-D-03			CMU-REQ-D-06 Support Run Mode - System Identifies faces and performs facial rec CMU-REQ-D-07 Display Result - Face-recognized Images		(Jetson)
REQ-D-02 REQ-D-03	A user should be abl	0 to letter	Tace-recognized images	Mandatory Mandatory	11 client (PC)
REQ-D-03	and be able	e to initiate a video feed,	end a feed	/44444	Interret Boundary
REQ-D-03	user should be able	to end a video food			
				E1. Human User	
1.EQ-D-06 A	user should be able	o save a video feed for offlir to tune image analysis	CMU-REO-D-08 A		DF25 Result (video Stream)
Th	ne system must use 2	PFA analysis	CMU-REQ-D-08 A user should be able to save a video feed for offline re		
Lord	ser credentials must b	be protected	CMU-REQ-D-09 The system must use 2FA	review Excluded DF1.2 Login Result (Display Change)	
2000	or compromised credon	Mala			
Nonres	epudiation, Users glound to	trais must be handled in a reasonale in transit. No intermediary to be snoop	CMU-REQ-D-11 Lost or compromised credentials must be handled in a reasonable way CMU-REQ-D-12 Lost or compromised credentials must be handled in a reasonable way CMU-REQ-D-13	Mandatory	
		it that the camera they are using is the one the deo feeds remain private between		Mandatory	
Multi	areaser Privacy - multiple		CMU-REQ-D-12 Nonrepudiation Upon the United States Company of the United S	Excluded	

7.04	Type Ir	nternal Engineer Ruin the administ	trator's repu	utation	-	Requirements	of Tartan Se	cure Can	nera App	lication									
	Goal F	Ruin the adminis	administrator	or redential data, find or rom the previous one that	tho	Requirements	of fartaina h	asic funct	ional requi	rements. Note									
	Motivation F	Revenge to the a	ucor Cr	redential data, find o	in wood pro	posed system has	the following b	asio idiio			1								
	Skill r	manipulate the	esseword fro	om the previous one that	is used	la la ba	able to initiate a	video feed	d, end a fe	ed.									
The second second	8	administrator's p	password		· torad	A user should be a	e able to end	a video	feed	offline review	900								
	1	to other system	the image	data not to recognize re	ogioto	A ser should b	e able to save	a Aldes	analysis			ents of	Seam						
	Misuse case	(TR-56) Change	e the image	e data not to recognize re	the	A user should b	e able to tune	image	allalysis.	quality attribu	tes) Iser	die	Secure Co	ding					
	WII3030 CEE	users.	admin	histrator's ID/Password	to the					, quanty	Este	display an	d system	6	rair	ing Pro-			
		(TR-57) Disclo	ose aumin	nistrator's ID/Password	- \$y	Stem also me		1. U. or vid	en as close	e to real time as	s possible,	de apaig se	Cure and con	rol appl	0-4	- Briogran	n. Project		
		employees in th	ne company.	1		ystem also has the	e system must o	deliver via	co as sire		qu	lested	application	enticat	Cation	is responsite	, Toject Des	Crima	
						especially in real	-time mode.			the tion for sig	on on and	ides me	a auton a	nd user	interf	nmunication	or the follows	TIPE	on-12
							he system must	use two f	factor author	nised credential	s must be	ang modes	er interface va		- itelis	ce when secure	for the following in the camera and mode is selected of the shall support		,-,
	T	Spy		-tom	0			Lost o	or compron	lised cross-	Se	acure or non	of operation	control	the si	er-	mode is select		
PnG 2	Туре	Steal all compo	onents of the	a system		handled in a rea	sonable way.	RECE	0.10		that Ote	erface Mode	- Use mode of	COme	- 5)	stem. User Inter	decied	or	
	Goal	Compositors re	equest	·	t	Harrens	When	in the des	ired mode	the system mu	st ensure that	samples to	query for Bes	can he a	ication	Dra	race shall support		
	Monage	Dhysical power	er and ability	to use various equipment nd server => Out of S/W b	oundary	handled in a rea	privacy: when	ate while	in transit.	No intermediary	Silouid De	Mode - Sw	collected the n	ame of the	ded to	the image	-PPOIT	the	
		(TP-58) Steal	the client an	nd server => Out of Sitt s		data sent to a u	ISCI TOTTION OP OP OP	oing video	o feed.		20	Kun Mode	com utilizes car		Pola	on in front of the	se. In this		
	Misuse case	(1100)				able to shoop o			should be	confident that t	he camera	Inion	System utilize:	a vie	entify t	aces -	amera and the		
						able to snoop o	y (nonrepudiatio	n): Users	e it is.		1	imag wi	th the carr	- video	file to i	dentify to	The camera and mode is selected of mode is selected of mode is selected of mode shall support se. In this mode the number and the number and the number action recognity.	r	
						Proof of identity they are using	is the one that ti	ney benev		Minte video for	eds remain	from the	es and an	and im	200 -	the image databate on in front of the co- aces and perform dentify faces and p	perform too		
	T =	Hacker		tion on the internet			- The system	must ens	sure that m	uitiple video le	C	no	arnera and in	compa	BLOWN CO.	alysis applicati			
PnG 3	Туре	Post the achie	evements of	f hacking on the internet			en the intended i	users.				Ponsibi	lities	age ana	lysis	amplifying anal	applications add		
	Goal	Strives for red	cognition	of network protocols ar	nd hacking	private better		neure that	video is re	liably delivered	The system	nting th	e specie		- 10	pplication in the	sis information		
	Motivation	Extensive ki	nowledge o	of network protocols a		 reliability: The 	system must er	ng errors		possible The	goal is to	that all	specified	enha		0.10	format specified		
10	Skill	program		t annul between	server and	should recove	er from network	Lannag.	5 Room	of Threat A		d to be	software in	hoth	icen	ents to the	, mou.		
		(TP-59) Sniff	f the commu	unication channel between		maintain a ser Aside from these re be addressed durin	wirements the	re are ave	found 28 to	orneat Mod	deling		ecuro and	Doth	appl	ication ine	application		
week MEETER ?	Misuse case	client to get	user credent	itial data.	-	Aside from these re	and development	ID	Tool	reats below by	using STRIDE Pro	2.5			TD	ons are	archite	itional co	
	Tes	Choric to g			t	be addressed duli	ig determ	AL IR.	Ca	tegory	Interaction	o, Brainstorming	g.		35 ST	Information Disclosure	The Ctor		nsideration
14 Documen	ationi International					1. Ensuring th	at all software in	n both &	STRIDE	rmation Disclosure			Threat Park		TR. STR	ne l	DF4.1 Store Login Credent	ial / Learning Date	storage. User credential
1 Week 15					REQ-Q-07	secure and	free of vulnerab	TR-	STRIDE		DF4.2 Load Login Cred	densal / Learning Data	If the user credential data		41 011	Spoofing			may be disclosed. Nee
						08 2. Conduct pr	oper fault/error		Tami	Pering	DEAD	18	is stored as User credential be kept securely	hould	TR- 44 STRIE	E	DF4.1 Store Login Credentia	If / Learning Data _	Credential Data can be Need
					REQ-Q-0	8 2. Conduct pr	ope.	TR. SI	TRIDE		DF4.2 Load Login Credi	ential / Learning Data n	In attacker User credental si		-	opooting	DF2.5 Result (Video Stream_		Data can be exposed to attackers.
					REQ-Q-	09 3. Ensure the	developed soft	wate as	Spoot	ng	DEAD	A	attacker or nept securely	ould	45 STRIDE	Spoofing	(video Stream_		may be spoofed by an attacker
Pomilio					REQ-Q-1	-10 quality star	ngarup.	IR-			DF4.2 Load Login Creder	ntial / Learning Data cr	odify user redential data d then server User credential sho		TR. STRIDE		DF2.5 Result (Video Stream_)	10	Client (PC)
Requirements from CI	MU documents on left					4. Ensure the	e developed soft	ware ⁰⁴ str	Spoofin			1918	be kept securely	uld	46 STRIDE	Tampering		s _i	nay be poofed by an tacker Need to authent
			Mor	Re-define Requirement from 'REO."	REQ-Q-	11 4. Elisare an		Droas STRE			DF2.1 Request (Login / Mod	de Ctrl.) An a	Macker Need to many		R. STRIDE	Information Discincure	DF2.5 Result (Video Stream)	Vi m	deo Stream
DEVELO	PMENT		cı	erged the duplicated 'REQ-*' to 'CMU-REQ	2-x1	Finalize REQs with E	ecurity Class	Prop Sing	DE Tamperin	0		(Clie	of the user nt) Need to more strong authentication procestacker	or s	+		DF2.5 Result (Video Stream)	by Vid	ay be Need to a video street an attacker.
Reference	Docario			DEVELOPMEN				TR.			DF2.1 Request (Login / Mode		de control Need to enco	45	STRIDE	Denial Of Service		may	y be sniffed Need to pour video street
-01 REQ-D-02 Establish	Description		ID I	DEVELOPMENT		To Do (excluding req o	of Tan	06 STRIDE	Repudiation			in orde	o server communication channel	TR	STRIDE		DF2.5 Result (Video Stream)	Clier	otter connection
REQ-D-03 Establishing conne	ction between Client and S	.		Description		an Architecure Doc)					DF2.1 Request (Login / Mode (Chients Chients	Can the the	52	- THE	Elevation Of Privilege			hes, halts, s or runs in abnorma
02		cerver	CMU-REQ-D-01 Fet	stablishing connection between Client and				TR. STRIDE	Information (Nactorius.		actions have	they Need to apply mutual authentication	TR- 53	STRIDE	Elevation Of Privilege	DF2.5 Result (Video Stream_)	Serve may b	or (Jetson) De able to
02 Support Secure Mo	de			connection between Client and	Server	Mandata				- sure	DF2.1 Request (Login / Mode Ct	An affact an) An affact	can			- Trivilege	DF2.5 Result (Video Stream_)	execut An area	le code Need input s
Support Non Securi	Mode		MU-REQ-D-02 A use	ser should be able to include		Mandatory		TR. STRIDE	Information			at.) sniff the on the connected	encrypting the	TR. 56	PnG	Tampering	(Seeam)	may pa into 1.1	RSS data Client Need input sa
Support Run Mode Support	de - Register new person to t	the Server	MU-REQ-D-03 A user	ser should be able to initiate a video feed, and a feed in Support fer should be able to initiate a video feed, and a feed in Support OPORT Learning Mode - Register	t Secure Mode N	Mandatory			Information De	cdosure	DF2.1 Request (Login / Mode Cat.		n now,				User credential data	Change	the
Support Test Run M	and performs faci	ial recogniti	MU-REQ-D-04 Supr	Oport Learning A4 - 1	t Non Secure Mode N.A.	Annal I		TR.			(Cogin / Mode Ctr.	(.) authentica may lead t	Need to more stronger	TR. 57	ng	Internal		to recogn registere	nize Need to protect
Display Result - Face	-recognized images	////_CM	MU-REQ-D-05 Support	port Run Mode - System identifies faces and performs ort Test Run Mode : A user should be able to tune image analy-	to the Server M	andatory		10 STRIDE	Denial Of Service			information the informa	Process			Information Disclosure	Client => Server	Disclose	
REQ-D-02	- ginzeu images	///// /см	MU-REQ-D-07 Di-	ort Test Run Mode : A user should be able to tune image analysi Dlay Result - Face-recognized laws	Macial recognition Ma	landatory		+			DF2.1 Request (Login / Mode Ctrl.)	of the communical	ion				- Onlyer	administra ID/Passivo the employ	ned to Nond to man
REO D 00		— <i>\\\\\\</i>	Displa	ort Test Run Mode : A user should be able to tune image analys play Result - Face-recognized images	Ma Mith local file	andatory					7	between clie and server is interrupted b	nt Need to use TLS	TR- 59 Pn	3	formation Disclosure		in the	authentication
REQ-D-03 A user should be able	e to initiate a video feed, er	nd a feed			Ma	andatory		STRIDE	Elevation Of Privile			attackers An attacker sends a				D-1C/OSUNE	Server <⇒ Client	Sniff the communical	tion
REQ-D-03 A user should be able	to end a video for	1.000								D	F2.1 Request (Login / Mode Ctrl.)	malicious det		TR. 60 Brain				channel between sen and client to	ver Need to protect the data over the connection
					1						- more CM.)	order to	Need to apply input sanitization	oo oran	storming No		No.	get user credential dat Compromise	
REQ-D-06 A user should be able to The system must use 2	save a video feed for offline	review // CMII	J-REO-D-00				TR.	STRIDE				change the flow of program	- Cason				Network		
The system must use 2	FA analysis	//	A user	r should be able to save a video feed for o	offling		27		Denial Of Service	Des	110	It may be						Dhysican	robust in abnormal
User credentials must b			-REQ-D-10 The sys	stem must use an	mine review Exclu	uded	TR-	STROE		DF3	.1 Camera Ctrl	physically damaged and you may not be	Need to protect	TR.				By changing the servericlients certificate or key, an attacker may affect the servericlients certificate or constitution of the servericlients or constitution of the servericlients of the servericli	
REQ-D-02 data send to a user remains private who Nonrepudiction, Users should be confident					Man	datan		10	rental O Sanden	DEA	1 64	Data from	Need to protect camera unit from physical damage	61 Brainsto	ming Tamp	ering/ Information Disclosure/ Spoofing		certificate or	
Manual Control of the	red intermediary to be snoop or s	CMU-	-REQ-D-11 Lost or co	redentials must be protected compromised credentials must be handled in a reasona	Many	datory datory					Store Login Credonsal/Learning D	Camera Data If is possible to				Uniclosure/ Spoofing	Server <=> Client	key, an attacker may attempt to connect to an unauthorized	Need to protect or verify the certificates and keep are
*Chirepudiation, Users should be confident				must be handled in a reason	this way	,						The state of	to minit the					I no an	verify the section
	that the camera they are using is the one that the eo feeds remain private between th	CMILE.	REQ-D-12 Nonrepudiation	on, Users should be confident that the	Exclud	ded												client And attacker	and keys used by the

-	Гуре	nternal Engineer		Tartan Secur	e Came	era Application										
	Goal	Ruin the administrator's reputation Revenge to the administrator manipulate the user credential data, find out the administrator's password from the previous one that is used	Requiremen	nts of Tartan Secur	o functio	onal requirements. Note	E_{ij}									
Titt C	Motivation	Revenge to the administrator credential data, find out the	proposed system	has the following basi	Cluitotio											
	Skill	nanipulate the user crown the previous one that is used		a able to initiate a vide	eo feed.	end a feed.	5									
THE PERSON NAMED IN	OKIII	administrator's password from the	A user should b	d he able to end a	rideo fe	ed	w.	Ma a								
		to other system (TR-56) Change the image data not to recognize	i chould	d be able to save a	VICIO	- elucis		ments	Of See							
	Misuse case	(TR-56) Change the image data not	A user should	d be able to save a d be able to tune in	nage ar	rams (i.e. quality attrib	utes)	Ser di-	. Decl	ire Cor	dine					
	IVIISUSO CUSO	users.		the following alcillor	Cas out			Establi	ly and swe	-	8	rair	ling P			
		users. (TR-57) Disclose administrator's ID	system also mas		.exvide	eo as close to real time a	is possible.	mage an	ng secure	em contr	ol appl	ione	. b r rograr	n. Project		
		employees in the company.	Performance:	The system must deli	ver vide	0.0000		quested	llysis appli	and autho	enticet	vation	is respondit	, roject De	Crime	
			specially in r	real-time mode.		tination for s	sign on and	OVIDES IF) in the	auon and	d user	interf	nmunication	for the following he the camera and mode is selected of the shall support	וזקויי	on-1.2
			200	a:The system must us	e two fa	actor authentication for s	als must be	Owing m	odes inte	riáce v		- rena	ce when security	the camera		,-,
	T	Spy		ale mist be protected	Lost or REQ-D-			Secure	r pon er	eration	control	the e	ocure	n the camera and pmode is selected of the sele		
PnG 2	Туре	Steal all compone					i and that	nterface	Mode - L	mode of	2000	- 3	stem. User Inte	dected	or	
	Goal	Competitors			he desir	red mode the system mu n transit. No intermediar										
	Motivation	Physical	an cat	tion privacy: When in the	while in	red mode the system monor in transit. No intermedian feed.	y should be	un Mode	- Sie colle	ted the na	me of t	ided to	the imag	Hodde	the	
	Skill	(TP	1 1					SI Kun M	Mode ut	tilizes com		1013	on in front of the	Se. In the		
THE PARTY OF	Misuse case			Ol Spy Cit		should be confident that	the camera	Union	Syste	m utilizes	era to ic	entify	laces -	amera and the		
The state of the s			1/1/1/1/1	(nonrepudiation):	Users s	it is.		Incatin	ng with the	Com	Video	file to	dentify & perform	facial -	r	
	and a second		The sale was				ands remain	d from	frames ar	camera a	and im	age	races and r	perform of the control of the contro		
	of the		The same same	The system m	ust ensu	ure that multiple video fe		cne	camera	and acc	compar	Dian	lalysis applicati			
PnG 3	The same of the sa		the state of the s	Mtended use	rs.			spon	Sibilitie	and ima	ge ana	llysis	amplifying as	On as specifical		
To de la constant	Tiend of		1	March		video is reliably delivered	d The system	entine	g the	,		7012 5	ipplication in the	sis information		
Sales and the	1	Sind Silver	1 / 1	ust ensu		an as possible. The	goal is to	7 that	all sp	cified	enh		in the	Tormat specific		
To an in			1 / 1/2/2	orking o	nnep.5	Result of Th		ed to	Soft	Vare in	Filha	ncer	nente to	pocified.		
Town I			100	Thaill Co	are We f	. Result of Threat Mo	deling		NE SECT		Doth	appl	icati to the	applicati		
neek la james and la james and la james			101/	ements, there	ale are I	ound 28 threats below by	/ Using STPIDE						adipns are	plications	ition	
1	la ser la	The state of the s		development.	0 1	found 28 threats below by	a STRIDE,	, PnG, Brainst	tormina			TR. ST	RIDE Information	on as specified. risis information e format specified. applications add architecture.	conal co	nsideration
The land of the land	Control of the second			that all coffware in b	oth or s	TRIDE Information Disclosure	Interaction		9.			TP	ason Disclosure	DF4.1 Store Login Credent		images in the storage
Will state of the	and state of the s		secure a	and free of vulnerabilities	TR-		DF4.2 Load Log		If the uses	Review		41 STRI	DE Spooting	- Credent	Bal / Learning Data	User credential New Medisclosed Communication Communicatio
The last of the la	Je 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	The state of the s	5/		02 STE	RIDE Tampering		Learning	ng Data is stored as	User credential shos	States	TR-		DF4.1 Store Login Credenta	ai / Learnies n	User Credental
The state of the s	1 / /	The state of the s	0-08 2. Conduct	t proper fault/error dete	70		DF4.2 Load Log	ogin Credential / Learning	An attacker			44 STRID	E Spooting			Data can be exposed to credi
Grand and	The land to	Solin at last last last last last last last l		the developed softwar	e 23 STRI	DE Spoofing			credential data	User credential should be kept securely	ad	TR. 45 STRIDE		DF2.5 Result (Video Stream_)	Server (Jetson)
Contrado Contra Contra Contrado Contra Contra Contra Contra Contra Contra Contra Contra Contr	1 2 100			standards.			DF4.2 Load Logic	gin Credental / Learning D	An attacker modify user credental and		4		Spoofing			spoofed by an auther attacker
Senter of the sent	1 /				TR- STRIDE	DE Spoofing		Learning D		User credential should be kept securely		TR. STRIDE	Tamperine	DF2.5 Result (Video Stream_)	l n	Client (PC)
Contra Co	() ()	Of the last of the	0-0-11 4. Ensure	the developed softwar		Spooting	DF2.1 Request (Logi		checking	-pr securely		TP.	Peling	DF2.5 Result (Video Stream)	Si	poofed by an authent
1				Committy Class Pro	IR- STRIDE	Tamasa	(Logi	yun / Mode Ctrl)	An attacker spoof the user	Need to more stronger	1 1 1	TR. 48 STRIDE	Information Disclosure		tan	ideo Stream lay be Need to video stream attacker.
and the state of t	10000	and REQ.** to 'CMU-REQ.**	Finalize REQs w	G Security Class Pro		· impering	DF2.1 Request (Login		An attacker	authentication process	1	R- STRIDE		DF2.5 Result (Video Stream)	Vid	
Street Street Street	Total and	DEVELOPMENT			TR-		(Login	an / Mode Ctr_)	or Mode control data to server co	leed to encrypt	49	SHODE	Denial Of Service		ma with	ly be sniffed Need to p video stre
01 Req	Control of the second		To Do (excluding re an Architecure Doc)	eq of Tan	STRIDE	Repudiation	200			nannel	TR 52	STRIDE	Elevator ou	DF2.5 Result (Video Stream)	Crast	cker connector nt (PC) hes, halts.
REQ- \	1	Description	an Architecure Doc)	5)	q.		DF2.1 Request (Login /	n / Mode Ctrl)	Clients can repudiate the actions they Nee		7-	-	Elevation Of Privilege	DF2.5 Result (Video Stream)	stops	hes, halts, s or runs in abnorma
12	The last of the la	Establishing connection between Client and Server	-	02	STRIDE	Information Disclosure			have performed.	ed to apply mutual hentication	53	STRIDE	Elevation Of Privilege			Pr (Jetson) De able to Need input
3 0000	The state of		Mandatory				DF2.1 Request (Login / M	/Mode Ctrl.)	An attack can sniff the data Need		TP			DF2.5 Result (Video Stream)	An atta	te code Need input s
4 3	A STATE OF THE STA	CMU-REQ-D-02 A user should be able to indicate	1	TR.	STRIDE	Information Disclosure	+		on the connection flow	d to consider pling the data	56	PnG	Tampering		may pa into 1.1 (PC)	ass data Client Need input sa
Suppor	And the state of t	CMU-REQ-D-03 Auer should be able to initiate a video feed and a feed in Support Secure Mode CMU-REQ-D-04 Support Learning Mode - Bearing and a feed in Support Non Secure Mode	Mandatory				DF2.1 Request (Login / Mo	Mode Car	Weak					User credential data	Change image d.	the lata not
Support state of the state of t	La Contraction of the Contractio	CMU-REQ-D-04 Support Learning Mode - Register new person to the Server CMU-REQ-0-05 Support Run Mode - System Identifies faces and partners shall be compared to the Server CMU-REQ-0-05 Support Run Mode - System Identifies faces and partners shall be compared to the Server CMU-REQ-0-05 Support Run Mode - System Identifies faces and partners shall be compared to the Server Shall be	Mandatory	TR.	OTOR			CN.)	authentication may lead to disclose authentication	to more stronger	TR- 57 P	ing	Information or		to recogn registerer	nize Need to protein
REQ-D-02		CMU-REQ-D-05 Support Run Mode - System identifies faces and performs facial recognition CMU-REQ-D-06 Support Test Run Mode : A user should be able to true impact.	Mandatory	10	STRIDE	Denial Of Service			Information the information	scation process			Information Disclosure	Client => Server	Disclose	
REQ-D-03	- and	CMU-REQ-D-06 Support Test Run Mode: A user should be able to time image analysis with local file CMU-REQ-D-07 Display Result - Face-recomplised to:	Mandatory				DF2.1 Request (Login / Mode	fode Ctrl)	communication		70				administra ID/Passwo the employ	ator's ord to Need to more st
REO-D-02		1//// // mages	Mandatory					an in	and server is interrupted by	ISE TLS	59 Pno	9	Information Disclosure		in the company.	authentication
REO-D-03	liate a video feed.	nd a feed	Mandatory	TR. 13	TRIDE	Elevation Of Privilege		at A	attackers. An attacker lends a				- Thursday	Server <=> Client	channel	Mon
REQ-D-03 A user should be able	e to end a video feed		1			- mage	DF2.1 Request (Login / Mode C	Ser ma	Palicious data		TR- 60 Brain				and client to	Need to protect the data over the connection
			1		-				ider to Nead to an	ply input	60 Grain	nstorming No			get user credential dat Compromise	
REQ-D-06 A user should be able to the system must use 3	o save a video feed for offline	review CMU-REO-D on I		TR. STE	IDF .			progr	W of					Network	the connection	n Server
The system must use	of a malysis	A user should be able to save a video feed for a file		29 316	De	enial Of Service		itma	ecution.						the connection of network physically by an attacker	Server need to be robust in abnormal case.
User credentials must	20.00	CMU-REQ-D-09 The system must use 2FA CMU-REQ-D-10 Uses	excluded	TR: CT	DE .	DF	PF3.1 Camera Ctrl	physi- dama	Sically		TD				By changing the	Need to protect or verify the certificates and keys used by the server and client for TLS communication.
EQ-D-02 data read to	tials must be handled in a reason.	CMU-REO-D-10 Uses and must use 2FA			Den	at o Sansee		able to	naged and may not be to get physical dama	om .	61 Brainste	ming Tame	Dering/ Information Disclosure/ Spoofing		server/clients certificate or	
		- I lost or a protected	Mandatory			Org	1 Store Login Credonsal/Le						- Rotmation Disclosure/ Spoofing	Server <=> Client	key, an attacker may attempt to	Need to -
		To compromised credentials must be be a second	Mandatory					1000	ossible to Need to limit to						connect to an unauthorized	verify the certificates
Reliability, the video is	deo feeds remain private between	CMU-REQ-D-12 Nonrepudiation, Users should be confident than the	xcluded					1							And attacker	server and client for

	Type	Internal Engli	ichator's ro	nutation		1	rements of Tartan Secure Camera Application						
PnG 1	Goal	Internal Englis Ruin the admi	Inistrator s re	ator	Aba	Requir	rements of Tarter Serie functional requirements. Note						
THE CO.	Motivation	Revenge to th	ne administra	credential data, find out from the previous one that is	the	oposed s	should be able to end a video feed for offline review.						
The state of the s	Skill	manipulate	the user	from the previous one that is	used		Who able to initiate a video feed, end a feed.						
The same	Skiii	administrator	's password	nom die p		A user sh	should be able to initiate a video feed should be able to end a video feed should be able to save a video feed for offline review.						
		to other syste	em	ge data not to recognize	ered	Auser	in the able to save a vide	ients of sa					
	Minuso caso	(TR-56) Cha	inge the imag	Je data not to	1 -	Auser	should be able to save a vittee should be able to tune image analysis. should be able to tune image analysis.	J. Secure Cod	in				
	Misuse case	users.		inistrator's IDE	/ne		should be able to tune image analysis. so has the following architectural concerns (i.e. quality attributes)	display and sum	ing Training				
		(TR-57) Dis	sclose adm	ninistrator's ID	5)	ystem als	so has the following a spossible,	tablishing security	l Summe	rogran	n D		
		employees in	n the compar	IV.	//	Devlares	mance: The system must deliver video as close to real time as possible,	luested analysis and author	application is re-	0	, Project De	in.	
		Ompro) Co			1 / 1	Periorin	ally in real-time mode.	Video Philication and	User in communi	ponsible f	Or the fall	cripti	on-1 2
				Control of the second	1	and Cole	ally in real-time mode. Intication: The system must use two factor authentication for sign on and intication: The system must use two factor authentication for sign on and intication: The system must use two factor authentication for sign on and intication: The system must use two factor authentication for sign on and intication: The system must use two factor authentication for sign on and intication: The system must use two factor authentication for sign on and intication: The system must use two factor authentication for sign on and intication for sign of sign of sign of sign on and intication for sign of si	ardisplay and system control age analysis application and uested. Wides the user interface to co addisplay and secure mode of co againing Mode - User images car analysis and system collected.	interface wh	en on with	the comming		-, -, -,
		Cour	100		100000	hen	ntication:The system must use two factor data.	Secure or operation of operation	ontrol me	secure	mode is and		
PnG 2	Type	Spy	mponen		-	/ CI	redentials must be protected control in a reasonable way.	earning Mod	the system.	USer	is selected	or	
PIIO Z	Goal	Steal all con				/ /							
TELL NOT !	Motivation	Competitors	1		1	1 277 March	cation privacy: When in the desired mode the system must ensure that a user remains private while in transit. No intermediary should be a user remains private while in transit.	Secure or hon secure mode of co earning Mode - User images car terface should query for the name an Mode - System secure of co to the face should secure of the name of the face should secure of the name of the face should secure of the name of the face of the face of the name of the name of the face of the face of the name of th	be added to REO D	09	support	the	
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		1 /	THE PROPERTY OF	Similar Company	1	1	(nonrepudiation): Users should be confident that the camera	earning Mode - User images car terface should query for the name of the standard of the name of the name of the standard of the name of th	video file to races at	d perfor	and the numb	,	
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	all want			X // King X	\ \ / .	. se	ecurity Requirements video feeds remain	an Mode – System utilizes camera as Run Mode – System utilizes a sonition unicating with the camera and unicating with the camera and image frames and any according to the camera and from the camera and system.	id image analysi	and p	erform facial		
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	A Street Street	- m	\		SR-C	03	Errors, exceptions, and abnormal conditions that may occur in the software must be handled robustly.		MI-10		DF4.1 Store Login Credent	ial / Learning Dut-	User credental
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State of the last	1			Tri Commence	SR-0	04	Input validation check is required in Client side.	CMU-REQ-D-15	MI-04		DF4 1 Store Login Credents	I/Learning Data_	Credential Data can be Need
San Contraction of the Contracti				The little little and the second	SR-0					2			Data can be exposed to attackers.
1	The second		O'BER HI	1 1 1	SK-0	05	Only the verified server and client should be connected and communicated.		MI-05		DF2.5 Result (Video Stream_)	Server (Jetson) may be Need
nord or	- I - I	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	in a		SR-0)6	Protect Communicated.		Miss		DF2.5 Result (Video Stream)		spoofed by an attacker Client (PC)
and O broads	1/4/	San San San	111		0100	-	Protect Camera from physical damage		MI-11	9			may be spoofed by an attacker
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\ \ meters	The state of the s	and the last	1 200 100	rent from 'REQ-*' REQ-*' to 'CMU-REQ-*'			Restrictions related to files are necessary to avoid system problems.		mroo	Osciosure		15	may be Need to video structure of the connection
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00		Jan / Joine Par	Total and	Description			Server and client must communicate using an encrypted channel.	CHUIDE	.111-03		DF2.5 Result (Video Stream_)	Serv	OF COAL
2	Jan Jan	1 / /	Q-D-01	Establishing connection between Client and Server	SR-10	, 11	ne system must perform an integrity check before at	CMU-REQ-D-02	MI-02	rilege			be able to Need input s
3 John John	- Indian	The state of	CMURES			Th	he system shall know the change of the system shall know the change of the				DF2.5 Result (Video Stream_)	An att	notes:
4 8	The state of the s	See See	CMU-REQ-D-02	A user should be able to initiate a video feed, and a feed in Support Secure A user should be able to initiate a	SR-12	Us	se well-known cryptography in		MI-07				lass data 1 Client Need input sa
Support	of the state of th	1				Us	ser Credential Data should be and robust algorithms.		MI-07		User credential data	Chang image	data not
Support	Land Land	oition				Vic	deo Stream over the storage.	CMU-REQ-D-10	MI-03, MI-07			to recog registers	onize Need to protect credential data
REQ-D-02	100		CMU-REO-D-06	bystern identifies faces and performs facial a		As	server and client program must perform an integrity check before using a ntificate or key.	OMO-REQ-D-10	MI-03	sure	Client => Server	Disclose	rators
REQ-D-03	/ "/	///////	CMU-REQ-D-07	Support Test Run Mode: A user should be able to tune image analysis with lo Display Result - Face-recognized images	SR-16	cer	rtificate or key.		MI-02			ID/Passion The employee	rord to Need to more str
REQ-D-02 REQ-D-03 A user should be	and the same of th			recognized images	01110	Га	ICE recognition data about the		MI-13	Sure		in the company. Sniff the	authentication
		end a feed			SR-17	Eve	very encryption time, newly generated random key is used for encryption to ake reverse analysis difficult				Server <=> Client	channel	
REQ-D-03 A user should be ab	ole to end a video food	/_/_			SR-18	RO.	ake reverse analysis difficult		MI-06			and client to	Need to protect the data over the connection
							OOT encrypt key must be protected from binary analysis		MI-14		Not	credential di	ata .
REQ-D-06 A user should be able The system must use	le to tune image and	e review	CMU-REO-D 00				IR. Over		MI-15		Network	the connection	on Server panels
The system must use	254 analysis	//	A (user should be able to save a video feed for offline			Denial Of Service	Rmay be	15			physically by an attacks	Server need to be robust in abnormal case. Need to protect or verify the certificates and keys used by the server and client for server ser
User credentials must	t he protect	————/	CMU-REQ-D-09 The	e system must use 2FA	review Exclu	uded	DF3.1 Camera Ctrl	R may be physically damaged and you may not be able to get Date from Camera unit from physical damage	TR.			By changing the	
		/	CMU-REO-D-10 U-	e system must use 2FA			Deniar of Sahora	able to get Data from Data from physical damage	Brainstorming Tampering/Information			server/clients certificate or	
send to a user remains private		x spy	CMU-REQ-D-11 Lost	er credentials must be protected or compromised credentials must be handled in a reasonable wa	Mano	ndatory	DE4 1 Store Login Credensal / Learnic		ormasc	Disclosure/ Spoofing	Server <⇒ Client	key, an attacker may attempt to	Need to a
Nonrepudiation House about	foot there is			profilised credentials must be bandled in	imano	datory		Data It is possible to Need to limit the				r connect to	protect or
	dent that the camera they are using is the one that video feeds remain private between		MU-REQ-D-12 Nonrepu	was de naridied in a reasonable wa	y Exclud	الماما		ON of many				unauthorized	and keys unclases

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Nesus case Title 50 Clange the image data not to lecularity in the second of the s	The same of the sa	J	administrator's passwo	Ad III	Au	ser should be able to end a video feed.	MARANA	trapkit.de/loois/		techniques to the	PO NOE	Execute
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PRG 2 Type Spl Good Composition Declaration Compositi			employees in the com-	party.	1 0	to mance: The system must don't	exploit stack Canaries	tables (PIE)	lave ma	checksec.sn sci	ing used	d.
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House Consolidation Find 3 Find 3 Find 4 F	PnG 2		Steal all componer			ed in a reasonable way.	test what standard L	ah (hef	ore)			
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PriG 3 We've derived the security requirements through out some of security requirements are linked to sy. C. Result of running checksec.sh (after apply options for defenses) Add symbol stripped option in add symbol stripped option or "No RUNPATH" ii. Apply option for "No RUNPATH" iii. Apply option for "No RUN						ication privacy: When in the desired in transit. No intermediary should						
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We've derived the security requirements through out some of security requirements are linked to sys SRJ Secure		and James	,)) ;		7	requirements	STACK CANARY	bled piE enabled Nanov	2	for defe	enses)	
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SR-03 Emiss, exceptions, and abnormal conditions that may occur in the software MII-10		Tight and		and a	A	Cryptographically Cryptographically and Cryp	Apply option	augation ID	GO Pro	chitector I	con:	nsideratio
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SR-07 Restrictions related to files are necessary to avoid system problems. SR-08 Save contents of the communication as a log and use as proof of non- SR-09 Server and client must communicate using an encrypted channel. CMU-REQ-D-01 Establishing connection between Client and Server SR-11 The system must perform an integrity check before using user credentials. SR-11 The system shall know the change of the user credential data. CMU-REQ-D-02 Aure module to also before a video feed, end a feed CMU-REQ-D-10 Display is: SR-12 Use well-known cryptographic libraries and robust algorithms. SR-13 A server and client must perform an integrity check before using a control of the communication as a log and use as proof of non- SR-10 The system must perform an integrity check before using user credentials. SR-11 The system shall know the change of the user credential data. SR-11 The system shall know the change of the user credential data. SR-12 Use well-known cryptographic libraries and robust algorithms. SR-13 User Credential Data should be encrypted in the storage. SR-14 Video Stream over the connection should be protected. SR-15 A server and client must communicate using a mask perform an integrity check before using a control of the communication as a log and use as proof of non- SR-10 The system shall know the change of the user credentials. SR-11 The system shall know the change of the user credential data. SR-11 The system shall know the change of the user credential data. SR-12 Use well-known cryptographic libraries and robust algorithms. SR-13 User Credential Data should be encrypted in the storage. SR-14 Video Stream over the connection should be protected. SR-15 A server and client program must perform an integrity check before using a control of the storage. SR-15 A server and client program must perform and integrity check before using a control of the storage. SR-16 Face recognition data as bould be encrypted in the storage. SR-17 Every encryption time, newly generated random key is u	or or or	1/2/	Jan and Jan		UN-00	Protect Camera from physical damage		MI-11	2		may i	By be Need :
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Description SR-09 Server and client must communicate using an encrypted channel. CMU-REQ-D-02 MI-02 MI-03 MI-07 MI-07 MI-07 MI-03 MI-07 MI-03 M	- Contraction	The state of the s			SR-08	Save contents of the communication		MI-12		DF2.5 Result (Video Stream)	/ Video s	
Description SR-09 Server and client must communicate using an encrypted channel. CMU-REQ-D-02 MI-02 MI-03 MI-07 MI-07 MI-07 MI-03 MI-07 MI-03 M	CO STATE TO STATE OF THE PARTY	The same of the sa	1 / 1/2/21 /	DEVELOPMENT		repudiation.			ce	DF2.5 Result (Video D	attacker	y an video stre
SR-10 The system must perform an integrity check before using user credentials. SR-11 The system must perform an integrity check before using user credentials. SR-12 Use well-known cryptographic libraries and robust algorithms. Support Support Learning Mode: A view should be able to end a video feed, end a feed of the sport than body. A view should be able to end a video feed, end a feed of the sport than body. A view should be able to end a video feed. SR-16 ROOT encrypt key must be protected from binary analysis.	O1 REQ.	Strand and Strang	The state of the s	Decription	SR-09	Server and client must community		MI-09	Philoge		Crashen	ts, halts. Need to re
CMU-REQ-D-02 A user should be able to end a video feed, end a feed of Control			A John Service		SD 10	The state of the s	CMILPEO D CC	-		DF2.5 Result (Video Stream_)	Server / In	an apport
CMU-REQ-D-03 A user should be able to mister a video feed, end a feed on Support Learning Mode - Register new person to the Support Learning Mode - Register ne	2	- Total	Total Indiana Co. D	Establishing connection between Client and Con	OR-10	The system must perform an integrity check before	SMO-REQ-D-02	MI-02	rittege			
Support Suppor	and Come Come		CMU-REO-D.	0-02				MLOZ		DF25 Result (Video Stream_)	An attacker may pass d	ker s data
Support Support Suppo	Sur	The same of the sa	CMU-REQ-D	7-03 A user should be able to initiate a video feed, and a feed in Support Service M.	SR-12	Use well-known cryptographic libraries and a l				Upper creations		
Display Re Display Re CMU-REQ-D-05 Support Run Mode - System identifies faces and performs facial rec CMU-REQ-D-10 MI-03 CMU-REQ-D-10 Support Test Run Mode - A user should be able to end a video feed, end a feed Q-D-03 A user should be able to end a video feed. A user should be able to end a video feed A user should be able to end a video feed SR-18 ROOT encrypt key must be protected from binary analysis.	Support	of a transfer out	CMU-REQ-D-	-OA Common to the a video feed, and a feed in Support Man Support	01110	User Credential Data should be encrypted in the stee				decental data	image data r	la not
EQ-D-02 Purply No. CMU-REQ-D-06 Support test flum Mode 1, Auser should be able to end a video feed, end a feed Q-D-03 A user should be able to end a video feed Q-D-03 A user should be able to end a video feed A user should be able to end a video feed A user should be able to end a video feed SR-15 SR-18 ROOT encrypt key must be protected from binary analysis.	Display Re	To a series	CMU-REO-D-C	-05 Support a the Mode - Register new person to the	0.117	Video Stream over the connection should be protected	CMU-REQ-D-10		osure		registered users.	credential data
CO-D-03 CO-D-03 A user should be able to end a video feed, end a feed O-D-03 A user should be able to end a video feed. A user should be able to end a video feed A user should be able to end a video feed A user should be able to end a video feed A user should be able to end a video feed A user should be able to end a video feed A user should be able to end a video feed SR-18 ROOT encrypt key must be protected from binary analysis.	KEQ-D-02	- Sand Order	CMU-REQ-D-(OG second performs facial and	SR-15	A server and client program must perform an integrity check had				Client ⇒ Server	administrator:	or's Nead
SR-17 Every encryption time, newly generated random key is used for encryption to make reverse analysis difficult SR-18 ROOT encrypt key must be protected from binary analysis.	REO-D-03	X	CMU-REQ-D-0	Display Result - Face-recognized image analysis with local		Face recognition data to the same and a same						process for authenticati
Q-D-03 A user should be able to end a video feed A user should be able to end a video feed A user should be able to end a video feed A user should be able to end a video feed MI-14	REQ-D-03 A user should be	liate and a	/// //	- grized images		Every encryption time, pour to be encrypted in the storage.		MI-13	osure	Sanue	Sniff the	
A user should be able to	REO-D-02	a video leed.	end a feed			make reverse analysis diffi-		MI-06		Client Chent		
CPU-0-06 A user should be able to save a video feed for offline review The system must use ZFA CMU-REQ-D-08 A user should be able to save a video feed for offline review The system must use ZFA CMU-REQ-D-09 A user should be able to save a video feed for offline review The system must use ZFA CMU-REQ-D-09 The system must use ZFA CMU-REQ-D-10 User credentials must be protected CMU-REQ-D-11 User credentials must be handled in a reasonable way Mandatory A user should be ab	ble to end a video feed			SR-18	ROOT encrypt key must be protected from by							
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Lost or compromised credentials must be handled in a reasonable way Lost or compromised credentials must be handled in a reasonable way Lost or compromised credentials must be handled in a reasonable way Lost or compromised credentials must be handled in a reasonable way Lost or compromised credentials must be handled in a reasonable way Lost or compromised credentials must be handled in a reasonable way Lost or compromised credentials must be handled in a reasonable way Lost or compromised credentials must be handled in a reasonable way Lost or compromised credentials must be handled in a reasonable way Lost or compromised credentials must be handled in a reasonable way Lost or compromised credentials must be handled in a reasonable way Lost or compromised credentials must be handled in a reasonable way Lost or compromised credentials must be protected Mandatory M	User credentials mus	st he protect	CMIL-PEC D CO	a save a video feed for offline re	view Excluded	DF3.1 Camera Ctrl	physically damaged and				an attacker By changing	Case.
CAMU REQ-D-11 Lost or compromised credentials must be protected Multi-user Privacy , multiple adds a few part of the protection of the pr				The system must use 2FA		Deniar of Sanica	you may not be able to get	TR. Brainstorming			server/clients	
Multi-user Privacy , multiple vide a few and control and in a reasonable way before it in the control and the control and the protection of the control and th	SQ-12-112 Idea		able way CMU-REO-D-11	User credentials must be protected	Mandato		Camera	lampering/informat	on Disclosure/ Spoofing	Server sea Court	key, an attacker may attacker	
Client and Abry state of Children and Childr			/ 10v	LUST OF COmpromised credentials asset to	Mandato		Lists possible to Need to limit a			Charles Charles	and the state of t	Alleria
Reliability, the video is not the state of t	Nonrepudiation, Users should be confid	ident that the camera they are using is the one store	the bar	the derivats must be handled in a reasonable.			The state of the s				connect to an unauthorized ver	verify the certificat

T 0.4	ype	ernal Engineer in the administrator's reputation in the administrator Tartan Secure C	amera Application octional requirements. Note 9.6. Compile Option	ns techr	lologies	
	Goal	ernal Engineer Jin the administrator's reputation Evenge to the administrator Form the previous one that is used Evenge to the administrator or proposed system has the following basic further according to the previous one that is used Evenge to the administrator or proposed system has the following basic further according to the previous one that is used Evenge to the administrator or proposed system has the following basic further or proposed system has the foll	nctional requirements. Note 9 6. Compile of	ns er, check the mitigation techn trapkit.de/tools/ch		
	Motivation	evenge to the during credential data, find out the proposed system has the following base to	at the compile	er, check the mass https://www.trapkit.de/tools/ch ux distributions offer some m ware vulnerabilities reliably. ware Address Space I	1.00()	dorto
	Skill	anipulate the user from the previous one that is used	ed, end a feed. Defenses at the	· · · doltools/ch	hecksecr)	nake it harder to
THE PERSON NAMED IN COLUMN		dministrator's password from the previous form of t	eo feed for offline review system.	thanww.trapkit.de/tools	wation techniques to	RO NoExecut
		Other system the image data not to recognize the save a vice	analysis.	ttps.//www.	nitigation such as REL	CLR) and Pos
	Misuse case		concerns (i.e. quality attributes) 1. Checkson	ux distributions one reliably.	Mitigation (ASLITY Vulnera
		sers.	A Modern Line	are vulnerabilities reliance	Layout Randonia exploi	iting arry vaned
	1	TR-57) Discusse delivery	rideo as close to real time as poss	ware valles Address Space	ave made reliably ships	ript is designou
		TR-57) Disclose administration is system also has the discontinuous system	(NX) Stack	https://www.trapkit.de/tools/ch ux distributions offer some m ware vulnerabilities reliably. k Canaries, Address Space I	The checksec.sing he	eing used.
		specially in real-time mode.	(NA), or support and a lande of	https://www.trapkit.de/toole-in- ux distributions offer some management of the second	ng. The features are be	511.5
		pentication:The system must use tw	of factor addressed credentials must tion independent or compromised credentials must tion independent tion	t do exist far more and Pax	security	
	Type	SOV gradentials must be protected	bilities that	standard Linux OS arre	-0)	
PnG 2	Goal	Steal all componed in a reasonable way.	test what	startos	(e)	
EET TO THE	Motivation	Competitors When in the d				
	Skill		B. Result of	+ strined		
	Misuse case	TE ON AN	eo leed.	pols is not striped	c.mbol s	
	IVIISUSO GUSO	and the second distriction of the second dis	rs should be confident that the camera	NIDATH	ADATH RUNPATH SYMBOLS	pols
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	100	7. Security Require	ements le video feeds remain	NARY Fortifiable FILE FOUND INX enabled INX enabled LefaceRecbemotor_Jetson_Nanov2 tof running checksec.sh (after the symbol stripped option)	No RPATH	ences)
	Total Min	Jan C	STACK CO	Fortifiable NX enabled Person_NanoV2	by options for def	GII2001
PnG 3		We've derived the security	RELRO FORTIFY FORTIFIED Canary F	LgFaceRecoell	ter apply options	
The state of the s	The second	We've derived the security out some of security requir	requirements through the	coupning checksec.sir (an		
July Land		out some of security requir	ements are linked to sve C Result	of running		
Jan Single		SR-ID Security Dead	C. III	symbol stripped opile	1.1"	
COX STREET OF THE STREET		Jeculty Requirement	i. Ao	t of running one dd Symbol stripped option pply option for "No RUNPAT"	H	ditional consideratio
1	Same Same and	A Strong authentication mathed		poly option for the	Toom architector	acional consideration
Transit land it is	Valley Control		ord should be used	MI-10	DF4.1 Store Login Co.	images in the storage
	all	SR-03 Errors, exceptions, and abnormal must be handled robustly.	al conditions that may occur in the software	ML01	Cogni Creder	ntial / Learning Data User credential No
The state of the s		SR-04 Input validation check is	CMU-REQ-D-15	5 MI-04	DF4 1 Store Login Credent	Viser Credental
The state of the s		10. Static Analysis In this static	in Client side.	WI-04		Data can be exposed to cre-
in the same of the	and the	In this statio	should be seen as a	MI-05	DF2.5 Result (Video Stream.	Server (Jetson) may be
Tree Comb	- = - - - - - - - -	analysis it is	should be connected and communicated.		DF2.5 Result (Video Stream	spoofed by an attacker Need author
and the same of th	1 / /	ve re actually the very helpful for		MI-11		Spoofed by an Need
lare \		them using thinking of hours		MI-08	DF2.5 Result (Video Stream_)	Video Stream
\ \ maintain	100	reason will any kind of at the to check will	al vuln	- Iniroo	Sciosure	may be tampered with by an attacker.
- The state of the	The state of the s	time why is this to Static tools Fire willnerabilities of the	vulnerabilities of	MI-12	DF2.5 Result (Video Stream)	
CO State Library and	Tour Contract of the Contract	In this static analysis, it is very helpful for us to check the initial them using any kind of static tools. Firstly, we used two tools in the pressure so that we can address the static tools.	Ode and		DF2.5 Result (Video Stream)	may be snifted with by an attacker connects
REQ. REQ.	Signal and Signal	We're actually thinking of how to check vulnerabilities of the check the initial them using any kind of static tools. Firstly, we used two tools in time pressure so that we can adapt it. Tools Support Flawfinder O O(2021-06-03) Very helpful for us to check the initial them using any kind of static tools. Firstly, we used two tools in the syllabus and it's	n out We Wanted to	MI-09	Wilene	stops or runs Need to n
and the same	1	Support Support It Syllabus and it's	Syllabus Flaurice to detect CMU-REO.D.CO		DF2.5 Result (Video Stream)	Server (Jetson) may be able to
1/2/2	The state of the s	Flawfinder C/C++ Free Latest	ppropriate comminder. The	MI-02	DF2.5 Result (Video Stream_)	remotely Need input execute code An attacker
S. James		CIVIL CIVIL	considering the	MI-07	(video Steam_)	may pass data
Suppor	A STATE OF THE PARTY OF THE PAR	CM RATS O CONTROL	9 116	MI-07	User credential data	Change the
Support	and the state of t	Ch SpotBugs O O X (2021-06-03) Detecting BOF and reporting SonarQube O O (2021-04-16) Detecting BOF and reporting PMD O O (2021-04-16) Like and PMD O O O (2021-04-16) Like and PMD O O O (2021-04-16) Like and PMD O O O O O O O O O O O O O O O O O O O		MI-07 MI-03, MI-07		image data not to recognize registered credential dat users.
REQ-D-02	1	SonarQube O	CMU-REQ-D-10	MI-03, MI-07	Client => Server	Users. Disclose
REQ-D-02	- marin	X (Jan X O (2021-04-16) Detecting ROS	HTML and	MI-02	- Server	ID/Password to the employees
REO-D-02		X (Java, JS,) O (2021-04-16) Like as findbug, Java code	000	MI-13		in the process for authentication
REQ-D-03	liate a video feed.	Klocwork O X Jaya code	condition		Server <=> Client	communication
REQ-D-03 A user should be able	to end a video feed	a feed Java code Java code	10	MI-06		and client to data over the
		V 등 영혈 -01)		MI-14	Natura	get user credential data Compromise
REQ-D-06 A user should be able to The system must use 28	to tune image analysis	Coverity Detection		MI-15	Network	
The system must use 28	FA	Note: Au	Tanay be Rangy be physically damaged and Meed (of network physically by an attacker Server need to be robust in abnormal case.
User credentials must b		*Note: Although our mentor(Professor Jeff)'s suggested to use the SonaCuberses	handling.	t to protect TR. Brainstorming		physically by positive and abbreviation of the physical p
Q-D-02 data send to a user remains private while Nonrepudiation, Users should be confident	ials must be handled in a reason.	way Mindight our mentor(Professor Jeff)'s suggested with the nithula way of the partial control of the partial co	able to get Data from Camero	ra unit from call damage 61 Brainstorming Tampering/Information (Disclosure/ Specific	certificate or key, an attacker
Nonrepudiation, Users should be confident	that the control intermediary to be snoop or	CMU-KEQ-D-11 Lost or compromised credentials must be handled to the compromised credentials must be approximated to the compromised credentials and the compromised credentials must be approximated to the compromised credentials and compromise	and Camera Camera Rispossible to Need to	O limit the	Server <=> Client	may attempt to connect to an varify an
Multi-user Privacy , multiple vide	eo feeds remain private between	CMU-REQ-D-12		A Impary		client and keys used by the
Reliability, the video is a	private between t	isers CANA WORD		The second secon		

	Гуре	Internal Engineer	Tarran Secure Camera Application	nilo Options	tion technologies	11
	Goal	Internal Engineer Ruin the administrator's reputation	he proposed system has the following basic functional requirements. Note A user should be able to initiate a video feed. A user should be able to end a video feed for offline review.	.6. Compile Options Defenses at the compiler, check the	e mitigation teem	
TITL &	Motivation	Revenge to the administrator credential data, find out tr	and proposed system has the following basic furtered	Defenses at the compiler, check u.s. System. 1. checksec.sh (https://www.tr	3 15 15 15 15 15 15 15 15 15 15 15 15 15	dorto
	Skill	manipulate the user from the previous one that is use	ed	pefenses at the	tools/checksec	to make it harder to
THE PERSON NAMED IN	OK.	administrator's password from	ed Auser should be able to end a video feed Auser should be able to end a video feed for offline review	system.	rapkit.de/loois	techniques to The NoExecute
		to other system	an abould be able to save a vice analysis	weeksec sh (https://www.	offer some mitigation	one such as RELICURI and Posi-
	Misuse case	to other system (TR-56) Change the image data not to recognize	A user should be able to save a made analysis. A user should be able to tune imade analysis. A user should be able to tune imade analysis.	1. checksoon distribution	ons offer sliably. Mitigatic	andomization (ASLIV) Julnera-
	Milodo	users. (TR-57) Disclose administrator's ID	the bas the following architecturar	Modern Linux distribution	abilities reliably	Randonius exploiting arry valled to
		(TR-57) Disclose darming (TR-57) Disclose darming (TR-57)	and the second deliver video as close to real time as po	exploit software valle	Address Space mad	of) In techniques to make it harder to one techniques to make it harder to one such as RELRO, NoExecute Randomization (ASLR) and Posi-Randomization (ASLR) any vulnerate reliably exploiting any vulnerate reliably exploiting any vulnerate reliably exploiting any vulnerate reliable reliably exploiting any vulnerate reliable rel
		employees in the company.	Performance: The system must deliver video as close to real time as possible performance.	(NIX) Stack Canalles,	cutables (PIE) Have The	n techniques to make it harder to n techniques to make it harder to ons such as RELRO, NoExecute Randomization (ASLR) and Posi- Randomization (ASLR) and Posi- de reliably exploiting any vulnera- de reliably exploiting any vulnera- checksec.sh script is designed to checksec.sh script used.
			specially in real-time mode: hentication: The system must use two factor authentication for sign of the system must use two factors are sign of the system must use two factors are sign of the system must use	on a Independent Execu	more challenging.	n techniques to the necessity of the nec
			hentication:The system must use two factor additional	that do exist la	os and Pax security	y
	Туре	Spy	andentials must be protested and ne	bilities triat dandard Lin	nux OS and	
PnG 2	Goal	Steal all compone	d in a reasonable way.	test what started	acksec.sh (before)	
TEN IN	Motivation	Competitors	cation privacy: When in the desired mode the system must e			
	Skill	Physical		B. Result of Far	trined	
	Misuse case	(TR) \ July July III	an ongoing vides	eymbols is		symbols
	Wilduso obse		(nonrepudiation): Users should be confident that the o	I. Symmeth	ana TH	RUNPATH
No. of the last of	1 mg		the one that they believe that	: BVV-110.	PIE	RW-RUNPATH 5215 ST
	and the last		7. Security Requirements of video feeds	STACK CANARY FILE FORTIFIABLE NX FILE FORTIFIABLE NX PARTY FILE FORTIF	E nor enabled No RPATH	(fances)
FD-0.2	Town live		7 4 4 10110110	RELRO FORTIFY Fortified Found NX enable Canaly 34 LgFaceRev	ocDemoTCP_Jetson_Nanov2	y options for defenses)
PnG 3			We've derived the security requirements through	FORTIFY FORTI Canary 18000 LgFaceke	sh (after apply	y opao.
Train of the same	- I want	The state of the s	out some of security requirements are linked	ugh the comming	checksec.sii (
in the second			out dorne of security requirements are linked	to sys C. Result of running i. Add Symbol st	and option	
The state of the s			SR-ID Security Pond	add Symbol st	for "No RUNPATH"	
cek frames and the state of the state of			Security Requirement	i. Add Sylve	for "No RUNPATH	ations additional consideration
	Sand Sand Ord		A Strong authentication mother data.	Apply option I	OI (10 mparting ID	architector consideration
The state of the s	Sugar Single			II.	MI-10	DF4.1 Store Login Course
William Control	and and the state of the state	10 2	SR-03 Errors, exceptions, and abnormal conditions that may occur in the must be handled robustly.	he software	MI-01	User credental Meeds may be disclosur credental may be disclosur
A TO THE WAY OF THE PARTY OF TH		10. Static A	SR-04 Input validation check is	CMU-REQ-D-15	MI-04	DF4.1 Store Login Credential / Learning Data Data can be Market
and the same	1 / /	10. Static Analysis	CO of			exposed to Credens
The state of the s	agent	In this static and	Only the verified server and client should be connected and		MI-05	DF2.5 Result (Video Stream) DF2.5 Result (Video Stream) May be Need to
and and	- - -	We's analysis, it is you		municated.	MI-11	DF2.5 Result (Video Stream) Need to a stracker Client (PC)
and and senter		we re actually think	helpful for		MI-11	spoofed by an Need to ap
Control	1	them using an ulinking of hours	to check the		MI-08	Video Stram
The state of the s	San	reason with any kind of station	O check vulna		Osciosure	DF2.5 Result as-
The state of the s	The same same	time no why is this tool stalle too	ols Firette abilities of the	01:-	MI-12	video Stream) video Stream video Stream may be suffled with by an attacked with by an attacked by a
RO Later Later	The same of the sa	pressure so that introd	helpful for us to check the initial vulnerabilities of the code and we wanted in the syllar.	our code.		DF2.5 Result (Video Stream) DF2.5 Result (Video Stream)
D1 REQ.	Sim and	Tools Tools We can ad	in the syllabor tools in syllab	to day	MI-09	crasher have
2 and one	The same of the sa	Support Support	helpful for us to check the initial vulnerabilities of considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced in the syllabus and it's appropriate considerable of the code and we wanted a luced a lu	delect CMU-REQ-D-02	694 496	
3	1 1	Flawfinder C/C++ Softwar Latest	treles appropriate constitution	ier. The	13% 070 470 4%	% <u>~</u>
1 3	and and and	CM	- 1010P	ring the		470
Suppor	The state of the s	CO Sports O (202	21-06-03) Detection	5 416		6%
Support	Land Land	C SpotBugs O O X (2014 SonarQube O O X (2014	21-06-03) Detecting BOF and reporting HTML and CSV format for reviewer Od-16) Like ST TOCTOR Like ST TOCTO		19%	3%
REQ-D-02	100	C SonarQube O X (2014)	Detecting BOF and reporting HTML and csv format for reviewer Od-16) Detecting BOF, TOCTOU, Race condition O5-04) Java code	CMU-REQ		6%
REQ-D-03	/ "/	X (Java, O (2021)	Detecting BOF, TOCTOU, Race condition O5-04) Java code			0,0
REQ-D-02 REQ-D-03 A user should be			-05-04) LIKe as findbug Javan Race con tri		1%	604
REO-D-02	liate a video feed,	end a feed Coppcheck Co X	05-29) Java code			6%
REQ-D-03 A user should be able	to end a video feed	0	Java code	10	1000	400
		사트 영역 -0	01)		18%	10%
REQ-D-06 A user should be able to The system must use 2	to tune image analysis	Coverity C	Detecting BOF, exception handling, memory leak, unused variables and variables and processing sections.	6/ecusion	10%	
User credentials must E	FA	Note: Au	Detecting BOF, exception handling, memory leak, unused variables and Need build environment variable	a may be photology of the property of the prop		tion Rule Violation Invalid Pointer Cast
		able way CMU-REQ-D-11 Lost or compromised credentials must be handled in a real-bridge of the users CMU-REQ-D-12 CMU-REQ-D-12 CMU-REQ-D-12 CMU-REQ-D-12 CMU-REQ-D-12	functions leak, unused variables and Need build environment suggested.	you may not i	ctuOneDefini	morphicit Constructor
EQ-D-02 data send to a user remains private wh Nonrepudiation, Users should be confident	ile in transit. No intermediate to	able way CMU-REQ-D-11 User Cleaterities How with the CMU-REQ-D-11	Need build and variables and		noConvConst	trilctol
		Lost or compromised credentials must be handled in a reasonable.	s suggested to environment	missingOverride	naccedBVVdII	ue
Reliability, the video is	deo feeds remain private between	CMU-REQ-D-12 Nonrepudiation Up-	Use the Songo	■ noOperatorEq	/ar unreadVariab	= useInitializationList
incliability, the video is	-1. I. I.	CAMP De confident that the	Were - VilaCinh	= uninitiviembei va	- unused ane	Communication ILS communication

Define security goal

Define assets to protect

Do threat modeling

Do risk assessment to prioritize items

Define security requirements

Derive mitigations

Construct architecture

Implement the mitigations

Verify the mitigations

Define security goal

"Protect the user privacy information in our system."





#privacy #stalker
#name



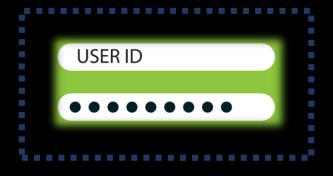


#privacy #stalker
#name



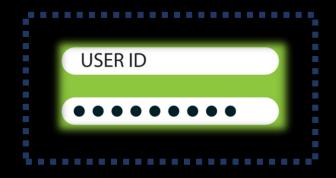


#authentication #2FA #face #recognition





#authentication
#login #password





#authentication #login #password





#privacy





#privacy





#authentication





+ name

Introduce login system Force users to use strong password Apply 2FA (what you know + what you are) Separate meta data from image on network Encrypt the image + name in the storage Use verified crypto algorithm (AES256-CBC) Use a random file name in the storage Use TLS in network communication



+ name

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Encrypt the hashed credential in the storage Use TLS in network communication



Encrypt the hashed credential in the storage



Encrypt the hashed credential in the storage



Embed the root key into code obfuscated Use TLS in network communication

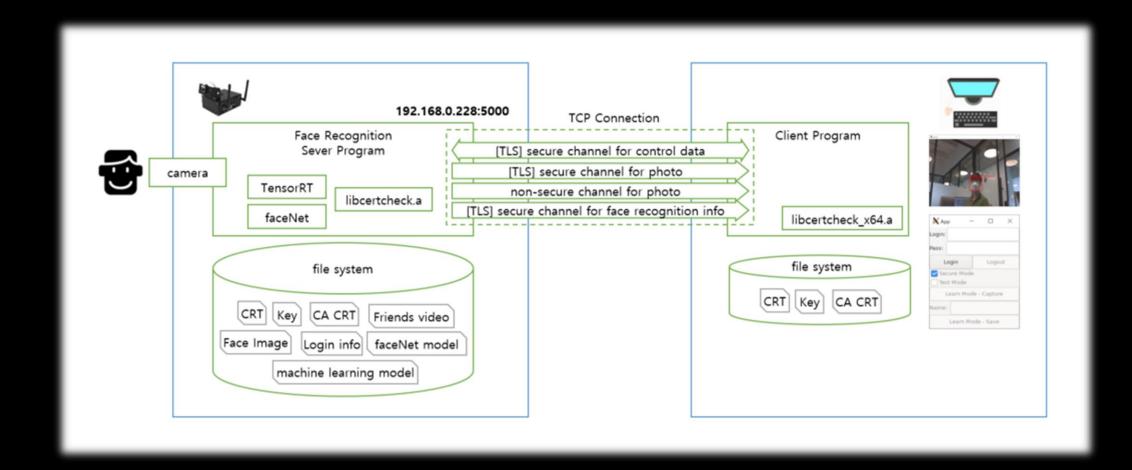


Embed the root key into code obfuscated

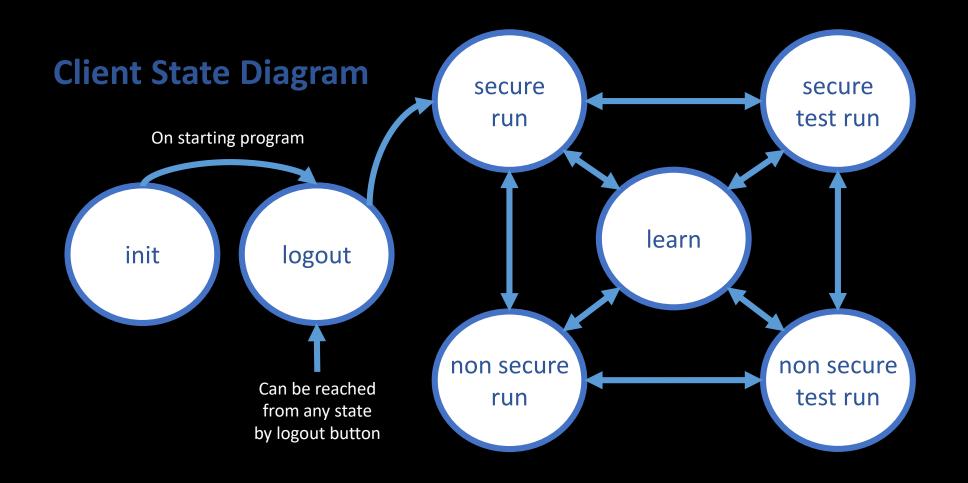


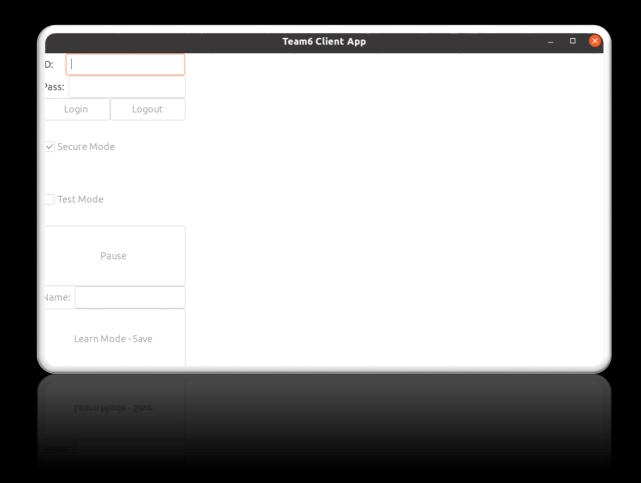
Embed the root key into code obfuscated

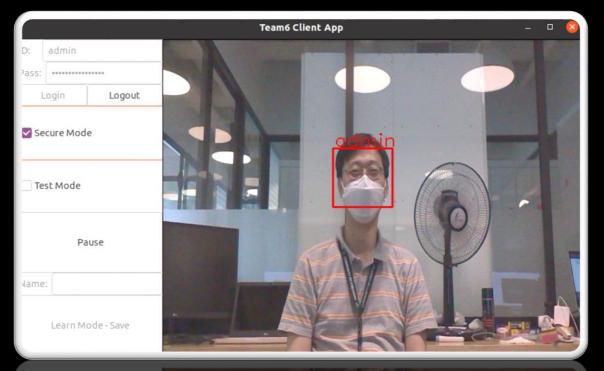
Introduce login system Force users to use strong password Encrypt the hashed credential in the storage Apply 2FA (what you know + what you are) Separate meta data from image on network Encrypt the image + name in the storage Use verified crypto algorithm (AES256-CBC) Embed the root key into code obfuscated Use a random file name in the storage Use TLS in network communication



```
source
   client
                          // client source codes
       src
   common
        keys
                          // self signed root certificate
            ca
                          // CA signed certificate & Private key for client
            client
                          // CA signed certificate & Private key for server
            server
       libs
                          // crypto library to support crypto API and to verify the integrity of keys.
           libcertcheck
                          // the root key for the crypto API are included as a string with obfuscated.
   server
                          // the path of faceNet models
      facenetModels
                          // the path of the photo registered with name. the filename and contents are encrypted
      imgs
      mtCNNModels
                          // the path of machine learning model in MTCNN_FaceDetection_TensorRT
                          // server source codes
      src
      trt l2norm helper
                          // TensorRT L2-Norm Helper
```







Let me show you demo clip..