

HDRI (High Dynamic Range Imaging) For Preservation of Historical Documents

Oliver Nina

Roger Pack

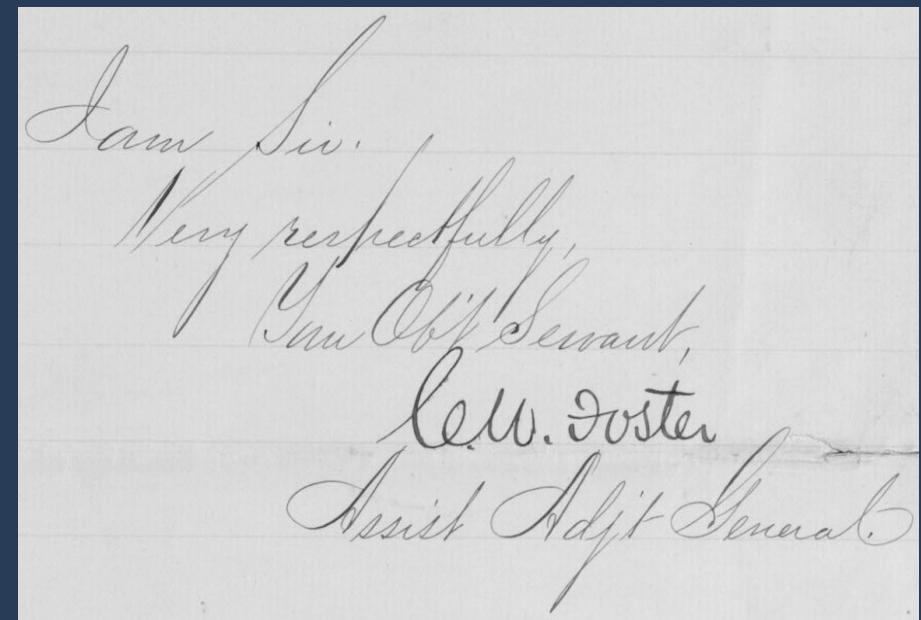
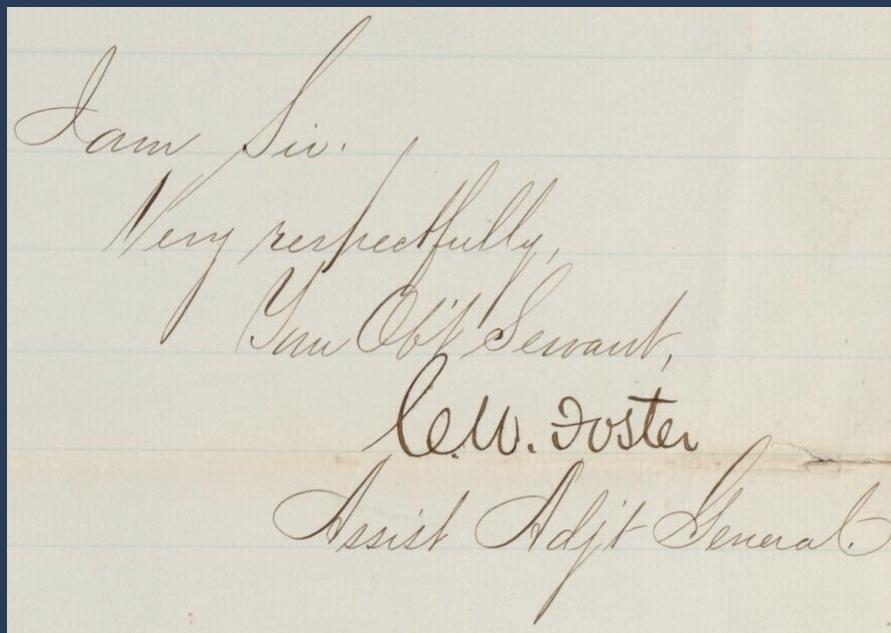


Motivation

- Great effort of digitally archiving historical documents
- Using Digital Cameras is most affordable and available
- Using Digital Cameras has some limitations :
 - Dimensions (2D)
 - Resolution (Limited)
 - Color Range (Low range)
 - DcamX(LDS church project) preserves documents in grayscale

Motivation

- Grayscale images loose information from the original image (even lower range)



Motivation

- Color images better than grayscale
- However, color images still have low range
- High Dynamic Range Imaging (HDRI) increases color range to better approximate that of the real world
- HDRI techniques haven't been applied for preservation of historical documents yet.
- We demonstrate that HDRI techniques allow better preservation of detail and contrast of document images even in gray scale

About HDR

- HDR combines images under different exposure
- Tone mapping reduces range while preserving contrast
- We used Photomatix software

HDR Example



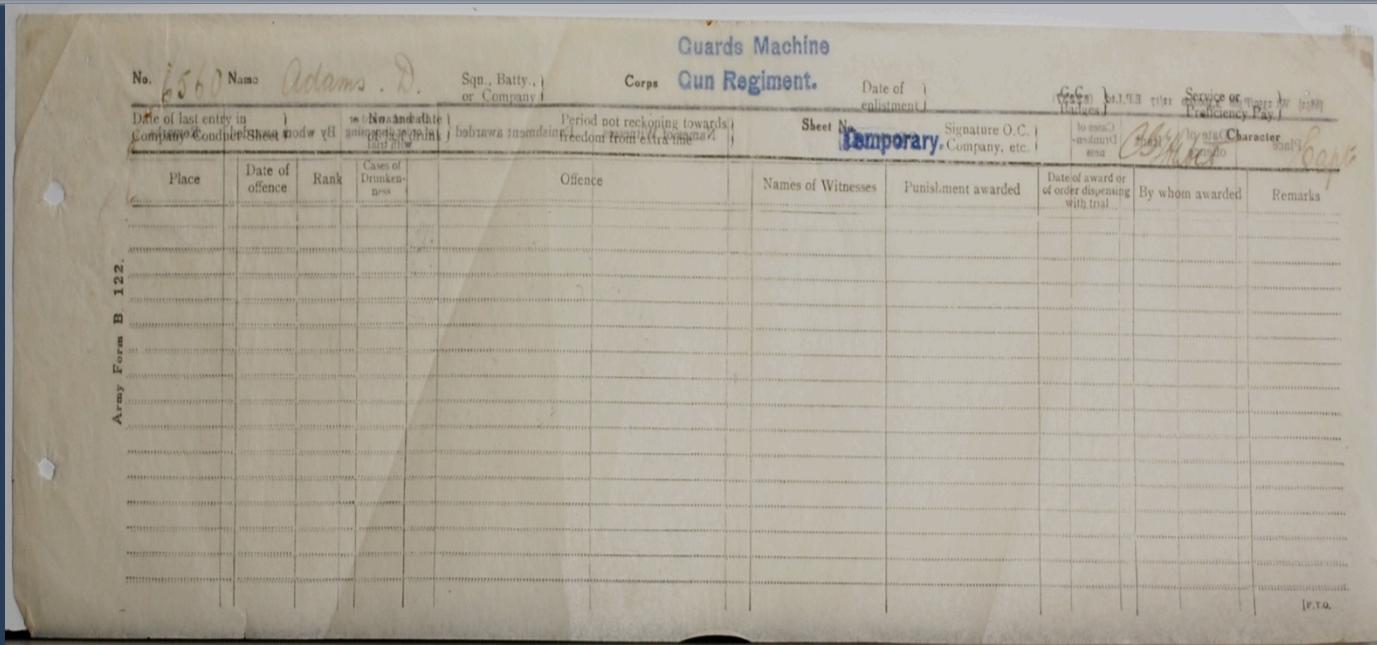
Results

No. 256 Name Adams, D.		Sgt. Batty, Co. Company	Guards Machine Gun Regiment.	Date of enrollment	Entered	Entered	Service or duty		
Date of last entry in Company		Non-individual	Period not recharging towards freedom from established	Sheet No.	Signature O. C. Temporary Company, etc.	In name of	Character		
Place	Date of offence	Rank	Case of offence	Offence	Names of Witnesses	Punishment awarded	Dated award or order suspending with trial	By whom awarded	Remarks
Army Form B 122.									

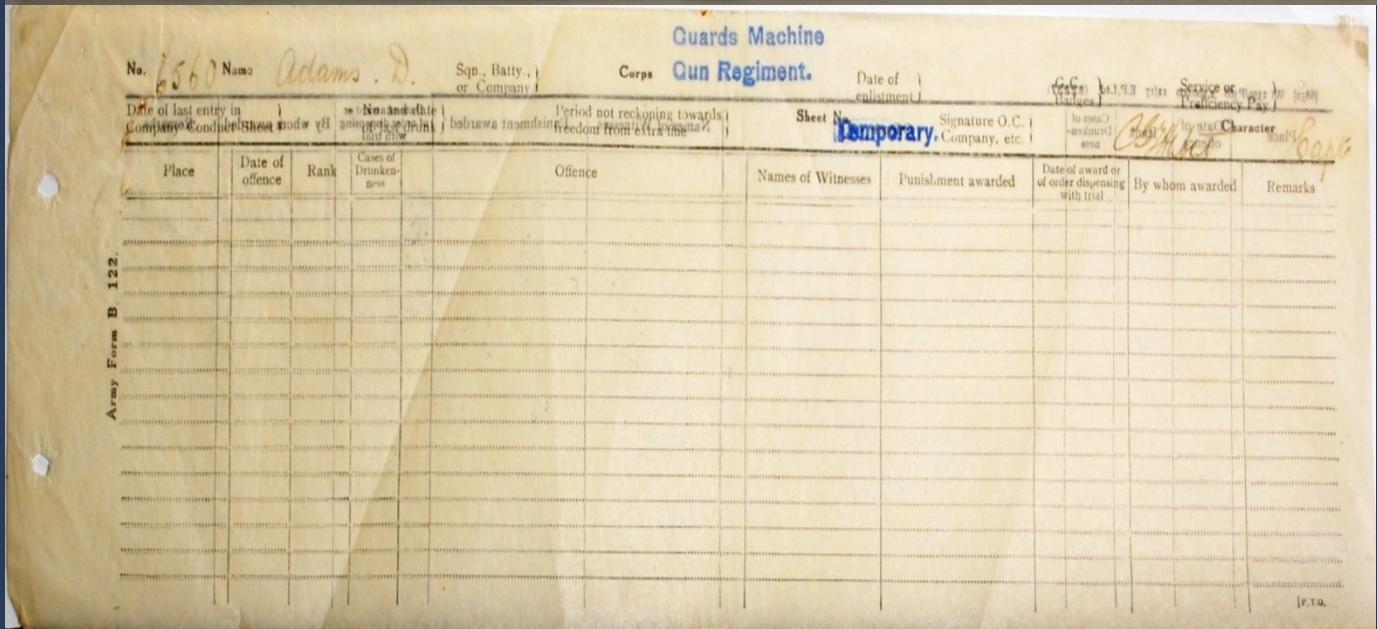
No.	Name	Sgt., Batty, Co. I	Guards Machine Gun Regiment.	Date of signature	For Service or Character
Date of last entry in Leave-Consideration Book	Non-combatant	Period not reckoning (month)	Sheet No.	Signature O.C. Temporary Company	Character
Leave-Consideration Book					
Place	Date of offence	Rank	Officer	Names of Witnesses	Punishment awarded
					Dated award of Medal
					By whom awarded
					Remarks

Results

Original



HDR



Results

REGIMENTAL CONDUCT SHEET.

Army Form B 120.

Regimental Number and Name	44808. Adams. William	Attested	Adlaw 2 : 9	1914	Joined	19				
Place.	Date of Offence.	Rank.	Offence.	Names of Witnesses.	PUNISHMENT awarded.	By whom.	Date of award, or date of order dispensing with trial.	Date of conviction.	Date of execution.	REMARKS.
No entries.										
R.M. P. & Lt. Lt. Captain, Commanding 10th Signal Coy. R.E.										
To be carried over.										
S.M.E. 1886 S.E.O. 544.										

Original

REGIMENTAL CONDUCT SHEET.

Army Form B 120.

Regimental Number and Name	44808. Adams. William	Attested	Adlaw 2 : 9	1914	Joined	19				
Place.	Date of Offence.	Rank.	Offence.	Names of Witnesses.	PUNISHMENT awarded.	By whom.	Date of award, or date of order dispensing with trial.	Date of conviction.	Date of execution.	REMARKS.
No entries.										
R.M. P. & Lt. Lt. Captain, Commanding 10th Signal Coy. R.E.										
To be carried over.										
S.M.E. 1886 S.E.O. 544.										

HDR

Results

W. P. Gottlieb & Sons Ltd., Piccadilly, Old Bailey, E.C. 4 [111] W2201 Y1155 1000M 7/18 127 65		Form E. 10 4.	REGIMENTAL CONDUCT SHEET.				Army Form B. 120.				
Regimental Number and Name		21009 Adams G. b.	Regiment of Army Pay Corps	Attested	10. 3. 1915.	Joined	10. 3. 1915.	Number of shots (in words)	Signature of C.O. or Adjutant		
Place	Date of Offence	Rank	Commission Number	OFFENCE	Names of Witnesses	PUNISHMENT awarded	Date of award, or date of sentence with trial	By whom	Date of Commission	Date of Expiry	REMARKS
				<i>Stated that there is no record of the above mentioned soldier having received any regimental pay during his service</i>				<i>J. H. Ward Captain C. Riddell Major</i>			
				<i>3-11-16</i>							
To be carried over											

Original

W. P. Griffith & Sons Ltd., Printers, Old Bailey, E.C. 4 [1112] W2201/T1150 1000m 7/18 127 55		Form E120 41.	REGIMENTAL CONDUCT SHEET.				Army Form B. 120.				
Regimental Number) and Name		Regiment of <u>Army Pay Corps</u>		Attested <u>10. 3. 1915.</u>		Number of sheets) (in words) <u>5</u>		Signature of C.O. or Adjutant <u>M. D. Morris Major</u>		Regiment. <u>10th APB</u>	
Place	Date of Offence	Rank & Grade of Pay Scale	OFFENCE	Names of Witnesses	PUNISHMENT awarded	Date of award or date of sentence commencing with rank	By whom	Date of Commencement	Date of Expiry	REMARKS	
<p><i>Certified that there is no record of the above mentioned Soldier having incurred any regimental pay corps rating by name</i></p> <p><i>J. H. Holland Captain 8th Cavalry Corps - 10</i></p>											
To be carried over											

HDR

Results

W. P. Gamm & Sons Ltd., Printers, Old Bailey, E.C. 4
[118] W2201, 21180 1000m 7/18 127 88 Form B.120. M.

REGIMENTAL CONDUCT SHEET. Army Form B. 120.

Regimental Number and Name 21209 Adams 9 b. Regiment of Army Regt 1/88. Attested 10. 3. 1915. Joined 10. 3. 1915.

Number of sheets } (in words) 1. Signature of C.O. or Adj'tant D. J. Adams.

Place	Date of Offence	Rank	Offence	Names of Witnesses	PUNISHMENT awarded	Date of award or date of expiring with rank	By whom	Date of Commencement	Date of Expiration	REMARKS
<p><i>Certified that there is no record of the above-named soldier having incurred any punishment during the period of his service in this regiment.</i></p> <p><i>J. K. Holland</i> <i>Adj'tant</i></p>										

To be carried over

Original

W. P. Gamm & Sons Ltd., Printers, Old Bailey, E.C. 4
[118] W2201, 21180 1000m 7/18 127 88 Form B.120. M.

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<p><i>Certified that there is no record of the above-named soldier having incurred any punishment during the period of his service in this regiment.</i></p> <p><i>J. K. Holland</i> <i>Adj'tant</i></p>										

To be carried over

HDR

Results (Oliver)

Description of		<i>John Henry Schellon E</i>
Apparent Age	34 years	months.
(To be determined according to the instructions given in the Regulations for Army Medical Services)		
Height	5 feet	6 $\frac{1}{2}$ inches.
Weight	180	lbs.
Chest measurement	Chest when fully expanded 40 inches. Ranges of expansion 2 inches.	
Complexion	<i>Fresh</i>	
Eyes	<i>Hazel</i>	
Hair	<i>dark brown</i>	
Religious denomination	Church of England Yes: Presbyterian Wesleyan Baptist or Congregationalist Other Protestants <small>(Denomination to be stated.)</small>	
Roman Catholic		
Jews		
Distinctive marks, and marks peculiarities or previous disease		
Should the Medical Officer be of opinion before he will, under the man's service, attach a slip to that effect approving Officer.		

Description of		<i>John George Jackson</i>	on
Apparent Age		34	years — months.
(To be determined according to the instructions given in the Regulations for Army Medical Services)			
Height	5	feet	6 $\frac{1}{2}$ inches.
Weight	180	lbs.	
Chest measurement	Girth when fully expanded Range of expansion	46 ⁰ 2	inches.
Complexion	<i>Fresh</i>		
Eyes	<i>Hazel</i>		
Hair	<i>Dark brown</i>		
Church of England	<i>Yes</i>		
Presbyterian			
Wesleyan			
Baptist or Congregationalist			
Other Protestants			
(Denomination to be stated.)			
Roman Catholic			
Jews			
Welshmen			
denomination			
Distinctive marks, and marks peculiarities or previous disease			
(Should the Medical Officer be of opinion before, in, will, unless the man service, attach a slip to that effect approving Officer.)			

Corps	Promotions, Reductions, Transfers to other Corps, Re-engagements, &c., &c., &c.	Rank	Period of Service in each Rank	
			From	To
R.R.A.F.	Enrolled	Pte	1-4-89	17/5/89
	Promoted	Cpl		
	"	Sgt	18/5/89	22/3/91
R.C.A.F.	Enrolled	"	23/3/86	29/3/91
	Re-enlisted	"	29/3/91	29/3/96

Corps	Promotions, Reductions, Transfers to other Corps, Re-engagements, &c., &c., &c.	Rank	(Period of Service in each Rank)	
			From	To
Blk & Y.	Enrolled	Off	1.4.89	
	Promoted	Cpl		17/5/89
	"	Sgt	18/5/89	22/3/90
	Retired	"	23/3/86	19/3/90
	Engaged	"	9/9/86	

Traditional

HDR

Results

Description of John Henry Jackson, M.D., on Entering Service

Apparent Age 34 years 0 months
 (To be determined according to the instructions given in the Regulations for Army Medical Services.)

Height 5 feet 6 1/2 inches.

Weight 180 lbs.

Chest measurement	Girth when fully expanded	<u>40</u>	inches.
	Range of expansion	<u>2</u>	inches.

Complexion Dark

Eyes Hazel

Hair Dark brown

Religious denomination
 Church of England Yes
 Presbyterian _____
 Wesleyan _____
 Baptist or Congregationalist _____
 Other Protestants _____
 (Denomination to be stated)
 Roman Catholic _____
 Jews _____

STATEMENT of the SERVICES of No. 179 Name J. H. Jackson

Corps	Promotions, Reductions, Transfers to other Corps, Re-engagements, &c., &c., &c.	Rank	Period of Service in each Rank	
			From	To
U.S.A.F.	Enrolled	Cpl	1.4.84	17/5/14
	Promoted	Cpl	18/3/14	22/3/14
"	Attached	"	22/3/14	23/3/14
	Detached	"	23/3/14	"

Traditional

Description of John Henry Jackson, M.D., on Entering Service

Apparent Age 34 years 0 months.
 (To be determined according to the instructions given in the Regulations for Army Medical Services.)

Height 5 feet 6 1/2 inches.

Weight 180 lbs.

Chest measurement	Girth when fully expanded	<u>40</u>	inches.
	Range of expansion	<u>2</u>	inches.

Complexion Dark

Eyes Hazel

Hair Dark brown

Religious denomination
 Church of England Yes
 Presbyterian _____
 Wesleyan _____
 Baptist or Congregationalist _____
 Other Protestants _____
 (Denomination to be stated)
 Roman Catholic _____
 Jews _____

STATEMENT of the SERVICES of No. 179 Name J. H. Jackson

Corps	Promotions, Reductions, Transfers to other Corps, Re-engagements, &c., &c., &c.	Rank	Period of Service in each Rank	
			From	To
U.S.A.F.	Enrolled	Cpl	1.4.84	17/5/14
	Promoted	Cpl	18/3/14	22/3/14
"	Attached	"	22/3/14	23/3/14
	Detached	"	23/3/14	"

HDR

Conclusion

- Digital Cameras are affordable and common for preservation
- However, traditional digital photography has lower color range
- High Dynamic Range Imaging (HDRI) increases color range to better approximate that of the real world
- HDRI techniques allow better preservation of detail and contrast of document images even when converted grayscale

Future Work

- Investigate how to implement it with Dcam (Grayscale)
- Investigate compression of HDR radiation map.
- Improve tone mapping technique

Questions?

Special Thanks

Craig Johnson for his help and feedback.

Chong Ahn for lending his Nikon camera.

Credits

Debevec et al. *SIGGRAPH 97*.

Photomatix software

Images

H-DIBCO dataset – Slide 3