504688650 12/14/2017 PATENT ASSIGNMENT COVER SHEET

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SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
BIAO WANG	10/27/2017
BING YU	10/26/2017
CHANG KYU CHOI	12/11/2017
DEHENG QIAN	10/25/2017
JAE-JOON HAN	12/11/2017
JINGTAO XU	10/25/2017
YAOZU AN	10/26/2017

RECEIVING PARTY DATA

Name:	SAMSUNG ELECTRONICS CO., LTD.
Street Address:	129, SAMSUNG-RO, YEONGTONG-GU, GYEONGGI-DO
City:	SUWON-SI
State/Country:	KOREA, REPUBLIC OF
Postal Code:	16677
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PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	15842190

CORRESPONDENCE DATA

Fax Number:(202)315-3758Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone:	202-429-0020
Email:	pto@nsiplaw.com
Correspondent Name:	NSIP LAW
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ATTORNEY DOCKET NUMBER:	012052.1529
NAME OF SUBMITTER:	S. MAHMOOD AHMAD
SIGNATURE:	/S. Mahmood Ahmad/
DATE SIGNED:	12/14/2017

Total Attachments: 18

source=NewApp_0120521529_executedCDAwAppNo#page1.tif source=NewApp 0120521529 executedCDAwAppNo#page2.tif source=NewApp 0120521529 executedCDAwAppNo#page3.tif source=NewApp_0120521529_executedCDAwAppNo#page4.tif source=NewApp 0120521529 executedCDAwAppNo#page5.tif source=NewApp 0120521529 executedCDAwAppNo#page6.tif source=NewApp 0120521529 executedCDAwAppNo#page7.tif source=NewApp 0120521529 executedCDAwAppNo#page8.tif source=NewApp 0120521529 executedCDAwAppNo#page9.tif source=NewApp 0120521529 executedCDAwAppNo#page10.tif source=NewApp_0120521529_executedCDAwAppNo#page11.tif source=NewApp 0120521529 executedCDAwAppNo#page12.tif source=NewApp 0120521529 executedCDAwAppNo#page13.tif source=NewApp_0120521529_executedCDAwAppNo#page14.tif source=NewApp_0120521529_executedCDAwAppNo#page15.tif source=NewApp_0120521529_executedCDAwAppNo#page16.tif source=NewApp 0120521529 executedCDAwAppNo#page17.tif source=NewApp 0120521529 executedCDAwAppNo#page18.tif

DECLARATION

As a below-named inventor, I hereby declare that this declaration is directed to the application attached hereto, or

to United States Application Number or PCT International Application Number

filed on _____ (if applicable), entitled:

IMAGE PROCESSING METHOD AND APPARATUS

The above-identified application was made or authorized to be made by me.

I believe I am the original inventor or an original joint inventor of a claimed invention in the above-identified application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 USC 1001 by fine or imprisonment of not more than five (5) years, or both.

I have reviewed and understand the contents of the above-identified application, including the claims.

I am aware of the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information that became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

ASSIGNMENT

For valuable consideration, I, as a below-named assignor, hereby assign to:

SAMSUNG ELECTRONICS CO., LTD. 129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 16677 Republic of Korea

and its successors and assigns (collectively hereinafter called "the Assignee"), the entire right, title, and interest throughout the world in the inventions and improvements that are the subject of the application identified in the above declaration, which is United States Application Number or PCT International Application Number $\frac{15/842,190}{15/842,190}$ filed on December 14, 2017

I authorize and request the attorneys appointed in the above-identified application to hereafter complete this Assignment by inserting above the application number and the filing date of the above-identified application when known, and to correct any typographical errors that may be discovered in this Assignment.

This Assignment includes the above-identified application, any and all United States and foreign patents, utility models, and design registrations granted for any of the inventions and improvements that are the subject of the above-identified application, and the right to claim priority based on the filing date of the above-identified application under the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes; and I authorize the Assignee to apply in all countries in my name or in its own name for patents, utility models, design registrations, like rights of exclusion, and inventors' certificates for any of the inventions and improvements that are the subject of the above-identified application; and I agree for myself and my heirs, legal representatives, and assigns without further

WC-201609-006-1-US0 012052.1529

COMBINED DECLARATION AND ASSIGNMENT UNDER 37 CFR 1.63(e)

compensation to perform such lawful acts and to sign such further applications, Assignments, preliminary statements, and other lawful documents as the Assignee may reasonably request to effectuate fully this Assignment.

In witness whereof, I, as a below-named inventor and assignor, intending to be legally bound, have hereunto affixed my signature on the date indicated below next to my signature.

Inventor's Legal Name	Biao WANG		
Inventor's Signature	BIAO WONG	Date	do1).10.d)
Residence (City, Country)	Beijing, P.R.China		
Mailing Address	Samsung Advanced Institute of Technolog Gyeonggi-do, 16678, Republic of Korea	y, 130 Samsı	ung-ro, Youngtong-gu, Suwon-si,

Inventor's Legal Name	Bing YU				ų.	e i ga de este
Inventor's Signature			Date			
Residence (City, Country)	Beijing, P.R.China					
Mailing Address	Samsung Advanced Gyeonggi-do, 16678	Institute of Technolo , Republic of Korea	gy, 130 Samsi	ung-ro, Young	tong-gu, Su	won-si,

Inventor's Legal Name	CHANG KYU CHOI				
Inventor's Signature		Date			
Residence (City, Country)	Seongnam-si, Republic of Korea		40 		a se transforma a se
Mailing Address	Samsung Advanced Institute of Technology, 13 Gyeonggi-do, 16678, Republic of Korea	30 Sams	ung-ro, Youngton	g-gu, Suv	won-si,

Inventor's Legal Name	Deheng QIAN		
Inventor's Signature		Date	
Residence (City, Country)	Beijing, P.R.China		
Mailing Address	Samsung Advanced Institute of Technology, 13 Gyeonggl-do, 16678, Republic of Korea	30 Samsı	ung-ro, Youngtong-gu, Suwon-si,

Inventor's Legal Name	Jae-Joon HAN		
Inventor's Signature		Date	
Residence (City, Country)	Seoul, Republic of Korea		
Mailing Address	Samsung Advanced Institute of Technology, 13 Gyeonggi-do, 16678, Republic of Korea	0 Samsi	ung-ro, Youngtong-gu, Suwon-si,

Inventor's Legal Name	Jingtao XU		
Inventor's Signature		Date	
Residence (City, Country)	Beijing, P.R.China		
Mailing Address	Samsung Advanced Institute of Technology, 13 Gyeonggi-do, 16678, Republic of Korea	0 Samsı	ung-ro, Youngtong-gu, Suwon-si,

Inventor's Legal Name	Yaozu AN		
Inventor's Signature		Date	
Residence (City, Country)	Beijing, P.R.China		
Mailing Address	Samsung Advanced Institute of Technology, 13 Gyeonggi-do, 16678, Republic of Korea	0 Samsı	ung-ro, Youngtong-gu, Suwon-si,

WC-201608-008-1-US0 012052-1529

COMBINED DECLARATION AND ASSIGNMENT UNDER 37 CFR 1.63(e)

DECLARATION

IMAGE PROCESSING METHOD AND APPARATUS

The above-identified application was made or authorized to be made by me.

I believe I am the original inventor or an original joint inventor of a claimed invention in the above-identified application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 USC 1001 by fine or imprisonment of not more than five (5) years, or both.

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ASSIGNMENT

For valuable consideration, I, as a below-named assignor, hereby assign to:

SAMSUNG ELECTRONICS CO., LTD. 129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 18677 Republic of Korea

and its successors and assigns (collectively hereinafter called "the Assignee"), the entire right, title, and interest throughout the world in the inventions and improvements that are the subject of the application identified in the

above declaration, which is United States Application Number or PCT International Application Number

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Page 1 of 3

WC-201609-008-1-US0 012062.1529

COMBINED DECLARATION AND ASSIGNMENT UNDER 37 CFR 1.63(e)

compensation to perform such lawful acts and to sign such further applications, Assignments, preliminary statements, and other lawful documents as the Assignee may reasonably request to effectuate fully this Assignment

In witness whereof, I, as a below-named inventor and assignor, intending to be legally bound, have hereunto affixed my signature on the date indicated below next to my signature.

Inventor's Legal Name	Biao WANG	
Inventor's Signature		Date
Residence (City, Country)	Beijing, P.R.China	
Mailing Address	Samsung Advanced Institute of Technology, 13 Gyeonggi-do, 16876, Republic of Korea	0 Sanisung-ro, Youngtong-gu, Suwon-el,

inventor's Legal Name	Bing YU	
Inventor's Signature	Jer vak	Date 2017. 10.26
Residence (City, Country)	Beijing, P.R.China	
Mailing Address	Samsung Advanced Institute of Technology, 13 Gyeonggi-do, 16978, Republic of Korea	i0 Samsung-ro, Youngtong-gu, Suwori-si

Inventor's Legal Name	CHANG KYU CHOI	
Inventor's Signature		Date
Residence (City, Country)	Seongnam-si, Republic of Korsa	
Mailing Address	Sameung Advanced Institute of Technology, 1 Gyeonggi-do, 18678, Republic of Koraa	30 Semsung-ro, Youngtong-gu, Suwon-si,

inventor's Legal Name	Deheng QIAN	
Inventor's Signature		Date
Residence (City, Country)	Beijing, P.R China	
Mailing Address	Samsung Advanced Institute of Technology, 13 Gyeonogi-do, 16678, Republic of Korea	0 Samsung-ro, Youngtong-gu, Suwon-el,

Page 2 of 3

WC-201605-006-1-US0 012052.1529

COMBINED DECLARATION AND ASSIGNMENT UNDER 37 CFR 1.63(6)

Inventor's Legal Name	jae-joon HAN
Inventor's Signature	Date
Residence (City, Country)	Seoul, Republic of Korea
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korea

Inventor's Legal Name	Jingtao XU	
Inventor's Signature		Date
Residence (City, Country)	Beijing, P.P.China	
	Samsung Advanced Institute of Technology, 13 Gyeonggi-do, 15878, Republic of Korea	0 Sameung-ro, Youngtong-gu, Suwori-si,

Inventor's Legal Name	Yaozu AN	
Inventor's Signature		Date
Residence (City, Country)	Beijing, P.R.China	
Mailing Address	Sameung Advanced Institute of Technology, 13 Gyeonggi-do, 16578, Republic of Korea	0 Samsung-ro, Youngtong-gu, Suwon-si,

Page 3 of 3

DECLARATION

As a below-named inventor, I hereby declare that this declaration is directed to the application attached hereto, or to United States Application Number or PCT International Application Number

______filed on ______(if applicable), entitled:

IMAGE PROCESSING METHOD AND APPARATUS

The above-identified application was made or authorized to be made by me.

I believe I am the original inventor or an original joint inventor of a claimed invention in the above-identified application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 USC 1001 by fine or imprisonment of not more than five (5) years, or both.

I have reviewed and understand the contents of the above-identified application, including the claims.

I am aware of the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information that became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

ASSIGNMENT

For valuable consideration, I, as a below-named assignor, hereby assign to:

SAMSUNG ELECTRONICS CO., LTD 129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 16677 Republic of Korea

I authorize and request the attorneys appointed in the above-identified application to hereafter complete this Assignment by inserting above the application number and the filing date of the above-identified application when known, and to correct any typographical errors that may be discovered in this Assignment.

This Assignment includes the above-identified application, any and all United States and foreign patents, utility models, and design registrations granted for any of the inventions and improvements that are the subject of the above-identified application, and the right to claim priority based on the filing date of the aboveidentified application under the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes; and I authorize the Assignee to apply in all countries in my name or in its own name for patents, utility models, design registrations, like rights of exclusion, and inventors' certificates for any of the inventions and improvements that are the subject of the above-identified application; and I agree for myself and my heirs, legal representatives, and assigns without further compensation to perform such lawful acts and to sign such further applications. Assignments, preliminary statements, and other lawful documents as the Assignee may reasonably request to effectuate fully this Assignment.

Page 1 of 3

In witness whereof, I, as a below-named inventor and assignor, intending to be legally bound, have hereunto affixed my signature on the date indicated below next to my signature.

Inventor's Legai Name	Biao WANG
Inventor's Signature	Date
Residence (City, Country)	Beljing, P.R.China
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korsa

Inventor's Legal Name	Bing YU
Inventor's Signature	Date
Residence (City, Country)	Beijing, P.R.China
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Younglong-gu, Suwon-si, Gyeonggi-do, 16676, Republic of Korea

Inventor's Legal Name	CHANG KYU CHOI
Inventor's Signature	Date December 11, 2017
Residence (City, Country)	Seongnam-si, Republic of Korea
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Younglong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korea

Inventor's Legal Name	Deheng QIAN
Inventor's Signature	Dale
Residence (City, Country)	Beijing, P.R.China
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korea

inventor's Legal Name	Jae-Joon HAN		
Inventor's Signature	- ADA	Date	December 11, 2017
Residence (City, Country)	Seoul, Republic of Korea		
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korea		

Inventor's Legal Name	Jingtao XU	
Inventor's Signature	Date	
Residence (City, Country)	Beijing, P.R.China	
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16676, Republic of Korea	

Inventor's Legal Name	Yaozu AN	
Inventor's Signature	Date	
Residence (City, Country)	Beijing, P.R.China	
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korea	



Page 3 of 3

PATENT REEL: 044400 FRAME: 0527

DECLARATION

As a below-named inventor, I hereby declare that this declaration is directed to the application attached hereto, or

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IMAGE PROCESSING METHOD AND APPARATUS

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SAMSUNG ELECTRONICS CO., LTD. 129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 16677 Republic of Korea

and its successors and assigns (collectively hereinafter called "the Assignee"), the entire right, title, and interest throughout the world in the inventions and improvements that are the subject of the application identified in the above declaration, which is United States Application Number or PCT International Application Number 15/842,190 filed on December 14, 2017

I authorize and request the attorneys appointed in the above-identified application to hereafter complete this Assignment by inserting above the application number and the filing date of the above-identified application when known, and to correct any typographical errors that may be discovered in this Assignment.

This Assignment includes the above-identified application, any and all United States and foreign patents, utility models, and design registrations granted for any of the inventions and improvements that are the subject of the above-identified application, and the right to claim priority based on the filing date of the above-identified application under the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes; and I authorize the Assignee to apply in all countries in my name or in its own name for patents, utility models, design registrations, like rights of exclusion, and inventors' certificates for any of the inventions and improvements that are the subject of the above-identified application; and I agree for myself and my heirs, legal representatives, and assigns without further

compensation to perform such lawful acts and to sign such further applications. Assignments, preliminary statements, and other lawful documents as the Assignee may reasonably request to effectuate fully this Assignment

In witness whereof, I, as a below-named inventor and assignor, intending to be legally bound, have hereunto affixed my signature on the date indicated below next to my signature.

Inventor's Legal Name	Biao WANG	
Inventor's Signature	Date	
Residence (City. Country)	Beijing, P.R.China	
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korea	

inventor's Legal Name	Bing YU	
Inventor's Signature	Date	
Residence (City, Country)	Beijing, P.R.China	
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korea	

inventor's Legal Name	CHANG KYU CHOI
Inventor's Signature	Date
Residence (City, Country)	Seongnam-si, Republic of Korea
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korea

Inventor's Legal Name	Deheng QIAN		
Inventor's Signature	Deheng Qian	Date 2017-10-25	
Residence (City, Country)	Beijing, P.R.China		
Mailing Address	Samsung Advanced Institute of Te Gyeonggi-do, 16678, Republic of K	chnology, 130 Samsung-ro, Youngtong-gu, Suwon-si, /orea	

Page 2 of 3

2010 III (666496758C) Bellerg-SAIT (5668 i.al) 20171025174858

Inventor's Legal Name	Jae-Joon HAN		
Inventor's Signature		Date	
Residence (City, Country)	Seoul, Republic of Korea		
Mailing Address	Samsung Advanced Institute of Technology, 13 Gyeonggi-do, 16678, Republic of Korea	0 Samsi	ung-ro, Youngtong-gu, Suwon-si,

Inventor's Legal Name	Jingtao XU		
Inventor's Signature		Date	
Residence (City, Country)	Beijing, P.R.China		
Mailing Address	Samsung Advanced Institute of Technology, 13 Gyeonggi-do, 16678, Republic of Korea	0 Samsı	ung-ro, Youngtong-gu, Suwon-si,

Inventor's Legal Name	Yaozu AN		
Inventor's Signature		Date	
Residence (City, Country)	Beijing, P.R.China		
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korea		

DECLARATION

As a below-named inventor, I hereby declare that this declaration is directed to the application attached hereto, or

to United States Application Number or PCT International Application Number

filed on _____ (if applicable), entitled:

IMAGE PROCESSING METHOD AND APPARATUS

The above-identified application was made or authorized to be made by me.

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ASSIGNMENT

For valuable consideration, I, as a below-named assignor, hereby assign to:

SAMSUNG ELECTRONICS CO., LTD. 129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 16677 Republic of Korea

and its successors and assigns (collectively hereinafter called "the Assignee"), the entire right, title, and interest throughout the world in the inventions and improvements that are the subject of the application identified in the above declaration, which is United States Application Number or PCT International Application Number 15/842,190 filed on ______ December 14, 2017 _____.

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Inventor's Legal Name	Biao WANG		
Inventor's Signature		Date	
Residence (City, Country)	Beijing, P.R.China		
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korea		

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Inventor's Legal Name	CHANG KYU CHOI		
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Residence (City, Country)	Seongnam-si, Republic of Korea		
Mailing Address	Samsung Advanced Institute of Technology, 13 Gyeonggi-do, 16678, Republic of Korea	0 Samsı	ung-ro, Youngtong-gu, Suwon-si,

Inventor's Legal Name	Deheng QIAN		
Inventor's Signature		Date	
Residence (City, Country)	Beijing, P.R.China		
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korea		

Inventor's Legal Name	Jae-Joon HAN
Inventor's Signature	Date
Residence (City, Country)	Seoul. Republic of Korea
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korea

inventor's Legal Name	Jingtao XU
Inventor's Signature	Tington Ver Date 2017/10/25
Residence (City, Country)	Beijing, P.R.China
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korea

Inventor's Legal Name	Yaozu AN	
Inventor's Signature	Date	
Residence (City, Country)	Beijing, P.R.China	
Mailing Address	Samsung Advanced Institute of Technology, 130 Samsung-ro, Youngtong-gu, Suwon-si, Gyeonggi-do, 16678, Republic of Korea	

DECLARATION

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to United States Application Number or PCT International Application Number

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and its successors and assigns (collectively hereinafter called "the Assignee"), the entire right, title, and interest throughout the world in the inventions and improvements that are the subject of the application identified in the above declaration, which is United States Application Number or PCT International Application Number $\frac{15/842,190}{\text{filed on December 14, 2017}}$

I authorize and request the attorneys appointed in the above-identified application to hereafter complete this Assignment by inserting above the application number and the filing date of the above-identified application when known, and to correct any typographical errors that may be discovered in this Assignment.

This Assignment includes the above-identified application, any and all United States and foreign patents, utility models, and design registrations granted for any of the inventions and improvements that are the subject of the above-identified application, and the right to claim priority based on the filing date of the above-identified application under the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes; and I authorize the Assignee to apply in all countries in my name or in its own name for patents, utility models, design registrations, like rights of exclusion, and inventors' certificates for any of the inventions and improvements that are the subject of the above-identified application; and I agree for myself and my heirs, legal representatives, and assigns without further

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compensation to perform such lawful acts and to sign such further applications, Assignments, preliminary statements, and other lawful documents as the Assignee may reasonably request to effectuate fully this Assignment.

In witness whereof, I, as a below-named inventor and assignor, intending to be legally bound, have hereunto affixed my signature on the date indicated below next to my signature.

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