

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT6056720

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT
CONVEYING PARTY DATA	
Name	Execution Date
TAREK D. HADDAD	04/09/2020
NIRANJAN CHAKRAVARTHY	03/25/2020
DONALD R. MUSGROVE	04/09/2020
ANDREW RADTKE	03/25/2020
EDUARDO N. WARMAN	03/27/2020
RODOLPHE KATRA	03/26/2020
LINDSAY A. PEDALTY	04/09/2020
RECEIVING PARTY DATA	
Name:	MEDTRONIC, INC.
Street Address:	710 MEDTRONIC PARKWAY NE
City:	MINNEAPOLIS
State/Country:	MINNESOTA
Postal Code:	55432-5604
PROPERTY NUMBERS Total: 1	
Property Type	Number
Application Number:	16845996
CORRESPONDENCE DATA	
Fax Number:	
<i>Correspondence 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.</i>	
Phone:	7635263539
Email:	rs.patents.five@medtronic.com
Correspondent Name:	MEDTRONIC INC. (CVG)
Address Line 1:	8200 CORAL SEA STREET NE.
Address Line 4:	MINNEAPOLIS, UNITED STATES 55112
ATTORNEY DOCKET NUMBER:	A0001601US02/1111-713US01
NAME OF SUBMITTER:	KAREN SORENSEN
SIGNATURE:	/Karen Sorensen/
DATE SIGNED:	04/10/2020

Total Attachments: 56

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ASSIGNMENT OF APPLICATION(S)

WHEREAS I/WE, the below named inventor(s), with residence as indicated below, have made one or more inventions relating to:

**MACHINE LEARNING BASED DEPOLARIZATION IDENTIFICATION AND ARRHYTHMIA
LOCALIZATION VISUALIZATION**

- for which an application for a United States Patent or a U.S. Provisional Application is being filed contemporaneously herewith;
- for which an application for a United States Patent identified as U.S. Patent Application No. _____ was filed on _____;
- for which U.S. Provisional Application No. _____ was filed on _____;
- for which the above application claims the benefit of U.S. Provisional Patent Application No. 62/843,786, filed on May 6, 2019; and/or
- for which an application identified as PCT International Patent Application No. _____ was filed on _____

(and for which I/WE hereby authorize the below identified ASSIGNEE and its successors, representatives and assigns to hereafter insert the application number and/or filing date of the above-identified application(s) after such information becomes known to them).

WHEREAS, Medtronic, Inc. ("ASSIGNEE"), a corporation organized and existing under the laws of the State of Minnesota and having a principal place of business at 710 Medtronic Parkway NE., Minneapolis, Minnesota 55432-5604, desires to acquire the entire right, title and interest throughout the world in and to said inventions, including the entire right, title and interest in and to the application(s) identified above and all other patent applications filed for the inventions, and in and to all patents throughout the world that have granted or may be granted hereafter for the inventions, including but not limited to patents granted or based on any application(s) identified above or any other patent applications for the inventions, and including any and all rights of priority in the application(s) identified above and any other patent applications for the inventions;

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, I/WE do hereby acknowledge that I/WE have sold, assigned, and transferred and set over and by these presents do sell, assign, transfer and set over unto ASSIGNEE, and its successors, representatives and assigns, the entire right, title and interest throughout the world in and to the inventions, including the entire-right, title and interest in and to all applications that have been filed or may be filed in the United States and all organizations for the invention(s), including the application(s) identified above and all other applications for the invention(s), all applications claiming benefit or priority to the application(s) identified above, and all divisional, continuation, continuation-in-part, substitute, renewal, reissue, re-examinations, provisional, non-provisional, and all other applications for patent which have been or shall be filed in the United States and all foreign countries for the inventions; including the entire right, title and interest in and to all original and reissued or re-examined patents which have been or shall be issued in the United States and all foreign countries for the inventions, including all patents granted on or based on the application(s) identified above or any of the other foregoing applications, and including any utility models, design registrations, inventor's certificates or other like rights of exclusion granted for the inventions; and specifically including any and all rights of priority in the inventions and the application(s) identified above and any of the other foregoing applications, including the right to file the application(s) identified above and any of the other foregoing applications, and the right to claim the priority of the application(s) identified above and any of the other foregoing applications under the International Convention for the Protection for Industrial Property, or any other conventions, treaties, laws or agreements of like purposes; and including the right to enforce and sue for past, present and future infringement of any patents issuing from or based on the application(s) identified above or any of the other foregoing applications for the full term of such patents, all such rights to be held and enjoyed by ASSIGNEE and its successors, representatives, and assigns, for its own use and benefit to the

full end of the term for which any of the U.S. patents, foreign patents, utility models, design registrations, inventor's certificates, or like rights of exclusion are granted;

AND I/WE materially represent to ASSIGNEE, its successors, representatives, and assigns, that I/WE are the sole lawful owners of the entire unencumbered right, title and interest in and to said inventions, and that I/WE have good right and lawful authority to sell and convey the same in the manner herein set forth, and hereby covenant that I/WE have not and will not execute any writing or do any act whatsoever conflicting with these presents;

AND I/WE individually covenant and agree that, when requested and at the expense of ASSIGNEE, its successors representatives, and assigns, but at no charge to ASSIGNEE, will (1) execute all divisional, continuation, continuation-in-part, substitute, renewal, reissue, re-examinations, provisional, non-provisional, and all other patent applications based on said inventions; (2) execute all rightful oaths, declarations, assignments, powers of attorney and other papers relating to the foregoing; (3) communicate to the ASSIGNEE all facts known to the undersigned relating to said inventions and the history relating thereto; (4) cooperate with the ASSIGNEE in any interference, opposition, dispute, litigation, or other proceeding involving any of the applications or patents for such inventions, including but not limited to testifying; and (5) generally do everything possible which the ASSIGNEE shall consider desirable for vesting title to any patent applications relating to said inventions in the ASSIGNEE, and for securing, maintaining and enforcing proper patent protection for such inventions.

AND I/WE do hereby sell, assign, transfer and convey to ASSIGNEE, its successors, representatives, and assigns, all claims for damages and all remedies arising out of or relating to any violation(s) of any of the rights assigned hereby that have or may have accrued prior to the date of assignment to said ASSIGNEE, or may accrue hereafter, including, but not limited to the right to sue for, seek, obtain, collect, recover, and retain damages and any ongoing or prospective royalties to which I/WE may be emitted, or that I/WE may collect for any infringement or from any settlement or agreement related to any patent relating to said inventions before or after issuance;

AND I/WE do hereby authorize and request any issuing authority throughout the world having an applicable duty to issue any and all United States and foreign patents, utility models, design registrations, inventor's certificates or other like rights of exclusion granted on said inventions to the ASSIGNEE, its successors, representatives, and assigns, and authorize ASSIGNEE to apply for such patents utility models, design registrations, inventor's certificates or other like rights of exclusion for said inventions in its own name.

In witness whereof, I/WE have signed my/our name(s) on the day and year set forth below.

Given Name (first and middle initial [if any]): Tarek D.	Family Name or Surname (last name): Haddad
Inventor's Signature: <i>Tarek Haddad</i>	Date: 4/9/20
City and State: Minneapolis, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Niranjan	Family Name or Surname (last name): Chakravarthy
Inventor's Signature:	Date:
City and State: Singapore	Country: Singapore

Given Name (first and middle initial [if any]): Donald R.	Family Name or Surname (last name): Musgrove
Inventor's Signature:	Date:
City and State: Minneapolis, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Andrew	Family Name or Surname (last name): Radtke
Inventor's Signature:	Date:
City and State: Minneapolis, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Eduardo N.	Family Name or Surname (last name): Warman
Inventor's Signature:	Date:
City and State: Maple Grove, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Rodolphe	Family Name or Surname (last name): Katra
Inventor's Signature:	Date:
City and State: Blaine, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Lindsay A.	Family Name or Surname (last name): Pedalty	
Inventor's Signature:	Date:	
City and State: Minneapolis, Minnesota	Country: USA	

ASSIGNMENT OF APPLICATION(S)

WHEREAS I/WE, the below named inventor(s), with residence as indicated below, have made one or more inventions relating to:

**MACHINE LEARNING BASED DEPOLARIZATION IDENTIFICATION AND ARRHYTHMIA
LOCALIZATION VISUALIZATION**

- for which an application for a United States Patent or a U.S. Provisional Application is being filed contemporaneously herewith;
- for which an application for a United States Patent identified as U.S. Patent Application No. _____ was filed on _____;
- for which U.S. Provisional Application No. _____ was filed on _____;
- for which the above application claims the benefit of U.S. Provisional Patent Application No. 62/843,786, filed on Mar 6, 2019; and/or
- for which an application identified as PCT International Patent Application No. _____ was filed on _____

(and for which I/WE hereby authorize the below identified ASSIGNEE and its successors, representatives and assigns to hereafter insert the application number and/or filing date of the above-identified application(s) after such information becomes known to them).

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NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, I/WE do hereby acknowledge that I/WE have sold, assigned, and transferred and set over and by these presents do sell, assign, transfer and set over unto ASSIGNEE, and its successors, representatives and assigns, the entire right, title and interest throughout the world in and to the inventions, including the entire-right, title and interest in and to all applications that have been filed or may be filed in the United States and all organizations for the invention(s), including the application(s) identified above and all other applications for the invention(s), all applications claiming benefit or priority to the application(s) identified above, and all divisional, continuation, continuation-in-part, substitute, renewal, reissue, re-examinations, provisional, non-provisional, and all other applications for patent which have been or shall be filed in the United States and all foreign countries for the inventions; including the entire right, title and interest in and to all original and reissued or re-examined patents which have been or shall be issued in the United States and all foreign countries for the inventions, including all patents granted on or based on the application(s) identified above or any of the other foregoing applications, and including any utility models, design registrations, inventor's certificates or other like rights of exclusion granted for the inventions, and specifically including any and all rights of priority in the inventions and the application(s) identified above and any of the other foregoing applications, including the right to file the application(s) identified above and any of the other foregoing applications, and the right to claim the priority of the application(s) identified above and any of the other foregoing applications under the International Convention for the Protection for Industrial Property, or any other conventions, treaties, laws or agreements of like purposes; and including the right to enforce and sue for past, present and future infringement of any patents issuing from or based on the application(s) identified above or any of the other foregoing applications for the full term of such patents, all such rights to be held and enjoyed by ASSIGNEE and its successors, representatives, and assigns, for its own use and benefit to the

full end of the term for which any of the U.S. patents, foreign patents, utility models, design registrations, inventor's certificates, or like rights of exclusion are granted;

AND I/WE materially represent to ASSIGNEE, its successors, representatives, and assigns, that I/WE are the sole lawful owners of the entire unencumbered right, title and interest in and to said inventions, and that I/WE have good right and lawful authority to sell and convey the same in the manner herein set forth, and hereby covenant that I/WE have not and will not execute any writing or do any act whatsoever conflicting with these presents;

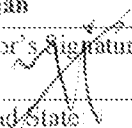
AND I/WE individually covenant and agree that, when requested and at the expense of ASSIGNEE, its successors representatives, and assigns, but at no charge to ASSIGNEE, will (1) execute all divisional, continuation, continuation-in-part, substitute, renewal, reissue, re-examinations, provisional, non-provisional, and all other patent applications based on said inventions; (2) execute all rightful oaths, declarations, assignments, powers of attorney and other papers relating to the foregoing; (3) communicate to the ASSIGNEE all facts known to the undersigned relating to said inventions and the history relating thereto; (4) cooperate with the ASSIGNEE in any interference, opposition, dispute, litigation, or other proceeding involving any of the applications or patents for such inventions, including but not limited to testifying, and (5) generally do everything possible which the ASSIGNEE shall consider desirable for vesting title to any patent applications relating to said inventions in the ASSIGNEE, and for securing, maintaining and enforcing proper patent protection for such inventions.

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In witness whereof, I/WE have signed my/our name(s) on the day and year set forth below.

Given Name (first and middle initial [if any]): Tarek B.	Family Name or Surname (last name): Haddad
Inventor's Signature:	Date:
City and State: Minneapolis, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Niranjan	Family Name or Surname (last name): Chakravarthy
Inventor's Signature: 	Date: MAR 25, 2020
City and State: Singapore	Country: Singapore

Given Name (first and middle initial [if any]): Donald R.	Family Name or Surname (last name): Musgrove
Inventor's Signature:	Date:
City and State: Minneapolis, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Andrew	Family Name or Surname (last name): Radtke
Inventor's Signature:	Date:
City and State Minneapolis, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Eduardo N.	Family Name or Surname (last name): Warman
Inventor's Signature:	Date:
City and State: Maple Grove, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Rodolphe	Family Name or Surname (last name): Katra
Inventor's Signature:	Date:
City and State: Blaine, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Lindsay A.	Family Name or Surname (last name): Pedalty
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City and State: Minneapolis, Minnesota	Country: USA

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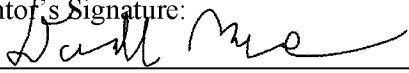
AND I/WE do hereby sell, assign, transfer and convey to ASSIGNEE, its successors, representatives, and assigns, all claims for damages and all remedies arising out of or relating to any violation(s) of any of the rights assigned hereby that have or may have accrued prior to the date of assignment to said ASSIGNEE, or may accrue hereafter, including, but not limited to the right to sue for, seek, obtain, collect, recover, and retain damages and any ongoing or prospective royalties to which I/WE may be entitled, or that I/WE may collect for any infringement or from any settlement or agreement related to any patent relating to said inventions before or after issuance;

AND I/WE do hereby authorize and request any issuing authority throughout the world having an applicable duty to issue any and all United States and foreign patents, utility models, design registrations, inventor's certificates or other like rights of exclusion granted on said inventions to the ASSIGNEE, its successors, representatives, and assigns, and authorize ASSIGNEE to apply for such patents utility models, design registrations, inventor's certificates or other like rights of exclusion for said inventions in its own name.

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Given Name (first and middle initial [if any]): Tarek D.	Family Name or Surname (last name): Haddad
Inventor's Signature:	Date:
City and State: Minneapolis, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Niranjan	Family Name or Surname (last name): Chakravarthy
Inventor's Signature:	Date:
City and State: Singapore	Country: Singapore

Given Name (first and middle initial [if any]): Donald R.	Family Name or Surname (last name): Musgrove
Inventor's Signature: 	Date: 09APR2020
City and State: Minneapolis, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Andrew	Family Name or Surname (last name): Radtke	
Inventor's Signature:	Date:	
City and State: Minneapolis, Minnesota	Country: USA	

Given Name (first and middle initial [if any]): Eduardo N.	Family Name or Surname (last name): Warman
Inventor's Signature:	Date:
City and State: Maple Grove, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Rodolphe	Family Name or Surname (last name): Katra
Inventor's Signature:	Date:
City and State: Blaine, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Lindsay A.	Family Name or Surname (last name): Pedalty
Inventor's Signature:	Date:
City and State: Minneapolis, Minnesota	Country: USA

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NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, I/WE do hereby acknowledge that I/WE have sold, assigned, and transferred and set over and by these presents do sell, assign, transfer and set over unto ASSIGNEE, and its successors, representatives and assigns, the entire right, title and interest throughout the world in and to the inventions, including the entire-right, title and interest in and to all applications that have been filed or may be filed in the United States and all organizations for the invention(s), including the application(s) identified above and all other applications for the invention(s), all applications claiming benefit or priority to the application(s) identified above, and all divisional, continuation, continuation-in-part, substitute, renewal, reissue, re-examinations, provisional, non-provisional, and all other applications for patent which have been or shall be filed in the United States and all foreign countries for the inventions; including the entire right, title and interest in and to all original and reissued or re-examined patents which have been or shall be issued in the United States and all foreign countries for the inventions, including all patents granted on or based on the application(s) identified above or any of the other foregoing applications, and including any utility models, design registrations, inventor's certificates or other like rights of exclusion granted for the inventions; and specifically including any and all rights of priority in the inventions and the application(s) identified above and any of the other foregoing applications, including the right to file the application(s) identified above and any of the other foregoing applications, and the right to claim the priority of the application(s) identified above and any of the other foregoing applications under the International Convention for the Protection for Industrial Property, or any other conventions, treaties, laws or agreements of like purposes; and including the right to enforce and sue for past, present and future infringement of any patents issuing from or based on the application(s) identified above or any of the other foregoing applications for the full term of such patents, all such rights to be held and enjoyed by ASSIGNEE and its successors, representatives, and assigns, for its own use and benefit to the

full end of the term for which any of the U.S. patents, foreign patents, utility models, design registrations, inventor's certificates, or like rights of exclusion are granted;

AND I/WE materially represent to ASSIGNEE, its successors, representatives, and assigns, that I/WE are the sole lawful owners of the entire unencumbered right, title and interest in and to said inventions, and that I/WE have good right and lawful authority to sell and convey the same in the manner herein set forth, and hereby covenant that I/WE have not and will not execute any writing or do any act whatsoever conflicting with these presents;

AND I/WE individually covenant and agree that, when requested and at the expense of ASSIGNEE, its successors representatives, and assigns, but at no charge to ASSIGNEE, will (1) execute all divisional, continuation, continuation-in-part, substitute, renewal, reissue, re-examinations, provisional, non-provisional, and all other patent applications based on said inventions; (2) execute all rightful oaths, declarations, assignments, powers of attorney and other papers relating to the foregoing; (3) communicate to the ASSIGNEE all facts known to the undersigned relating to said inventions and the history relating thereto; (4) cooperate with the ASSIGNEE in any interference, opposition, dispute, litigation, or other proceeding involving any of the applications or patents for such inventions, including but not limited to testifying; and (5) generally do everything possible which the ASSIGNEE shall consider desirable for vesting title to any patent applications relating to said inventions in the ASSIGNEE, and for securing, maintaining and enforcing proper patent protection for such inventions.

AND I/WE do hereby sell, assign, transfer and convey to ASSIGNEE, its successors, representatives, and assigns, all claims for damages and all remedies arising out of or relating to any violation(s) of any of the rights assigned hereby that have or may have accrued prior to the date of assignment to said ASSIGNEE, or may accrue hereafter, including, but not limited to the right to sue for, seek, obtain, collect, recover, and retain damages and any ongoing or prospective royalties to which I/WE may be entitled, or that I/WE may collect for any infringement or from any settlement or agreement related to any patent relating to said inventions before or after issuance;


AND I/WE do hereby authorize and request any issuing authority throughout the world having an applicable duty to issue any and all United States and foreign patents, utility models, design registrations, inventor's certificates or other like rights of exclusion granted on said inventions to the ASSIGNEE, its successors, representatives, and assigns, and authorize ASSIGNEE to apply for such patents utility models, design registrations, inventor's certificates or other like rights of exclusion for said inventions in its own name.

In witness whereof, I/WE have signed my/our name(s) on the day and year set forth below.

Given Name (first and middle initial [if any]): Tarek D.	Family Name or Surname (last name): Haddad
Inventor's Signature:	Date:
City and State: Minneapolis, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Niranjan	Family Name or Surname (last name): Chakravarthy
Inventor's Signature:	Date:
City and State: Singapore	Country: Singapore

Given Name (first and middle initial [if any]): Donald R.	Family Name or Surname (last name): Musgrove	
Inventor's Signature:	Date:	
City and State: Minneapolis, Minnesota	Country: USA	

Given Name (first and middle initial [if any]): Andrew	Family Name or Surname (last name): Radtke
Inventor's Signature: 	Date: 03/25/2020
City and State: Minneapolis, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Eduardo N.	Family Name or Surname (last name): Warman
Inventor's Signature:	Date:
City and State: Maple Grove, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Rodolphe	Family Name or Surname (last name): Katra
Inventor's Signature:	Date:
City and State: Blaine, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Lindsay A.	Family Name or Surname (last name): Pedalty
Inventor's Signature:	Date:
City and State: Minneapolis, Minnesota	Country: USA

ASSIGNMENT OF APPLICATION(S)

WHEREAS I/WE, the below named inventor(s), with residence as indicated below, have made one or more inventions relating to:

**MACHINE LEARNING BASED DEPOLARIZATION IDENTIFICATION AND ARRHYTHMIA
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- for which an application for a United States Patent or a U.S. Provisional Application is being filed contemporaneously herewith;
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- for which U.S. Provisional Application No. _____ was filed on _____;
- for which the above application claims the benefit of U.S. Provisional Patent Application No. 62/843,786, filed on May 6, 2019; and/or
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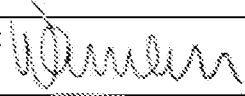
In witness whereof, I/WE have signed my/our name(s) on the day and year set forth below.

Given Name (first and middle initial [if any]): Tarek D.	Family Name or Surname (last name): Haddad
Inventor's Signature:	Date:
City and State: Minneapolis, Minnesota	Country: USA

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Inventor's Signature:	Date:
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Inventor's Signature: 	Date: 3/27/2020	
City and State: Maple Grove, Minnesota	Country: USA	

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Inventor's Signature:	Date:
City and State: Blaine, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Lindsay A.	Family Name or Surname (last name): Pedalty
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Given Name (first and middle initial [if any]): Rodolphe	Family Name or Surname (last name): Katra
Inventor's Signature: 	Date: 3/26/20
City and State: Blaine, Minnesota	Country: USA

Given Name (first and middle initial [if any]): Lindsay A.	Family Name or Surname (last name): Pedaly
Inventor's Signature:	Date:
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Given Name (first and middle initial [if any]): Lindsay A.	Family Name or Surname (last name): Pedalty
Inventor's Signature: <i>Lindsay A Pedalty</i>	Date: 09 April 2020
City and State: Minneapolis, Minnesota	Country: USA