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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* JINGFENG JIANG and CHARLES STROTHER

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Appeal 2017-003972  
Application 13/229,141<sup>1</sup>  
Technology Center 3700

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Before: ERIC B. GRIMES, TAWEN CHANG, and DAVID COTTA,  
*Administrative Patent Judges.*

COTTA, *Administrative Patent Judge.*

DECISION ON APPEAL

This is an Appeal under 35 U.S.C. § 134 involving claims directed to a non-transitory computer readable storage medium and a computer system. The Examiner rejected claims 1–30 under 35 U.S.C. § 101 as not directed to patent eligible subject matter, under 35 U.S.C. § 102(b) as anticipated, and under 35 U.S.C. § 103(a) as obvious.

We AFFIRM.

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<sup>1</sup> According to Appellants, the real party in interest is Wisconsin Alumni Research Foundation. Br. 1.

STATEMENT OF THE CASE

The Specification discloses that “[t]he conventional endovascular approach for treating cerebral aneurysms is rapidly evolving from coiling, or stent-assisted coiling, to using flow diversion devices, such as densely woven flow-diverting stents.” Spec. ¶ 3. “Because these aforementioned flow-diverting devices are used to treat cerebral aneurysms by directly altering the aneurismal hemodynamics, there is increasing interest in the characterization of flow in and around cerebral aneurysms before and after the deployment of a particular device” which is preferably done using a “virtual device and using patient-specific computational fluid dynamics (‘CFD’) simulations.” *Id.* ¶ 4. The Specification states that prior art CFD simulations were “too computationally expensive to make them attractive for routine use in a clinical setting.” *Id.* ¶ 10.

The Specification states: “The present invention overcomes the aforementioned drawbacks by providing a method for virtual deployment of a flow-diverting device that uses a porous media approach to reduce computational cost.” *Id.* ¶ 12. “This method is capable of automatically generating subject-specific computational flow dynamics (‘CFD’) models with the embedment of virtual flow-diverting devices in clinically relevant times.” *Id.*

Claims 1–30 are on appeal. Claim 1 below is illustrative and reads as follows:

1. A non-transitory computer readable storage medium having stored thereon a computer program comprising instructions that when executed by a processor causes the processor to:
  - a) receive a medical image acquired with a medical imaging system and that depicts a blood vessel of a patient;

b) generate a pre-treatment blood vessel model that includes a volume of a normal portion of the blood vessel and a volume of an abnormal portion of the blood vessel by segmenting the received medical image;

c) generate a post-treatment blood vessel model that includes a volume of a normal portion of the blood vessel and a volume of an abnormal portion of the blood vessel as affected by a flow-diverting device using the pretreatment vessel model generated in step b);

d) calculate a post-deployment flow-diverting device model using the post-treatment blood vessel model generated in step c); and

e) generate a computational flow dynamics model using the post-treatment blood vessel model generated in step c) and the post-deployment flow-diverting device model calculated in step d).

Br. 19.

#### REJECTIONS

The claims stand rejected as follows:

Claims 1–30 were rejected under 35 U.S.C. § 101 as directed to patent ineligible subject matter. Non-Final Act.<sup>2</sup> 6–7.

Claims 1–4, 15–18, and 20 were rejected under 35 U.S.C. § 102(b) as anticipated by Groden.<sup>3</sup> Non-Final Act. 7–10.

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<sup>2</sup> Office Action mailed January 11, 2016 (“Non-Final Act.”).

<sup>3</sup> Groden et al., *Three-Dimensional Pulsatile Flow Simulation Before and After Endovascular Coil Embolization of a Terminal Cerebral Aneurysm*, 21 JOURNAL OF CEREBRAL BLOOD FLOW & METABOLISM 1464–71 (2001) (“Groden”).

Claims 5–7, 9, 10, 19, 22–24, and 27–29 were rejected under 35 U.S.C. § 103(a) as obvious over the combination of Groden and Klauschen.<sup>4</sup> Non-Final Act. 11–19.

Claims 12 and 13 were rejected under 35 U.S.C. § 103(a) as obvious over the combination of Groden and Antiga.<sup>5</sup> Non-Final Act. 19–20.

Claim 21 was rejected under 35 U.S.C. § 103(a) as obvious over the combination of Groden and Bashiri.<sup>6</sup> Non-Final Act. 20–21.

Claim 30 was rejected under 35 U.S.C. § 103(a) as obvious over the combination of Groden, Klauschen and Bashiri. Non-Final Act. 21.

#### SUBJECT MATTER ELIGIBILITY

Appellants argue claims 1–30 together. We designate claim 1 as representative.

In finding claim 1 patent ineligible, the Examiner found that the claims were directed to an abstract idea. Non-Final Act. 6. The Examiner concluded that “the generating and calculating steps outlined in claims 1 and 22 are merely an algorithm implemented by a generic computer structure for performing a conventional, well understood, routine method in the medical art of receiving and analyzing data in order to create a model of a physiological process.” *Id.* The Examiner then concluded that the additional elements recited in the claims were mere data gathering and did not transform the abstract idea into patent eligible subject matter. *Id.* at 6–7.

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<sup>4</sup> Klauschen et al., *Computational Reconstruction of Cell and Tissue Surfaces for modeling and data analysis*, 4(7) NAT. PROTOC., 1006–1012 (2009) (“Klauschen”).

<sup>5</sup> Antiga et al., *Robust and Objective Decomposition and Mapping of Bifurcating Vessels*, 23(6) IEEE TRANSACTIONS ON MEDICAL IMAGING 704–713 (2004) (“Antiga”).

<sup>6</sup> Bashiri et al., US 2011/0054589 A1; pub. Mar. 3, 2011 (“Bashiri”).

We agree with the Examiner that the claims at issue are directed to patent ineligible subject matter.

Determination of subject matter eligibility involves a two-step test. First one must determine if the claimed subject matter is directed to a judicially recognized exception such as a product of nature. *Mayo Collaborative Services, v. Prometheus Lab., Inc.*, 566 U.S. 66, 78 (2012). If the claims address a judicially recognized exception, the next step is to determine if the claims recite additional elements that transform the nature of the claim. *Id.*

The Federal Circuit recently summarized application of the first step of the subject matter eligibility test to claims involving abstract ideas as follows:

Information as such is an intangible. Accordingly, we have treated collecting information, including when limited to particular content (which does not change its character as information), as within the realm of abstract ideas. In a similar vein, we have treated analyzing information by steps people go through in their minds, or by mathematical algorithms, without more, as essentially mental processes within the abstract-idea category. And we have recognized that merely presenting the results of abstract processes of collecting and analyzing information, without more (such as identifying a particular tool for presentation), is abstract as an ancillary part of such collection and analysis.

*Elec. Power Group, LLC v. Alstom SA*, 830 F.3d 1350, 1353–54 (Fed. Cir. 2016) (citations omitted).

Here, claim 1 is focused on an abstract idea, the generation of a computational flow dynamics (“CFD”) model. Each of the steps recited in claim 1 relates to the generation of the CFD model. Step (a) of claim 1 recites receiving information for use in the model while each of steps (b)

through (e) recite mathematical operations to be performed in generating the model. As in *Electric Power Group*, the advance reflected in claim 1 is related to “a process of gathering and analyzing information of a specified content, then displaying the results, and not any particular assertedly inventive technology for performing those functions.” *Id.* at 1354. As in *Electric Power Group*, this subject matter is not patent eligible.

Turning to the second step in the subject matter eligibility analysis, we find nothing sufficient to remove the claims from the class of subject matter ineligible for patenting. The fact that the CFD model is stored on a “non-transitory computer readable storage medium” and “executed by a processor” does not add enough to confer eligibility upon the abstract idea recited in claim 1. Appellants do not identify anything to suggest that the storage medium and processor recited in the claim involve something more than generic and conventional components. *Alice Corp. Pty. Ltd. v. CLS Bank Intern.*, 134 S.Ct. 2347, 2358 (2014) (“[T]he mere recitation of a generic computer cannot transform a patent ineligible abstract idea into a patent-eligible invention.”); *TLI Communications LLC v. AV Automotive LLC*, 823 F.3d 607, 613 (Fed. Cir. 2016) (“It is well-settled that mere recitation of concrete, tangible components is insufficient to confer patent eligibility to an otherwise abstract idea.”); *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1256 (Fed. Cir. 2014) (“[A]fter *Alice*, there can remain no doubt: recitation of generic computer limitations does not make an otherwise ineligible claim patent-eligible.”). Considering the steps of the claimed method individually and as an ordered combination, we find nothing that adds enough to the judicial exception to render the subject matter recited patent-eligible.

Appellants argue that their claims are patent eligible because they “include concepts inextricably tied to computer technology, including ‘a non-transitory *computer* readable storage medium having stored thereon a *computer* program comprising instructions executed by a *processor*,’ ‘a medical image acquired by a medical imaging *system*,’ ‘a [system] *memory* storing a medical image,’ ‘a *processor* configured to access the medical image from the *memory*,’ and ‘a *display unit* configured to receive the model from the *processor*.’” Br. 8–9. We are not persuaded because, as discussed above, the mere recitation of generic computer components does not confer subject matter eligibility on otherwise patent-ineligible subject matter.

Appellants argue that their claims are not abstract because they include data made available from a medical device. *Id.* at 9 (identifying the limitation of claim 1: “receiv[ing] ‘a medical image acquired with a medical imaging system and that depicts a blood vessel of a patient’”); *see also, id.* at 10 (arguing that claims are patent eligible because they require input from a physical device). We are not persuaded.

The limitation requiring the receipt of a medical image sets forth a conventional step at a high level of generality. Appellants do not identify, and we do not find, anything in the image receiving step that goes beyond conventional medical image generating techniques. As noted in *Mayo*, “[p]urely ‘conventional or obvious’ ‘[pre]-solution activity’ is normally not sufficient to transform . . . [ineligible subject matter] into a patent-eligible application of such [subject matter].” *Mayo*, 566 U.S. at 79 (second alteration in original). Accordingly, the fact that the information received in step (a) of claim 1 was generated by a medical device, does not add enough to render the claimed subject matter patent-eligible. *See, In re BRCA1- and*

*BRCA2-Based Hereditary Cancer Test Patent Litigation*, 774 F.3d 755, 764 (Fed. Cir. 2014) (finding that steps specifying how information about a nucleotide sequence was gathered “do nothing more than spell out what practitioners already knew—how to compare gene sequences using routine, ordinary techniques” —and thus do not add enough to confer eligibility on ineligible subject matter); *PerkinElmer Inc. v. Intema Ltd.*, 496 Fed. Appx. 65 (Fed. Cir. 2012) (“Even if required as part of the claimed processes, the data-gathering steps [which relate to data gathered by ultrasound] are conventional and obvious extra-solution activity that cannot save the claims.”).

Appellants argue that the claimed subject matter is not a mental process because it cannot be performed in the human mind. Br. 11. Appellants assert, “it is impossible for a human mind, or a pen and paper to execute software instructions via a processor.” *Id.* We are not persuaded.

As the Examiner explains, “[t]he recited models are nothing more than mathematical equations describing relationships between parameters, wherein decomposing is a mathematical algorithm by which such equations are broken down into independent simpler components (i.e. other mathematical equations).” Ans. 6 (citing Spec. ¶¶ 26–28). The fact that the claims require these mathematical computations to be performed by a computer does not render the claims patent eligible. *Alice Corp.*, 134 S.Ct. at 2358; *Intellectual Ventures I LLC v. Capital One Bank (USA), N.A.*, 792 F.3d 1363, 1366 (Fed. Cir. 2015) (“An abstract idea does not become nonabstract by limiting the invention to a particular field of use or technological environment, such as the Internet [or a computer].”).

Appellants argue that the claims are patent eligible because there is “no cited evidence that these claimed limitations exist in the prior art.” Br. 12. Appellants confuse analysis of anticipation and obviousness with analysis of subject matter eligibility. As the Supreme Court explained in *Parker v. Flook*, in a subject matter eligibility determination, “the novelty of the mathematical algorithm is not a determining factor at all.” 437 U.S. 585, 591–92 (1978).

Appellants argue that the claimed subject matter represents “an improvement to the computer itself that respond[s] to ‘a need or technological problem in medical technology, where the flow modeling is too computationally expensive to be suitable for routine use in a clinical setting.’” Br. 14. We are not persuaded.

The fact that a problem can be solved with a mathematical model or algorithm that requires less of a computer’s memory than solving a problem with a different algorithm does not mean that the algorithm is rooted in computer technology or that the algorithm overcomes a problem specifically arising in the realm of computer networks. It merely means that Appellants discovered a mathematical algorithm that uses computer memory in a conventional manner, but uses a relatively smaller amount of it. *See Parker v. Flook*, 437 U.S. at 595 (“If a claim is directed essentially to a method of calculating, using a mathematical formula, even if the solution is for a specific purpose, the claimed method is nonstatutory.”); *see also Digitech Image Tech., LLC v. Electronics for Imaging, Inc.*, 758 F.3d 1344, 1350 (Fed. Cir. 2014) (“The method in the ’415 patent claims an abstract idea because it describes a process of organizing information through

mathematical correlations and is not tied to a specific structure or machine.”).

Accordingly, we affirm the Examiner’s rejection of the pending claims as not directed to patent-eligible subject matter.

#### ANTICIPATION AND OBVIOUSNESS

Appellants do not address the Examiner’s anticipation and obviousness rejections. We therefore summarily affirm these rejections. *See* Manual of Patent Examining Procedure § 1205.02 (“If a ground of rejection stated by the examiner is not addressed in the appellant’s brief, that ground of rejection will be summarily sustained by the Board.”).

#### DECISION

In summary, we affirm the rejection of claims 1–30 under 35 U.S.C. § 101 as directed to patent ineligible subject matter.

We affirm the rejection of claims 1–4, 15–18, and 20 under 35 U.S.C. § 102(b) as anticipated by Groden.

We affirm the rejection of claims 5–7, 9, 10, 19, 22–24, and 27–29 under 35 U.S.C. § 103(a) as obvious over the combination of Groden and Klauschen.

We affirm the rejection of claims 12 and 13 under 35 U.S.C. § 103(a) as obvious over the combination of Groden and Antiga.

We affirm the rejection of claim 21 under 35 U.S.C. § 103(a) as obvious over the combination of Groden and Bashiri.

We affirm the rejection of claim 30 under 35 U.S.C. § 103(a) as obvious over the combination of Groden, Klauschen and Bashiri.

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136.

AFFIRMED