IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of:	Stephen Barbour	
U.S. Patent No.:	11/574,372	Attorney Docket No.: 54598-0001PS1
Issue Date:	February 7, 2023	
Appl. Serial No.:	16/484,728	
Filing Date:	January 6, 2020	
Title:	BLOCKCHAIN MINE AT OIL OR GAS FACILITY	

DECLARATION OF MICHAEL NIKOLAOU

I, Michael Nikolaou, declare as follows:

I. ASSIGNMENT

1. I have been retained on behalf of Crusoe Energy Systems, LLC. ("Crusoe" or "Petitioner") to offer technical opinions related to U.S. Patent No. 11/574,372 ("The '372 patent") (EX1001). I understand that Crusoe is requesting the Patent Trial and Appeal Board ("PTAB" or "Board") to institute a post-grant review ("PGR") proceeding of the '372 patent.

2. I have been asked to provide my independent analysis of the '372 patent in light of the prior art cited in this declaration. Crusoe has specifically asked for my analysis from the perspective of a POSITA in the gas and oil industry. To the extent this declaration provides opinions on subject matter related to bitcoin mining, I am relying on the opinions of Mr. Vernon Kasdorf (EX1004). To that end, I am relying on Mr. Kasdorf's review and analysis of CryptoKube, Szmigielski, Kheterpal, and Polivka – which are all identified as prior art herein.

3. I am not and never have been, an employee of Crusoe. I received no compensation for this declaration beyond my normal hourly compensation based on my time actually spent analyzing the '372 patent, the prior art cited below, and issues related thereto, and I will not receive any added compensation based on the outcome of this PGR or other proceeding involving the '372 patent.

II. QUALIFICATIONS

4. I am a Professor and Associate Chair of Chemical and Biomolecular Engineering in the Cullen College of Engineering at the University of Houston. I also have a joint appointment in the Petroleum Engineering Department at the University of Houston.

5. I graduated with a Diploma in Chemical Engineering from the National Technical University in Athens, Greece in 1984. I then earned a Ph.D. in Chemical Engineering at the University of California, Los Angeles in 1989. Prior to coming to the University of Houston, I

was an Assistant (and then Associate) Professor at Texas A&M University for eight years. After my promotion to Associate Professor and tenure at Texas A&M, I took a sabbatical leave as a Visiting Scientist at MIT in 1995. I have taught at the University of Houston for over twenty-five years, since 1997.

6. In my role as a Professor at the University of Houston I teach both undergraduate and graduate courses every year. At the undergraduate level, these courses include Analytical Methods for Chemical Engineers, Numerical Methods for Chemical Engineers, Plant Economics, Plant Design, Thermodynamics, Statistical Methods in Chemical Engineering, Statistical Quality Control Methods, and Chemical Process Control. At the graduate level, I teach Mathematical Methods in Chemical Engineering, Advanced Process Control, and Natural Gas Engineering. I also routinely advise both undergraduate and graduate (Master and Ph.D.) students.

7. I have extensive experience in process systems engineering and mathematical modeling. My research interests are in computer-aided systems engineering, i.e., development and use of computer-based methods for the design, optimization, monitoring, and automatic control of various kinds of systems, in a diverse array of industries.

8. In my over 30 years of academic and industrial consulting experience I have worked on problems in several industries, including the oil & gas industry and oil refining & petrochemicals. Much of my work tackles fundamental research issues and is described in a number of publications, as discussed below. A substantial portion of my work is directed to concrete solutions to problems faced by industrial partners and has resulted in specific commercial products (e.g. for Lam Research, https://www.lamresearch.com/), patents, and the formation (by the corresponding project's managers) of a small company that was eventually bought by Schlumberger, a major global oilfield services company

(http://www.slb.com/services/drilling/drilling_services_systems/directional_drilling/slider.aspx).

9. In addition to teaching, I have also served as a consultant for various oil and gas companies over the past twenty-seven years, working with both major companies and smaller, independent companies, both "upstream" (i.e., oil and gas exploration and production) and "downstream" (oil and gas transportation, oil refining, and chemicals). I have consulted on a variety of matters for ENI, Schlumberger, WildHorse / RotoSlide, Synergy Fluid Services, XGas/EPT, IQPC Oil & Gas, Intelligent Agents Corporation, Landmark / Halliburton, ECOPETROL, Lam Research, Shell Global Solutions, Noble Drilling, AspenTech, General Electric, Simulation Sciences, Bryan Research & Engineering, Frito-Lay, Shell Development, and Union Pacific Resources.

10. I have published over 150 peer-reviewed publications in journals and conference proceedings in the area of computer-aided systems engineering. My publications focus on applications to the design, optimization, monitoring, and automatic control of various kinds of systems, in oil & gas, oil refining & petrochemicals, snack food production, semiconductor manufacturing, and development and administration of antibiotics against resistant or persistent infections. Three of my refereed journal publications have been featured on the cover of high-impact journals (AIChE Journal, 2011; IEEE Control Systems Magazine, 2006; PLoS Computational Biology, 2011).

11. I have also presented my work as a speaker at numerous academic conferences, whether in regular sessions, invited sessions, or as a keynote speaker. As an example, I have been invited twice (in 1996 and 2011) to give presentations in the flagship conference on Chemical Process Control, held every five years (CPC-V and CPC-VIII); and was a keynote speaker at the 2017 International Petroleum & Petrochemical Technology Conference (IPPTC) in Beijing, China.

I have also published 5 book chapters on various aspects of computer-aided systems engineering. Finally, I serve regularly as a peer reviewer at several major engineering and scientific journals (including *Automatica, PLoS, AIChE Journal, SPE Journal, Journal of Process Control, Computers & Chemical Engineering*) as well as at federal and international funding agencies, including National Science Foundation (NSF), Petroleum Research Fund (PRF), National Institutes of Health (NIH), and the Qatar National Research Fund (QNRF).

12. I am a member of the American Institute of Chemical Engineers, the Society of Petroleum Engineers, and Omega Chi Epsilon. I serve as a co-organizer or co-chair of several major international conferences, including the AIChE Annual Meeting and the AIChE Spring Meeting.

13. I have received numerous teaching awards from both Texas A&M and University of Houston, including the Dow Excellence in Teaching Award, and the Cullen College of Engineering Teaching Excellence Award. I have also been named a Top Reviewer by *Automatica*, and, in 2007, I received the Computing & Systems Technology (CAST) Directors Award from the American Institute of Chemical Engineering. In 2017, I received the Abraham E. Dukler Distinguished Engineering Faculty Award at the University of Houston, which is given to faculty who have made significant contributions to society and whose accomplishments and careers have brought credit to the University of Houston Cullen College of Engineering. In 2019, I received the Fluor Corp. Faculty Excellence Award in the Cullen College of Engineering. This award is the highest distinction bestowed to faculty of this College.

14. My curriculum vitae, which includes a complete list of my publications, is included as Appendix A.

15. I am being compensated at a rate of $700 per hour for my work in this case. This

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