OFFICIAL ABSTRACT and CERTIFICATION

Running an Action Using Blockchain

Isha Patel
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Blockchain is a fairly new technology that emerged with the introduction of the famous CryptoCurrency BitCoin. But there are many uses of blockchain besides just CryptoCurrency, for example, Walmart has a blockchain that allows them to track their produce and the United States Postal Service has placed a patent to use blockchain as an identity verification measure. Blockchain is used for tasks as simple as securing databases to as complicated as monitoring carbon offsets. It can also be used to manage an auction and would be able to safely transfer money, keep identities of bidders secure, and keep an accurate ledger of the bids. This project builds a smart contract for a blockchain-based auction that uses components of a minimum bid auction merged with one component of a Vickrey auction. A widely used online IDE called Ethereum was used to run the blockchain code. In the auction, the seller sets the minimum bid, the bidders give their bids, and when the auctioneer closes the auction, the highest bidder pays the second-highest bid. The project met the criteria set for it, which was to set up a functioning auction and add the Vickrey auction component. Albeit most of the functions are manual, such as changing the bidder, the auction runs smoothly.

Category
Pick one only — mark an "X" in box at right

- Animal Sciences
- Behavioral & Social Sciences
- Biochemistry
- Biomedical & Health Sciences
- Biomedical Engineering
- Cellular & Molecular Biology
- Chemistry
- Computational Biology & Bioinformatics
- Earth & Environmental Sciences
- Embedded Systems
- Energy: Sustainable Materials and Design
- Engineering Mechanics
- Environmental Engineering
- Materials Science
- Mathematics
- Microbiology
- Physics & Astronomy
- Plant Sciences
- Robotics & Intelligent Machines
- Systems Software ■
- Translational Medical Sciences

1. As a part of this research project, the student directly handled, manipulated, or interacted with (check ALL that apply):

   ☐ human participants ☐ potentially hazardous biological agents

   ☐ vertebrate animals ☐ microorganisms ☐ rDNA ☐ tissue

2. I/we worked or used equipment in a regulated research institution or industrial setting: ☐ Yes ■ No

3. This project is a continuation of previous research. ☐ Yes ■ No

4. My display board includes non-published photographs/visual depictions of humans (other than myself): ☐ Yes ■ No

5. This abstract describes only procedures performed by me/us, reflects my/our own independent research, and represents one year's work only ■ Yes ☐ No

6. I/we hereby certify that the abstract and responses to the above statements are correct and properly reflect my/our own work. ■ Yes ☐ No

This stamp or embossed seal attests that this project is in compliance with all federal and state laws and regulations and that all appropriate reviews and approvals have been obtained including the final clearance by the Scientific Review Committee.

Checklist for Adult Sponsor (1)

This completed form is required for ALL projects.

To be completed by the Adult Sponsor in collaboration with the student researcher(s):

Student's Name(s): Isha Patel

Project Title: Running an Auction Using Blockchain

1. ☑ I have reviewed the ISEF Rules and Guidelines.

2. ☑ I have reviewed the student's completed Student Checklist (1A) and Research Plan/Project Summary.

3. ☑ I have worked with the student and we have discussed the possible risks involved in the project.

4. ☐ The project involves one or more of the following and requires prior approval by an SRC, IRB, IACUC or IBC:
   - ☐ Humans
   - ☐ Vertebrate Animals
   - ☐ Potentially Hazardous Biological Agents
   - ☐ Microorganisms ☐ rDNA ☐ Tissues

5. ☐ Items to be completed for **ALL PROJECTS**
   - ☑ Adult Sponsor Checklist (1)
   - ☑ Student Checklist (1A)
   - ☑ Research Plan/Project Summary
   - ☑ Approval Form (1B)
   - ☐ Regulated Research Institutional/Industrial Setting Form (1C) (when applicable; after completed experiment)
   - ☐ Continuation/Research Progression Form (7) (when applicable)

Additional forms required if the project includes the use of one or more of the following (check all that apply):

- ☐ **Humans,** including student designed inventions/prototypes. (Requires prior approval by an Institutional Review Board (IRB); see full text of the rules.)
  - ☐ Human Participants Form (4) or appropriate Institutional IRB documentation
  - ☐ Sample of Informed Consent Form (when applicable and/or required by the IRB)
  - ☐ Qualified Scientist Form (2) (when applicable and/or required by the IRB)

- ☐ **Vertebrate Animals** (Requires prior approval, see full text of the rules.)
  - ☐ Vertebrate Animal Form (5A) - for projects conducted in a school/home/field research site (SRC prior approval required.)
  - ☐ Vertebrate Animal Form (5B) - for projects conducted at a Regulated Research Institution. (Institutional Animal Care and Use Committee (IACUC) approval required prior experimentation.)
  - ☐ Qualified Scientist Form (2) (Required for all vertebrate animal projects at a regulated research site or when applicable)

- ☐ **Potentially Hazardous Biological Agents** (Requires prior approval by SRC, IACUC or IBC, see full text of the rules.)
  - ☐ Potentially Hazardous Biological Agents Risk Assessment Form (6A)
  - ☐ Human and Vertebrate Animal Tissue Form (6B) - to be completed in addition to Form 6A when project involves the use of fresh or frozen tissue, primary cell cultures, blood, blood products and body fluids.
  - ☐ Qualified Scientist Form (2) (when applicable)
  - ☐ The following are exempt from prior review but require a Risk Assessment Form 3: projects involving protists, archae and similar microorganisms, for projects using manure for composting, fuel production or other non-culturing experiments, projects using color change coliform water test kits, microbial fuel cells, and projects involving decomposing vertebrate organisms.

- ☐ **Hazardous Chemicals, Activities and Devices** (No SRC prior approval required, see full text of the rules.)
  - ☐ Risk Assessment Form (3)
  - ☐ Qualified Scientist Form (2) (required for projects involving DEA-controlled substances or when applicable)

- ☐ **Other**
  - ☐ Risk Assessment Form (3)

Jack Waddell
Adult Sponsor's Printed Name

Signature

1/04/20
Date of Review (mm/dd/yy)

—
Phone

waddellj@asmsa.org
Email

Student Checklist (1A)

This form is required for ALL projects.

1. a. Student/Team Leader: Isha Patel Grade: 11th

   Email: pateli21@asmsa.org Phone: (870)718-2796

   b. Team Member: _____ c. Team Member: _____

2. Title of Project:

   Running an Auction Using Blockchain

3. School: ASMSA School Phone: _____

   School Address: 200 Whittington Ave
   Hot Springs, AR 71901

4. Adult Sponsor: Jack Waddell Phone/Email: waddellj@asmsa.org

5. Does this project need SRC/IRB/IACUC or other pre-approval? ☐ Yes ☑ No Tentative start date: _____

6. Is this a continuation/progression from a previous year? ☐ Yes ☑ No

   If Yes:

   a. Attach the previous year's ☐ Abstract **and** ☐ Research Plan/Project Summary

   b. Explain how this project is new and different from previous years on

   ☐☐ Continuation/Research Progression Form (7)

7. This year's laboratory experiment/data collection:

   01/16/2020 (Actual Start Date: (mm/dd/yy)) 2/14/20 (End Date: (mm/dd/yy))

8. Where will you conduct your experimentation? (check all that apply)

   ☐ Research Institution ☑ School ☐ Field ☑ Home ☐ Other: _____

9. List name and address of all non-home and non-school work site(s):

Name:		
Address:		
Phone/ email		

10. **Complete a Research Plan/Project Summary following the Research Plan/Project Summary instructions and attach to this form.**

11. **An abstract is required for all projects after experimentation.**

Isha Patel

Running an Auction Using Blockchain

Research Plan

Rationale:
Blockchain has been used for decentralized currency, but it still has a vast array of untapped potential. I am making a blockchain-based auction to show how blockchain can be used other than cryptocurrency.

Engineering Goal:
I would like to make a blockchain program that will successfully hold an auction.

Procedures:
First I will learn a little bit of solidity (programming language). Then I will complete the basic auction code and attempt to add in some extra features or tricks. I will then test the program and try to figure out if there can be a crash due to any human error.

Risk and Safety:
There is no inherent risk in this project. Everything can be done on a personal computer.

Data Analysis:
I want to make sure the program runs smoothly without any obstacles and learn how to use it so I don't make any human error on my part. I also want to make the program to where the winning bidder gets to pay the runner-up price instead of the price they bid.

Bibliography:
Gupta, Manav. Blockchain for Dummies. 3rd ed., John Wiley & Sons, Inc., 2018.
This book describes blockchain is basically a "shared ledger" that can be used to record any transactions and also makes it nearly impossible to change past transactions. As data is sent or received, it is synchronized across the blockchain, which is cost-effective and saves time. All of the transactions are also very secure and authenticated.

Iansiti, Marco, and Karim R Lakhani. "The Truth About Blockchain." *Harvard Business Review*, Harvard Business Publishing, 21 Aug. 2019, https://hbr.org/2017/01/the-truth-about-blockchain.
This review talks about the advances made and that can be made due to blockchain. It also points at a major problem in the blockchain community: the over-hype of blockchain could possibly lead to disorganization because people will be rushing into it, without "understanding" how it will take hold.

Xu, Min, et al. "A Systematic Review of Blockchain." *SpringerLink*, Springer Berlin Heidelberg, 4 July 2019, https://link.springer.com/article/10.1186/s40854-019-0147-z.
This review talks about the importance of blockchain and discusses the research done in blockchain and research done with blockchain. It analyzes top-cited reviews regarding blockchain and discusses potential applications of blockchain.

Isha Patel

Post Project Summary

My project followed my research plan and nothing was changed.

Approval Form (1B)

A completed form is required for each student, including all team members.

1. To Be Completed by Student and Parent

a. **Student Acknowledgment:**

- I understand the risks and possible dangers to me of the proposed research plan.
- I have read the ISEF Rules and Guidelines and will adhere to all International Rules when conducting this research.
- I have read and will abide by the following Ethics statement

Student researchers are expected to maintain the highest standards of honesty and integrity. Scientific fraud and misconduct are not condoned at any level of research or competition. Such practices include but are not limited to plagiarism, forgery, use or presentation of other researcher's work as one's own, and fabrication of data. Fraudulent projects will fail to qualify for competition in affiliated fairs and ISEF.

Isha Patel	[signature]	01/14/20
Student's Printed Name	Signature	Date Acknowledged (mm/dd/yy) (Must be prior to experimentation.)

b. **Parent/Guardian Approval:** I have read and understand the risks and possible dangers involved in the **Research Plan/Project Summary**. I consent to my child participating in this research.

Hansa Patel	H.M. Patel.	01/15/20
Parent/Guardian's Printed Name	Signature	Date Acknowledged (mm/dd/yy) (Must be prior to experimentation.)

2. To be completed by the local or affiliated Fair SRC

(Required for projects requiring prior SRC/IRB APPROVAL. Sign 2a or 2b as appropriate.)

a. **Required for projects that need prior SRC/IRB approval BEFORE experimentation** (humans, vertebrates or potentially hazardous biological agents).

The SRC/IRB has carefully studied this project's **Research Plan/ Project Summary** and all the required forms are included. My signature indicates approval of the **Research Plan/Project Summary** before the student begins experimentation.

SRC/IRB Chair's Printed Name

Signature

Date of Approval (mm/dd/yy) (Must be prior to experimentation.)

OR

b. **Required for research conducted at all Regulated Research Institutions with no prior fair SRC/IRB approval.**

This project was conducted at a regulated research institution (**not home or high school, etc.**), was reviewed and approved by the proper institutional board before experimentation and complies with the ISEF Rules. **Attach (1C) and any required institutional approvals (e.g. IACUC, IRB).**

SRC Chair's Printed Name

Signature

Date of Signature (mm/dd/yy) (May be after experimentation)

3. Final ISEF Affiliated Fair SRC Approval (Required for ALL Projects)

SRC Approval After Experimentation and Before Competition at Regional/State/National Fair

I certify that this project adheres to the approved **Research Plan/Project Summary** and complies with all ISEF Rules.

PATRYCJA KRAKOWIAK	Patrycja A Kr	2-26-20
Regional SRC Chair's Printed Name	Signature	Date of Approval (mm/dd/yy)
State/National SRC Chair's Printed Name *(where applicable)*	Signature	Date of Approval (mm/dd/yy)