

COMS4507 Project Demo

# Economics of Cryptocurrency Mining Visualisation Tool (CryptoVis)



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# Introduction - Goals & Motivation

- **Goal:**

- To develop a visualisation tool that makes interpreting the economics of cryptocurrency mining more accessible and understandable.

- **Motivation:**

- Suitable for miners of all levels.
- Remove stress and hassle of manual calculations.



# Project Scope

In scope	Out scope
<ul style="list-style-type: none"><li>• Focused coins: Bitcoin, Ethereum, Monero</li><li>• Retrospective model</li><li>• Existing profitability model</li></ul>	<ul style="list-style-type: none"><li>• Future predictions</li></ul>



# Background Research

- Fundamentals of Cryptocurrency Mining.
- Hardware Platforms:
  - CPU.
  - GPU.
  - ASIC.
- Economic Drivers:
  - Coin price.
  - Block Rewards.
  - Electricity price.
  - Mining costs.



# Literature Review

## Papers reviewed:

1. Islam, Marinakis, Olson, White, Walsh, "Is Blockchain Mining Profitable in the Long Run?"
2. A. Malfuzi, A. S. Mehr, M. A. Rosen, M. Alharthi, and A. A. Kurilova, "Economic viability of bitcoin mining using a renewable-based SOFC power system to supply the electrical power demand"
3. O. Fadeyi, O. Krejcar, P. Maresova, K. Kuca, P. Brida, and A. Selamat, "Opinions on Sustainability of Smart Cities in the Context of Energy Challenges Posed by Cryptocurrency Mining"

## Existing Solutions reviewed:

1. [nicehash.com](https://nicehash.com)
2. [cryptocompare.com](https://cryptocompare.com)
3. [buybitcoinworldwide.com](https://buybitcoinworldwide.com)
4. [btc.com](https://btc.com)

# Agile Methodology - Iterative Design (1)

Handware type  
Quantity

ASIC 5000  $\times$  200

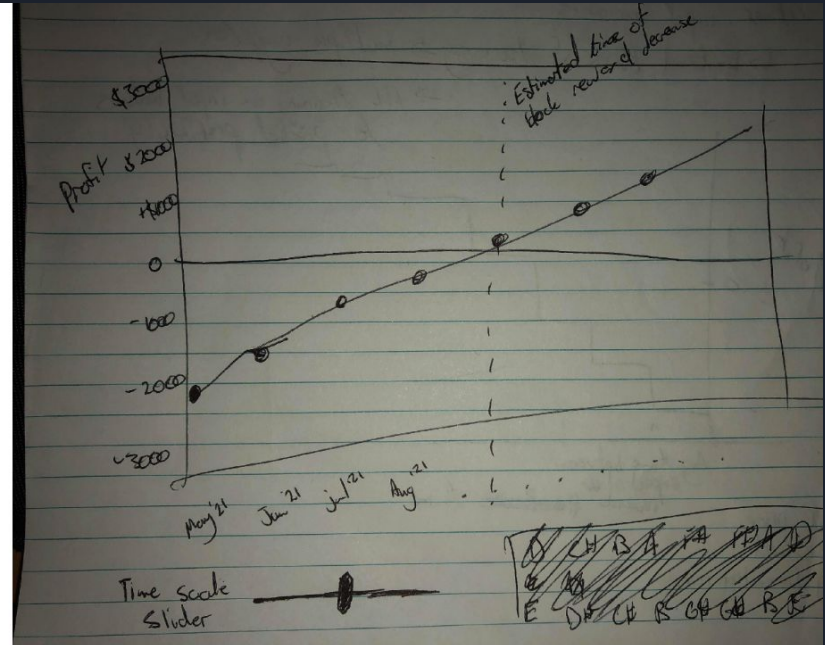
GPU 500  $\times$  150

Local Electricity Price \$ 60 /MWh

Other input variables?

↳ Extend this if too easy  $\rightarrow$  multiple cryptos

$\rightarrow$  ML training on input features to predict profitability



## Agile Methodology - Iterative Design (2)

This can pre-populate based on the country dropdown

Country  
<Dropdown>

Currency  
<Dropdown>

(this field is not priority) This can pre-populate based on the country dropdown

Local Electricity Price  
<FreeText>

Mining Pool?  
<Bool>

Processor Type	Processor	Quantity	Cost/Month	
<Dropdown>	<Dropdown>	2000	\$7630	- Remove Item
<Dropdown>	<Dropdown>	2000	\$7630	- Remove Item
<Dropdown>	<Dropdown>	2000	\$7630	- Remove Item
<Dropdown>	<Dropdown>	2000	\$7630	- Remove Item

+ Add Item

Total Cost/Month \$7630

# Agile Methodology - Iterative Design (3)

## Cryptovis - A Crypto Mining Visualiser

Give us some details on your proposed Bitcoin Mining Operation

Country	Electricity Price \$/kWh	Cryptocurrency Select
Australia	0.32	<input checked="" type="checkbox"/> Bitcoin <input type="checkbox"/> Ethereum

Give us some details about the processors you are looking to use

Processor type	Processor	Quantity	Enabled	Already Purchased
GPU	GTX 1080 Ti	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Processor type	Processor	Quantity	Enabled	Already Purchased
GPU	GTX 1080 Ti	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Enter any additional costs associated with running your operation

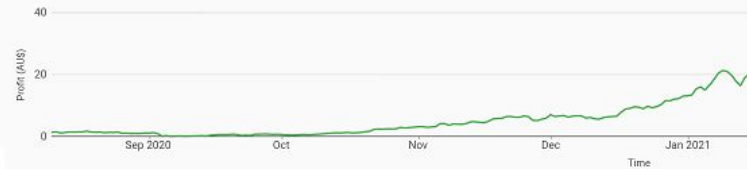
Other Fixed Costs (Daily)	Other Initial Capital Expenses (Daily)
0	0

1 Month 3 Month 1 Year 5 Years

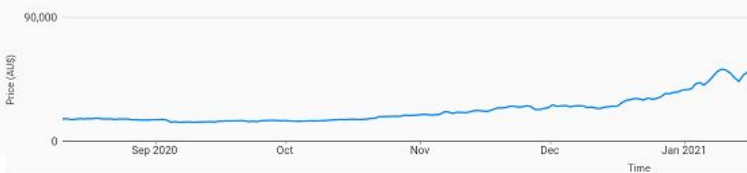
Cummulative Profit/Loss



Daily Profit/Loss

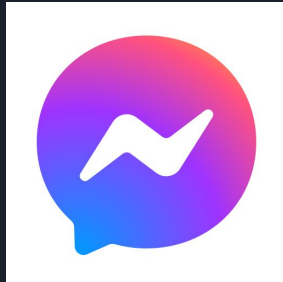
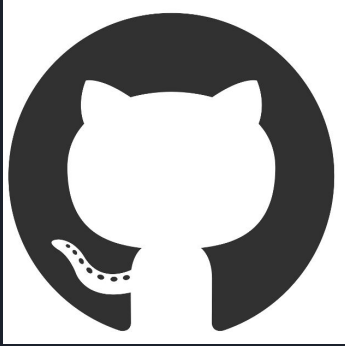


BTC Price





# Tools and Technologies





# Inputs and Outputs

## Input Factors:

- External Fixed Costs
- External Capital
- Cost of Processors
- Electricity Price
- Block Reward
- Crypto Value

## Output Model:

- Retrospective model implemented
- User is able to toggle different input factors
- User is able to adjust the time scale
- User is able to see both cumulative and daily profit/ loss

$$\text{Profit} = \left( \text{blockReward} \times \frac{1440}{\text{blockTime}} \times \frac{\text{userHashRate}}{\text{networkHashRate}} \times \text{coinPrice} \right) - (\text{fixedCosts} + \text{electricityPrice} \times 24 \times \text{processorPowerConsumption})$$

# DEMO

<https://cryptovis.xyz>





# Evaluation and Discussion

## Improvements from User experience feedback:

Before	After
Date range entry uses calendar pickers	Date-range button selection
Everything in one column — have to scroll to see graph changes on updates	Two-column layout; everything visible at once
“Show crypto price” button	Price always shown

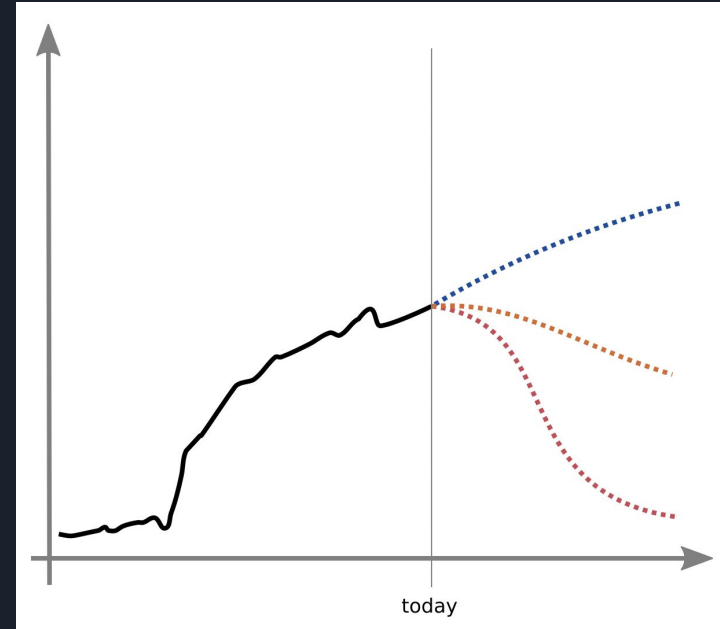
## Outcome assessment:

- ✓ Polished UI
- ✓ Implements standard model
- ✓ User-tested visualisation

✗ Predicts the future

# Future Work

- Further improved User Interface
- Content distributed over multiple pages
- Inclusion of other cryptocurrencies
- User inputs for unlisted hardware
- More extensive use of APIs
- Hash rate graph
- Responsible projections
  - Statistical model
  - Integration of Machine Learning techniques
  - User selection of scenario projection



A blue parallelogram and a light green parallelogram are positioned in the upper-left corner of the slide. The background is a dark navy blue with several diagonal bands of slightly different shades of blue and grey.

# Thanks for listening!

Questions?