

Engaging  
Students with  
Hands-On  
Projects -  
NFTs and  
Lockpicking!



UNIVERSITY of HAWAII®  
MAUI COLLEGE



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<http://maui.hawaii.edu/cybersecurity/>

Supported by National Convergence Tech Center  
and NSF Award # 1700562

July 27, 2022

# Agenda

- Background
- Basics of Crypto and Lockpicking
  - Creating NFTs on Open Sea
- Lessons Learned
- Q&A



# Background - College

- University of Hawaii Maui College
  - Serves Maui County - islands of Maui, Molokai and Lanai
  - 165,000 or so resident population
  - 2 Million or so tourists per year (pre-Covid)
    - Dropped 95% after March 2020!
    - Currently, ther
  - 2000+ full-time commuter students
  - 20 or so Associate Degrees
  - 2 Baccalaureate Degrees
  - 60% or so women students
  - Median age of students ~26 years
  - Non-traditional students
  - Commuter island college



# Cybersecurity Education - Traditional

- Certificates in Cybersecurity
  - Low Level - Intro, Network+, Security+
  - Higher Level - Ethical Hacking, Forensics
- Internships
  - Government, banks, utilities
- Baccalaureate Degree
  - Applied Business and Info Tech (ABIT)
  - ABIT BAS is a NSA/DHS CAE-CDE program
  - Cybersecurity courses are embedded
- Cyber competitions and Workshops
  - NSA GenCyber, US AFA CyberPatriot
- Supported by NSF Grants
  - ATE Program Award# 1700562



# Cybersecurity Education across Disciplines

- Cybersecurity education cuts across various segments
  - Community College program disciplines
  - Gender
  - Minorities
  - Background - high schools, professionals, returning veterans etc
  - Applicable to various programs
    - Accounting, Allied Health, Administration of Justice, Electronics, Tourism etc.
- One size education does not fit all types of students!
- Supported by NSF
  - ATE Grant, Award# 1700562
  - SFS Capacity Building Grant, Award# 1437514



# Cybersecurity Education – During Covid-19!

- Online education via Zoom!
  - Students were engaged as they felt safe
  - Higher attendance in classes
- Lab sessions
  - Difficult without a physical space and equipment
  - Students need to rely on their Internet connectivity
  - Cloud assignments required students to log in from their homes
- Hands-on activities - Fun Stuff in a Remote, Online Environment!
  - Creating NFTs on OpenSea.io
  - Lock Picking Activities
  - Pen Testing Tools from [www.Hak5.org](http://www.Hak5.org)
    - USB Rubber Ducky – writing Ducky Scripts
    - Bash Bunny - Pen testing tool to emulate various devices
    - LAN Turtle – Provides stealth remote shell access

Bitcoin.org needs your support!



# Bitcoin is an innovative payment network and a new kind of money.

Get started with Bitcoin

Choose your wallet

Buy Bitcoin



What is Bitcoin?



# Currencies - Online Transactions

- Physical cash
    - Non-traceable (well, mostly!)
    - Secure (mostly)
    - Low inflation
  - Fiat Currency – legal tender whose value is backed by a government
    - Note that since 1971, the US\$ has no backing with gold!
    - Cryptocurrencies are not fiat currencies!
  - Physical currencies can't be used online directly
- Electronic credit or debit transactions
- ◆ Bank sees all transactions
  - ◆ Merchants can track/profile customers
  - ◆ Cryptocurrencies are not associated with any bank or regulatory agency!

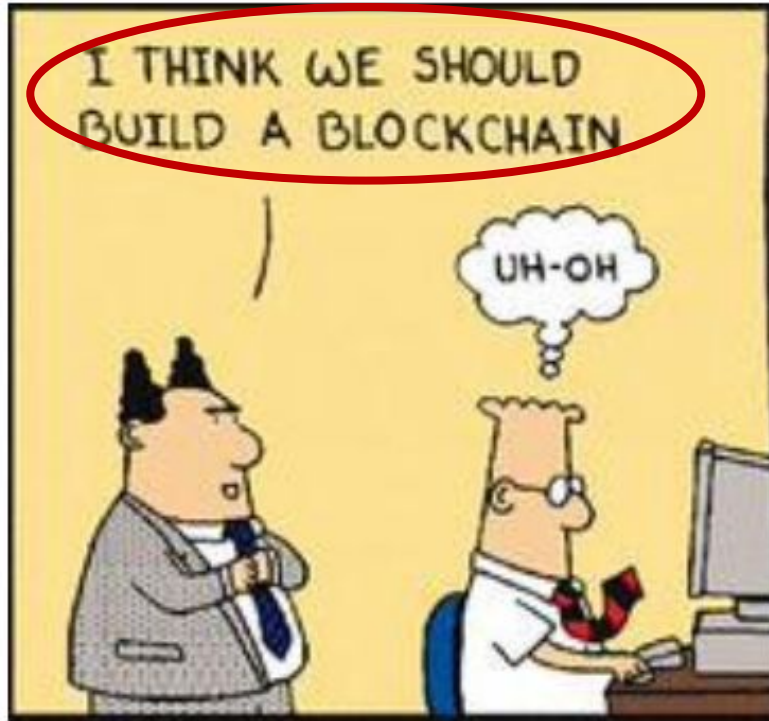


# Bitcoin

- Bitcoin paper by Satoshi Nakamoto on October 31, 2008.
  - First bitcoin transaction on January 12, 2009
  - Number of BitCoins in circulation ~19.1 million (July 2022)
  - Total number of BitCoins generated cannot exceed 21 million.
    - New blocks created every 10 minutes (very slow in # of transactions compared to credit cards)
    - Currently, each block adds 6.25 bitcoins into circulation
    - Mining will end in the year 2140...
  - Average price of a Bitcoin:
    - \$22,507 on July 23, 2022
    - \$48,117 on December 11, 2021
    - \$43,819.54 on September 21, 2021
    - \$43,045.91 on May 18, 2021
    - \$10,360.45 on July 1, 2019
    - \$4,110 on February 23, 2019
    - \$3,729 on Dec 29, 2018
    - \$8,522 on May 15, 2018
    - \$18,000 on December, 2017
    - \$3,867 on September 25, 2017
    - \$2,350 on June 27, 2017
- Price has been very unstable and speculative.

# Bitcoin Transactions





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The Merge is approaching, and comes with changes to Ethereum. [More on The Merge](#)



ಇಥಿರಿಯಾಂಸ್

# Welcome to Ethereum

Ethereum is the community-run technology powering the cryptocurrency ether (ETH) and thousands of decentralized applications.

Explore Ethereum

# Compared to Bitcoin

- Ethereum and Bitcoin both share Byzantine fault-tolerant consensus algorithm for synchronization of state updates
- Ethereum and Bitcoin are both peer-to-peer networks
- Ethereum and Bitcoin both use cryptographic primitives such as digital signatures and hashes
- Ethereum and Bitcoin both use the concept of a digital currency. (Ether and Bitcoins)
- Ethereum has a general purpose programmable blockchain that runs a virtual machine capable of executing arbitrary code of unbounded complexity.
- Bitcoin's Script language is limited and restricted to true/false evaluations of spending conditions.

# INTRODUCTION TO SMART CONTRACTS



Last edit: [@minimalism](#) , July 11, 2022

See contributors

## WHAT IS A SMART CONTRACT?

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A "smart contract" is simply a program that runs on the Ethereum blockchain. It's a collection of code (its functions) and data (its state) that resides at a specific address on the Ethereum blockchain.



# Non-fungible tokens (NFT)

- A way to represent anything unique as an Ethereum-based asset.
- NFTs are giving more power to content creators than ever before.
- Powered by smart contracts on the Ethereum blockchain.



# What's an NFT?

NFTs are tokens that we can use to represent ownership of unique items. They let us tokenise things like art, collectibles, even real estate. They can only have one official owner at a time and they're secured by the Ethereum blockchain – no one can modify the record of ownership or copy/paste a new NFT into existence.

NFT stands for non-fungible token. Non-fungible is an economic term that you could use to describe things like your furniture, a song file, or your computer. These things are not interchangeable for other items because they have unique properties.

Fungible items, on the other hand, can be exchanged because their value defines them rather than their unique properties. For example, ETH or dollars are fungible because 1 ETH / \$1 USD is exchangeable for another 1 ETH / \$1 USD.

## An NFT internet

NFTs are digitally unique, no two NFTs are the same.

Every NFT must have an owner and this is of public record and easy for anyone to verify.

NFTs are compatible with anything built using Ethereum. An NFT ticket for an event can be traded on every Ethereum marketplace, for an entirely different NFT. You could trade a piece of art for a ticket!

Content creators can sell their work anywhere and can access a global market.

Creators can retain ownership rights over their own work, and claim resale royalties directly.

Items can be used in surprising ways. For example, you can use digital artwork as collateral in a decentralised loan.

## The internet today

A copy of a file, like an .mp3 or .jpg, is the same as the original.

Ownership records of digital items are stored on servers controlled by institutions – you must take their word for it.

Companies with digital items must build their own infrastructure. For example an app that issues digital tickets for events would have to build their own ticket exchange.

Creators rely on the infrastructure and distribution of the platforms they use. These are often subject to terms of use and geographical restrictions.

Platforms, such as music streaming services, retain the majority of profits from sales.



**OpenSea**

🔍 Search items, collections, and accounts

# Discover, collect, and sell extraordinary NFTs
















OpenSea is the world's first and largest NFT marketplace

Explore

Create

▶ [Learn more about OpenSea](#)

## Top collections over last 24 hours ▼ On July 23, 2022

1		<b>The Potatoz</b> Floor price: $\blacklozenge$ 0.84	-31.66% $\blacklozenge$ 1,144.96
2		<b>Otherdeed for Others...</b> Floor price: $\blacklozenge$ 2.4	-0.01% $\blacklozenge$ 488.01
3		<b>Isekai Meta</b> Floor price: $\blacklozenge$ 0.4	+256.05% $\blacklozenge$ 441.91
4		<b>Mutant Ape Yacht Cl...</b> Floor price: $\blacklozenge$ 17.29	+3.62% $\blacklozenge$ 337.41
5		<b>MysticsUniverse</b> Floor price: $\blacklozenge$ 0.17	— $\blacklozenge$ 309.45
6		<b>Panda of kungfu pix ...</b> Floor price: $\blacklozenge$ 0.2	— $\blacklozenge$ 302.56
7		<b>CryptoPunks</b> Floor price: —	+7.77% $\blacklozenge$ 282
8		<b>Bored Ape Yacht Club</b> Floor price: $\blacklozenge$ 91.88	-58.22% $\blacklozenge$ 276.89
9		<b>Lady Ape Club</b> Floor price: $\blacklozenge$ 1.18	+47.31% $\blacklozenge$ 254.01
10		<b>FrootsNFT</b> Floor price: $\blacklozenge$ 7.77	-50.27% $\blacklozenge$ 9,065.55
11		<b>Casual Sloths Official</b> Floor price: $\blacklozenge$ 0.23	+1,170.04% $\blacklozenge$ 233.92
12		<b>META KONGZ OFFICIAL</b> Floor price: $\blacklozenge$ 1.52	+56.5% $\blacklozenge$ 185.51
13		<b>Moonbirds Oddities</b> Floor price: $\blacklozenge$ 1.54	-52.99% $\blacklozenge$ 183.44
14		<b>KIKI - XxEBLIRVxW</b> Floor price: $\blacklozenge$ 1.2	+24.4K% $\blacklozenge$ 6,123.99
15		<b>Art Blocks Curated</b> Floor price: —	-29.61% $\blacklozenge$ 156.27

## Create and sell your NFTs



### Set up your wallet

Once you've set up your wallet of choice, connect it to OpenSea by clicking the wallet icon in the top right corner. Learn about the [wallets we support](#).



### Create your collection

Click [My Collections](#) and set up your collection. Add social links, a description, profile & banner images, and set a secondary sales fee.



### Add your NFTs

Upload your work (image, video, audio, or 3D art), add a title and description, and customize your NFTs with properties, stats, and unlockable content.



### List them for sale

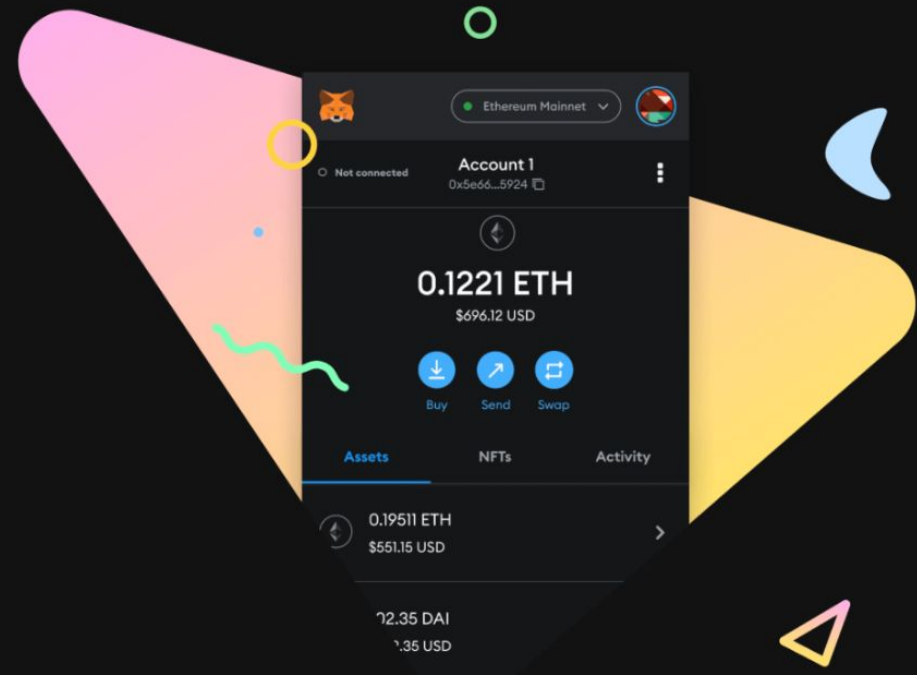
Choose between auctions, fixed-price listings, and declining-price listings. You choose how you want to sell your NFTs, and we help you sell them!



# A crypto wallet & gateway to blockchain apps

Start exploring blockchain applications in seconds. Trusted by over 30 million users worldwide.

Download for 





OpenSea

🔍 Search items, collections, and accounts



## Bored Ape Yacht Club 🔒



By YugaLabs 🔒

The Bored Ape Yacht Club is a collection of 10,000 unique Bored Ape NFTs— unique digital collectibles living on the Ethereum blockchain. Your Bored Ape doubles as your Yacht Club membership card, and grants access to members-only benefits, the first of which is access to THE BATHROOM, a collaborative graffiti board. Future areas and perks can be unlocked by the community through roadmap activation. Visit [www.BoredApeYachtClub.com](http://www.BoredApeYachtClub.com) for more details.

See less ^

**10.0K**  
items

**6.5K**  
owners

💎 **640.4K**  
total volume

💎 **91.88**  
floor price

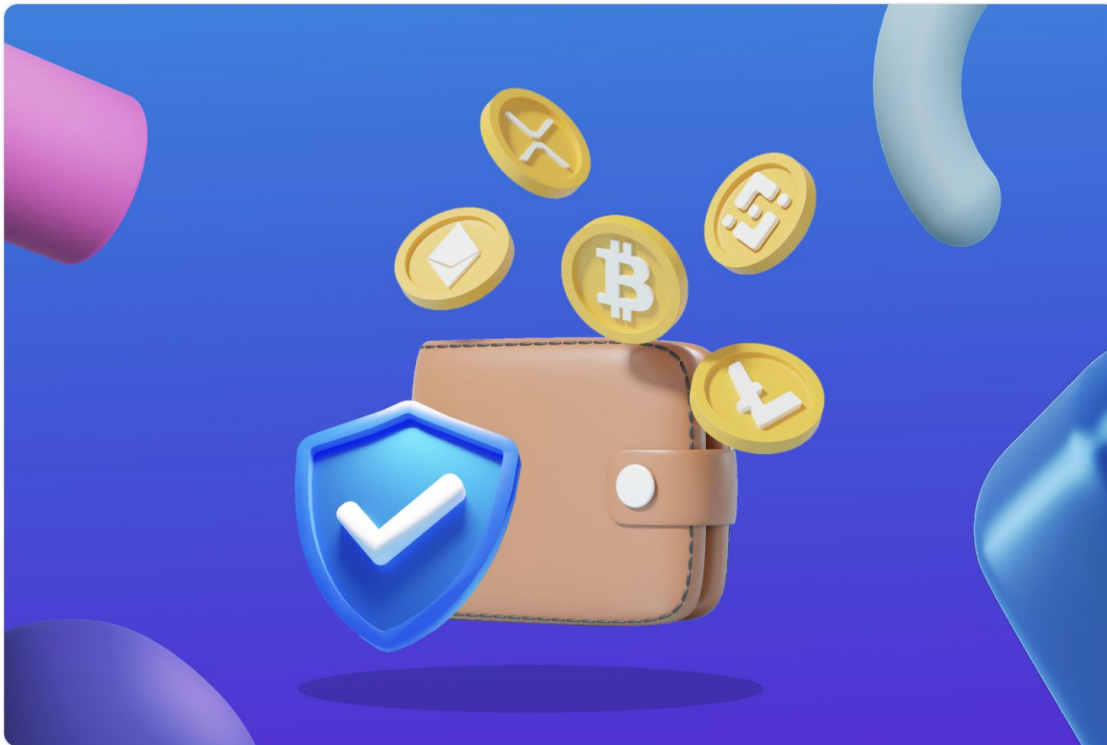
💎 **85.31**  
best offer

# Setup Metamask Wallet

<https://opensea.io/blog/guides/intro-to-crypto-wallets/>

## Intro to Crypto Wallets

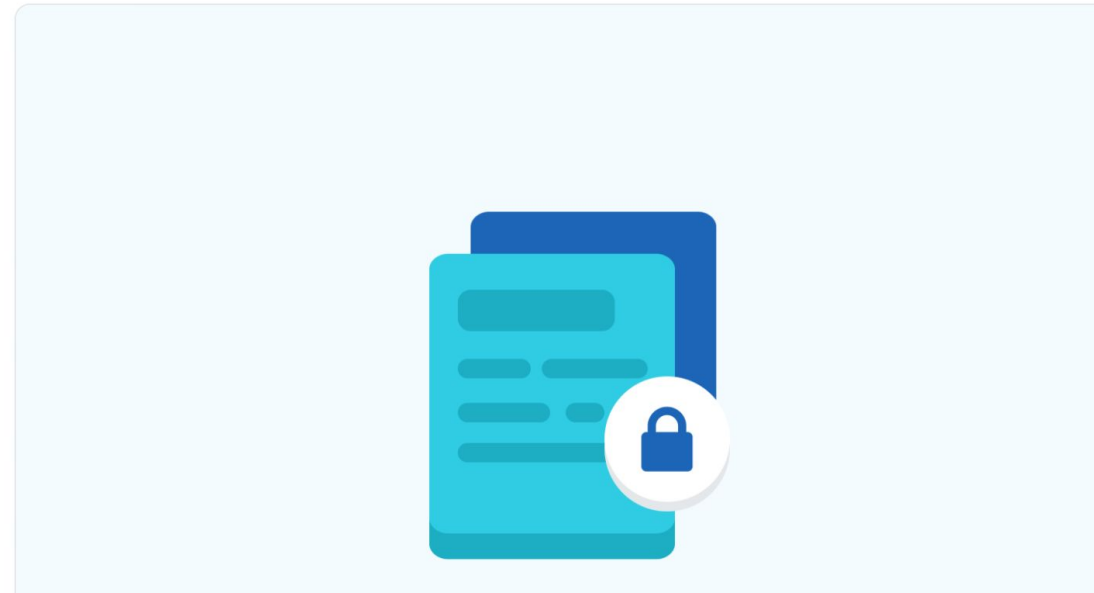
March 29, 2022 By Edric Barnes · Guide



<https://opensea.io/blog/learn/how-to-easily-setup-a-metamask-wallet/>

## How to Easily Setup a MetaMask Wallet

March 18, 2022 By Gideon Welles · Learn





# Sign up for OpenSea and Connect with Wallet



**OpenSea**

🔍 Search items, collections, and accounts

Explore

Stats

## Connect your wallet.

If you don't have a [wallet](#) yet, you can select a provider and create one now.



**MetaMask**

Popular

# Use Wallet to authenticate and authorize NFT

## Tutorial -

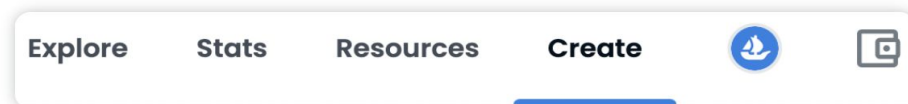
<https://support.opensea.io/hc/en-us/articles/360063498313-How-do-I-create-an-NFT->

## How do I create an NFT?

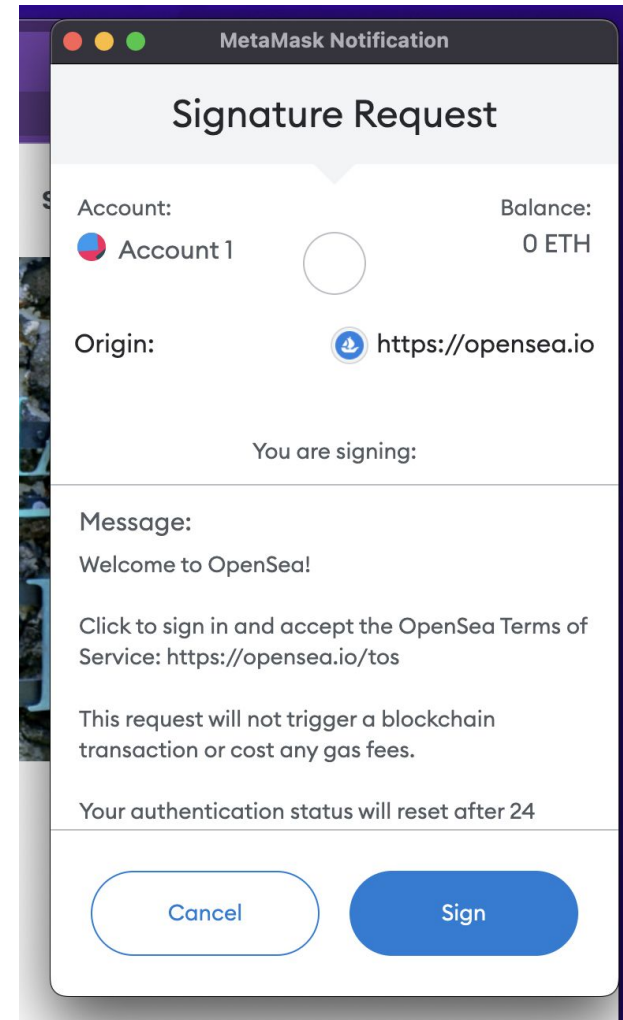
Creating an NFT on OpenSea is easy! This guide explains how to set up your first NFT.

## Setting up your first NFT collection

On OpenSea, click the **Create** tab in the top right corner.



You'll be taken to the NFT item creation page, where you can upload your NFT file, name it, and add a description.



# Fill in the blanks to create a new NFT!

## Create New Item

\* Required fields

### Image, Video, Audio, or 3D Model \*

File types supported: JPG, PNG, GIF, SVG, MP4, WEBM, MP3, WAV, OGG, GLB, GLTF. Max size: 100 MB



### Name \*

### External link

OpenSea will include a link to this URL on this item's detail page, so that users can click to learn more about it. You are welcome to link to your own webpage with more details.

### Description

The description will be included on the item's detail page underneath its image. [Markdown](#) syntax is supported.

# Lazy Minting!

Source:

<https://support.opensea.io/hc/en-us/articles/1500003076601-Can-I-list-an-item-without-paying-to-mint-it->

## Can I list an item without paying to "mint" it?

The new OpenSea collection manager allows creators to make NFTs without any upfront [gas cost](#), as the NFT isn't transferred on-chain until the first purchase or transfer is made.

NFTs made with the Collection Manager follow the [ERC-1155 standard](#), partly to help with gas-free minting and partly to help us add exciting features in the near future.

If this is your [first listing on OpenSea](#) you'll need to pay gas fees associated with initializing your account.

For more information on lazy minting, check out this [helpful resource](#) created by our co-founder, Alex!

# Wrapped Ethereum (WETH) - buy/sell with auctions

Source:  
<https://support.opensea.io/hc/en-us/articles/360063498293-What-s-WETH-How-do-I-get-it->

The screenshot shows a mobile application interface for buying crypto with a card. At the top, there's a title "Buy crypto with card" with a close button (X). Below the title, there are two tabs: "Deposit crypto" (selected with a downward arrow) and "Buy ETH with card" (selected with a card icon). The main content area is titled "Buy ETH" and includes a sub-header "I want to spend". A text input field contains the number "300", and next to it is a currency selector showing the US flag and "USD" with a dropdown arrow. Below this is a "Summary" section with a refresh icon and the text "Quote updates in 9s". A summary box displays "You get 0.1854 ETH for \$304.17" with a dropdown arrow. At the bottom of the main content area is a large blue button labeled "Continue" with a right-pointing arrow. Below the button is a small text line: "By continuing you agree to our cookie policy." At the very bottom, it says "Powered by" followed by the MoonPay logo.

# How to list and sell NFTs - Fixed Price, Auctions

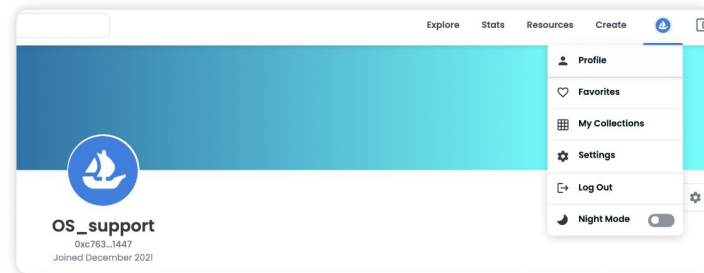
## Tutorial -

<https://support.opensea.io/hc/en-us/articles/360063498333-How-do-I-sell-an-NFT->

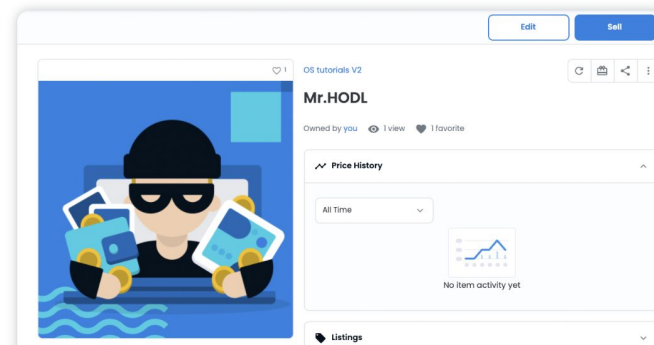
## Selling an NFT using OpenSea

On OpenSea, navigate to the top right of the page and click your **profile icon**.

Select the NFT you would like to sell from your wallet. If you don't have an NFT available to sell, check out our [create an NFT tutorial](#) to get started.



On the top right of the item page, click **Sell**.



Collected 6 Created Favorited Activity More



Search by name

Recently received



Uaou Bay 6  
North Shore Maui Collection



Uaou Bay 5  
North Shore Maui Collection



Uaou Bay 4  
North Shore Maui Collection



Uaou Bay 3  
North Shore Maui Collection



Uaou Bay 2  
North Shore Maui Collection



Uaou Bay 1  
North Shore Maui Collection

Edit

Sell

1 



North Shore Maui Collection



## Uaoa Bay 6

Owned by [you](#)  4 views  1 favorite

### Price History

All time 



No item activity yet

 Description

By you





Accept card payments to make it easier for others to purchase your NFTs.

## List item for sale

Type



\$ Fixed Price	🕒 Timed Auction
-------------------	--------------------

Price



📌 ETH

Duration

📅 1 month

[More options](#) ▾

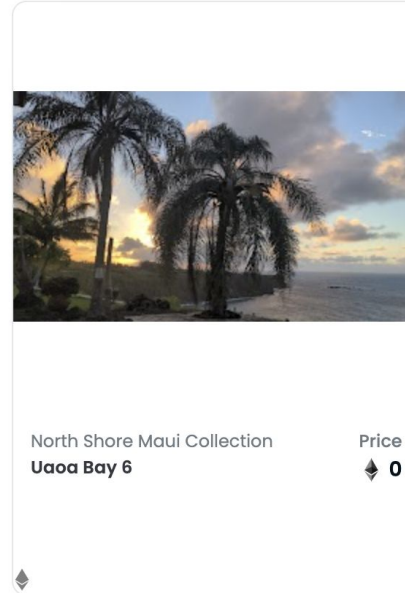
Fees



Service Fee	2.5%
Creator Fee	2.5%

Complete listing

## Preview



# LOCKPICKING



## Defcon: Hardware Security Starts with Lockpicking Village

By Sean Michael Kerner | July 29, 2012



From the 'Good Locks Make for Good Security?' files:

LAS VEGAS. I write a lot about software security. Which is why it's always a great reminder for me to visit Lockpicking Village at Defcon.

At the Lockpick Village this year there were 6 or so main tables where attendees tried out different locks and tried to pick them. There was also a presentation area, where I have to admit I spent a tonne of time, learning about how locks really work and how to defeat them. Then there was also the vendor, selling the tools of the trades (*pic left is a pic of the lockpicks for sale*).

All this at the world's largest hacker convention - and the reason why is simple. Hardware hacking is just as important in many cases, as the software side. Physical security, the

simple lock and key that have protected civilized persons for hundreds of years are still quite literally the lynchpin of the security industry.

Am I advocating that everyone should learn how to lockpick?

# DISCLAIMER

## GROUND RULES PER THE OPEN ORGANIZATION OF LOCKPICKERS (TOOOL)

“

- 1. Only pick, or attempt to pick, that which you own.*
- 2. Do not pick any lock that you may rely on (ex: lock to your house or car)*
- 3. The possession of lockpicking sets is generally legal throughout the United States but exceptions do exist. Local municipalities may differ so check with your local code office.*

*TOOOL provides a brief overview of the possession and ownership of lockpicks by state at their website, <https://toool.us/laws.html>*

”

# SUPPLIES



## Next Steps

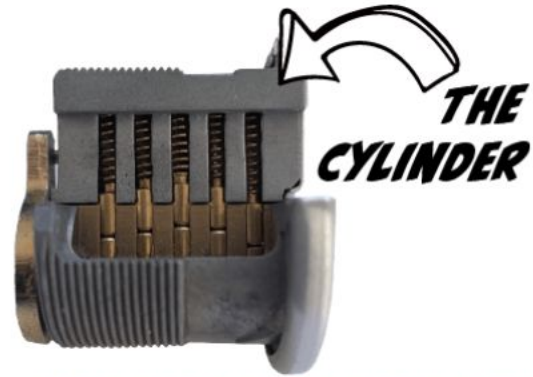
- Lock components
- Lock operation
- Reading lockpicking instructions
- Watching YouTube videos from experienced lockpickers

The screenshot shows an Amazon search results page for "lockpick sets". The search bar at the top contains "lockpick sets" and the Amazon logo is visible. The page displays 48 of 215 results. Three products are highlighted:

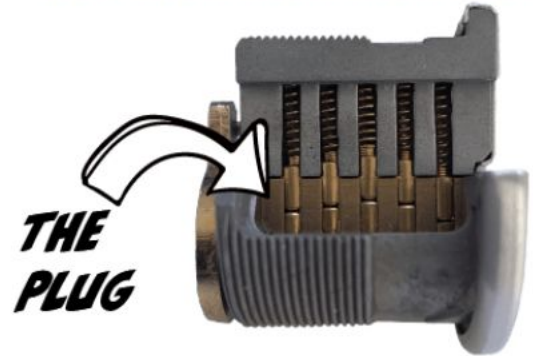
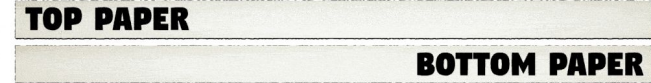
- Professional 24 PCS Set Training Kit with Lock - Blue**: Priced at \$25.99, with a note that it is available as soon as Tuesday, October 6, and is the last item in stock.
- Professional 17-PCS Set Training Kit 2 Locks(BLUE)**: Priced at \$25.99, with free shipping by Amazon and available in stock as of October 7, 2020.
- Stainless Steel Multi-Function Tools, Pick Repair Tool Set**: Priced at \$24.74 (a 14% discount from \$28.74), with a 40% coupon available. It is available as soon as Monday, October 5, with free shipping on orders over \$25.

# OPERATION

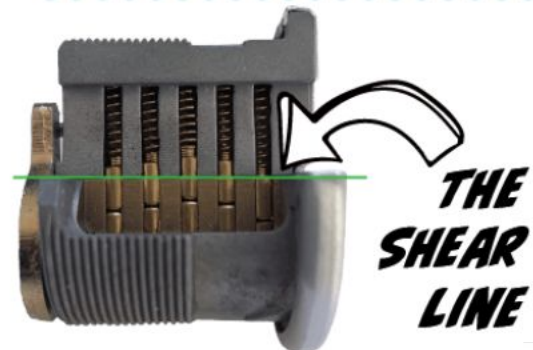
6 primary components  
that we effect while lockpicking



The cylinder, part of the lock houses the rest of the components, aka shell, housing, or body of the lock. It is what slides into a door or padlock, creating the upper limit of shear line. Consider this as the "top paper."



The plug surrounds the keyway, rotates freely within the housing, creating a rotational shear line. Consider this as the "bottom paper."

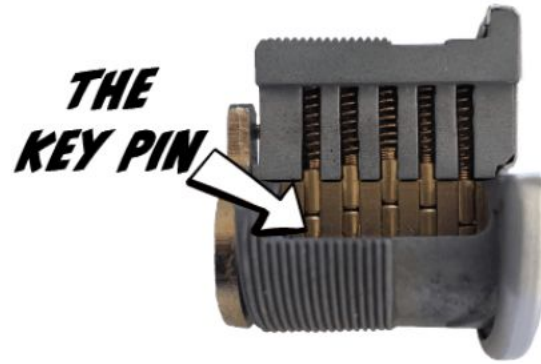


The shear line is where the plug and and hull casing meet. The goal of lockpicking is to manipulate the pins so that driver pins are above the shear line and key pins are still within the plug, allowing rotation and unlocking.

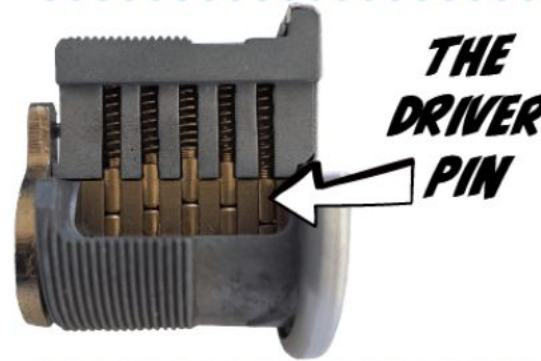


# OPERATION

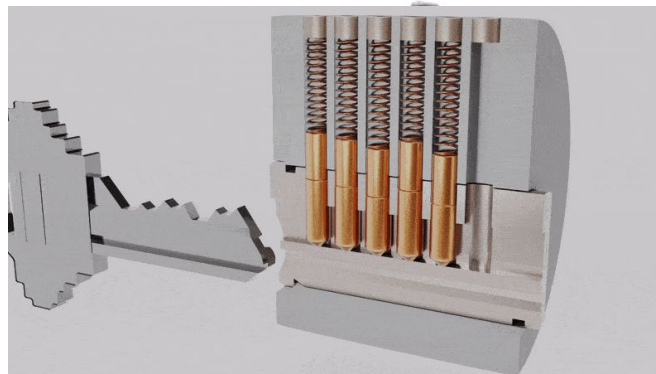
6 primary components  
that we effect while lockpicking



The opening of the lock that the key may be inserted into is called the keyway, where you are able to see key pins. The lower pins makes contact with the key upon insertion.

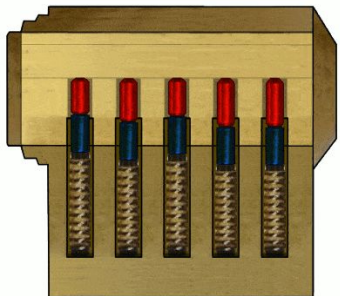
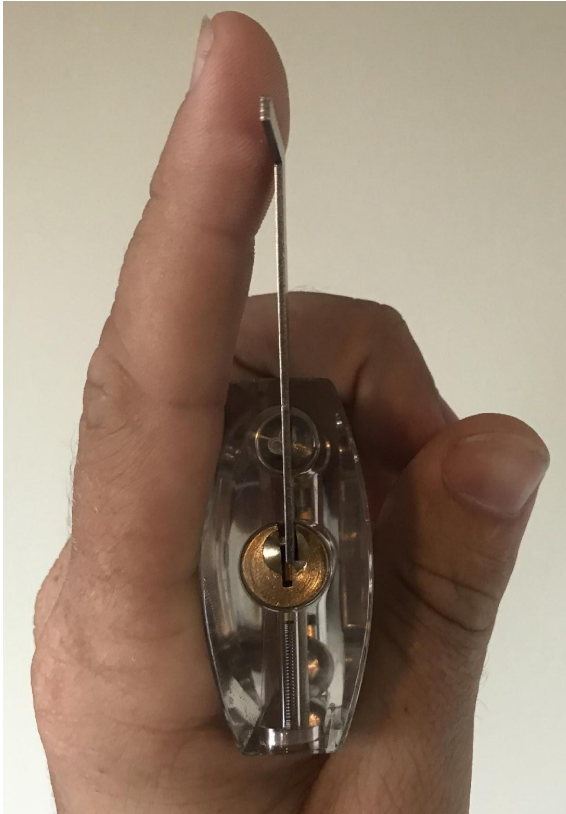


The top pins are called the driver pins because it is driven down by the springs, responsible for obstructing shear line and providing the locking action. Unlike the key pins, the driver pins are usually same length. Consider this as the "pencil."



The springs have two jobs: forcing everything down into the plug and push the key pins against the key, which helps read the cuts of the key. Without springs, the pins could get stuck anywhere in the pin chamber.

# INSTRUCTIONS



1. Begin by holding the lock in a comfortable manner in your left hand with the torque wrench inserted.



2. Wrap your left thumb around the bottom of the lock to provide support and your left index finger straight up to provide tension to the torque wrench.



3. Holding your pick as you would a dart, grasping it with your index finger and thumb, insert it into the lock all the way to the back.



4. As you get near the back of the lock, begin applying tension with your left index finger on the torque wrench.



5. When the pick is at the back begin to draw the pick out, pushing down gently against the key pins as you continue to provide even pressure on the torque wrench.



6. The process of pushing and pulling the pick against the pins is called raking. If the lock does not open within three to four rakes, release tension on the torque wrench and try again as it is possible that a pin has been pushed too far and is binding.



# Online Cybersecurity Education – Lessons Learned!

- Online education via Zoom!
  - Students feel safe
  - Students learn the theory
  - Students have to provide their own Internet connectivity and laptops
- Lab sessions
  - Cloud labs work, assuming they are free and no credit cards needed
  - Lab modules need to be transferred to a cloud environment
  - Students have to know about the cloud environment
- Hands-on activities – key to engagement!
  - Crypto and NFTs
  - Lockpicking
  - Pen Testing Tools from [www.Hak5.org](http://www.Hak5.org)
- Students learn to adapt and survive...



Questions? Comments? Feedback?!

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**MAUI COLLEGE**