Lecture 17

NFTs and Games
This Talk Will Answer Three Questions

• Are NFTs useful for game dev?

• Should you put NFTs in your game?

• Did I sell my *Black Lotus* too early?
This Talk Will Answer Three Questions

- Are NFTs useful for game dev?  
  Maybe yes

- Should you put NFTs in your game?  
  Absolutely not

- Did I sell my *Black Lotus* too early?  
  I needed the money
This Talk Will Not Answer

- Are cryptocurrencies a **scam**?
  - They certainly make scamming easy (see the video)
  - But different from saying everything is a scam

- Are cryptocurrencies **bad for the environment**?
  - **Proof of work vs. proof of stake** is relevant here
  - Must be addressed for crypto to be viable long-term

- **What is the best cryptocurrency platform?**
  - Most current game-related examples are on **Etherium**
  - Note that Avalanche is from a former CS professor
Are cryptocurrencies a scam?
- They certainly make scamming easy (see the video)
- But different from saying everything is a scam

Are cryptocurrencies bad for the environment?
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What is the best cryptocurrency platform?
- Most current game-related examples are on Ethereum
- Note that Avalanche is from a former CS professor

“In it for the tech”
Quick Survey of Crypto

- A cryptocurrency is a **distributed system** that
  - Has no central authority; **consensus is distributed**
  - Has an associated set of tokens (**cryptocurrency**)
  - Defines how **new currency tokens** can be created
  - Tracks **individual ownership** of these tokens
  - Allows individuals to **transfer** token ownership

- Often include two other **optional features**
  - Currency tokens are **limited** and **deflationary**
  - Transactions are **append-only**, preserving history
How Is This Money?

- Money is anything that can **pay for goods/services**
  - Unlike barter, has **universal value** (not situational)
  - If we can **get people to accept it**, it is money

- There is a long history of **community currencies**!
  - German communities during the Weimar period
  - Company scrip in mining and logging camps
  - Even Ithaca in recent decades (Ithaca Hours, Ithacash)

- Only need a few things to be accepted
  - A community that agrees on the **value of the currency**
  - Transparent controls on how **new currency enters system**
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  - Transparent controls on how **new currency enters system**
But Crypto Does Have Major Issues

- **Not universally accepted** for goods and services
  - Limited support for some "in-network" goods
  - NFTs are, in fact, an excuse to spend crypto

- Most people **buy in/cash out** in another currency
  - Makes crypto more of an **asset class**
  - Prevalent in the buy-and-hold mentality

- All crypto transactions **have (not so hidden) fees!**
  - Transfers incur a transaction cost (e.g. Gas fees)
  - Not unlike credit card fees, ATM withdrawals
  - But no way (e.g. paper money) to avoid the fees
But Crypto Does Have Major Issues

• Not universally accepted for goods and services
  • Limited support for some "in-network" goods

• NFTs and Games
  • More Legit

• But no way (e.g. paper money) to avoid the fees
What Is Up With the Fees?

- Crypto is a **distributed consensus protocol**
  - If you transfer ownership, consensus must verify
  - This is done with voting (like most consensus protocols)
  - Voters must solve **hard crypto problems**
  - Need to incentivize the voters for **time, electricity**

- Crypto is a world where **everything is financialized**
  - To some degree the world works this way too
  - But companies try hard to **hide this from consumer**
  - Crypto is very in your face about it
These Fees Are a Major Problem

- Many cryptocurrencies are intentionally deflationary
  - There is a limit on the number of tokens available
  - As reach limit, mining is harder, more expensive

- Cost of currency gets more expensive with demand
  - But this currency is what the fees are paid in
  - Means the cost of all transactions go up

- **Example:** Ethereum Gas Fees
  - Pay for every financial transaction
  - Depend on *time of day* and *transaction speed*
  - Average price currently around $50 per transaction
These Fees Are a Major Problem

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Imagine that on an ATM
Ethereum Gas Fees

Ethereum Average Gas Price
50.43 Gwei for Apr 12 2022

And it could be worse!
**Smart Contracts and NFTs**

- **Ethereum** generalized the notion of currency
  - No longer just a numeric token
  - Now actually a (small) **block of data**
  - This data can store **small programs**

- This led to the concept of a **smart contract**
  - Crypto framework guarantees you own something
  - But the code indicates what that ownership means
  - Money is a **certificate of ownership** (of something)
Nature of NFTs

- Digital ownership is about **rights**
  - Say you buy something (JPEG)
  - The NFT is not that something
  - It is your rights (copy, use, sell)
  - What rights depends on purchase

- NFTs are not magical
  - Rights exist in the “real world”
  - Done with traditional contracts
  - NFTs do not give new rights
  - Just a means to buy and sell
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Games Already Have Digital Items!

Plants you buy in the store will be bought for all profiles

- **Jalapeno**
  - Best deal
  - Ignoles a whole row of zombies.
  - Price: $2.99

- **Torchwood**
  - Ignoles peas for double damage.
  - Price: $3.99

- **Snow Pea**
  - Shoots peas that slow zombies.
  - Price: $3.99

- **Power Lily**
  - Creates one Plant Food.
  - Price: $2.99

BUY T-SHIRTS, TOYS & MORE
So Why Would We Want Crypto?

- Ownership is **transferable**
  - Can buy items from other players
  - Can sell items to other players

- Ownership is **portable**
  - Items are not lost when server is shutdown
  - Items could be moved to a new game/server
  - (Though value of this is matter of debate)

- Everything is **decentralized**
So Why Would We Want Crypto?

- Ownership is **transferable**
  - Can buy items
  - Can sell items
  - Cannot be prevented by game developer

- Ownership is **portable**
  - Items are not lost when server is shutdown
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  - (Though value of this is matter of debate)

- Everything is **decentralized**
This Can Be Taken Too Far

- **Wolf Game**: Entire game on block chain
  - Primary mechanic is farming digital items
  - Sheep NFTs produce crypto tokens
  - Wolf NFTs can steal other NFTs
- No server, so can never go down
  - Well, except if Ethereum goes down
- Unfortunately, it had bugs!
  - Ethereum and NFTs are *append-only*
  - **Could not be patched**, only reissued
  - Reissuing bugs resulted in **lost value**!
Real Focus: Play-to-Earn

- P2E: game designed so players can **extract money**
  - Acquire digital assets in the core loop
  - Use transferability of digital assets to cash out

- Most digital games **discourage** or **forbid** this
  - Reason why *World of Warcraft* made “bind on X” items
  - Selling game items typically requires selling account

- Wolf Game is also an example of P2E
  - Can sell everything ($WOOL, characters) on OpenSea
  - But **can also lose money**: wolves can steal sheep NFTs
This Is Not a New Idea

NFTs and Games
Is P2E Gambling?

- Gambling (in the US) is a complicated topic
  - Legality varies state to state (due to Constitution)
  - Not everything involving money is gambling (e.g. Bingo)

- NYS explicitly has carve-outs for **games of skill**
  - Outcome doesn’t depend on a **material degree** of chance
  - Poker ruled game of skill (legal) in 2012
  - Online fantasy sports ruled (legal) in 2022!

- This makes legislation extremely difficult
  - Legality is determined on state-by-state basis
  - But **online games** are accessible everywhere
The 2000s saw a massive boom in poker worldwide

- **Texas hold ‘em** was sensationalized on TV
- **Online poker websites** were created everywhere
- Cornell CS students went to work at some of them

Online poker created many problems

- Much easier to lose all your money than in person
- Bots were everywhere, taking people's money
- Universities struggled with students betting tuition money

US Congress wanted to get involved

- But remember, gambling is a state issue
And Then Came Black Friday

- Congress used its classic trick: **interstate commerce**
  - They cannot outlaw something that is a matter of state law
  - But they can regulate how money flows between states

- Unlawful Internet Gambling Enforcement Act (**UIGEA**)
  - Outlaws “knowingly accepting payments ... [used] in a bet”
  - Does not outlaw gambling; goes after **money, not game**

- This effectively **killed online poker** in 2011
  - Three largest poker websites had their domains seized
  - Smaller sites exist today, but nowhere near the boom
Why Do We Care About This?

- Exactly the problem crypto was supposed to solve!
  - Decentralize finance and give power to communities
  - Prevent someone from shutting down money transfers

- So why didn't crypto help with poker?
  - Because crypto is *not a currency*; need to cash out
  - The places to cash out can be *targeted by the law*
  - Plus, remember those *high transaction costs?*

- What is the *ultimate goal* here?
  - Need some way for players to make money
  - But must do it without *betting or staking*
UIGEA Definition of Betting is Broad

- Risking **anything of value** in a game **subject to chance**
  - Designed to catch poker, even though skill a major factor
  - But this includes almost all video games as well

- Video games have this exception

  *participation in any game or contest in which participants do not stake or risk anything of value other than points or credits ... provide[d] to participants free of charge and that can be used or redeemed only for participation in games or contests offered by the sponsor*

- This means that games must have a **closed economy**
  - In *Magic Arena*, cannot trade cards or “cash out”
  - Ability to official cash out assets makes UIGEA a threat
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NOT material degree
Almost Certainly Illegal Betting

Risky Game

The choice is yours. Claim your wool or try your luck with the wolves.

Terms of Service

No Risk

Play it safe. You're guaranteed to get your wool in a wool pouch, but you'll pay the wolves a 20% tax.

Yes Risk

Sheep committed: 7,760
Prize pool: 1,879,510.788 $wool
Almost Certainly Illegal Betting

Issue is taking payment, not the game
Almost Certainly Illegal Betting

Issue is taking payment, not the game

But where? Is Ethereum payment?
What Are Okay Ways to Make Money?

- **Collector model**
  - Certain resources are rare and unique
  - Players sell after they have gone up in value

- **Farmer model**
  - Certain resources only achieved by player effort
  - Players charge their labor cost for “creation”

- **eSports model**
  - Players can win money by playing tournaments
  - Money is put up by sponsors, not by the players
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Fundamentally the NFT business model
The Collector Model

Sobs in 2001
The Collector Model

- But never a good time to sell
  - Item earns nothing while hold
  - Few items outpace investments
  - Best time is if need money

- A best a one-time windfall
  - Cannot just buy another one
  - Not a reliable revenue source

- Only good for early adopters
Magic is What P2E Aspires To Be

- Players **can earn money** from
  - **Playing tournaments** (prize money)
  - **Selling** off your card collection
  - **Renting** your cards to other players

- Can use cards to play a **wide variety of games**
  - Official formats like **Standard**, **Modern**, or **Legacy**
  - Fan-made games like **Commander** or **Tiny Bones**

- No coincidence early P2E have a CCG feel
  - **Axie Infinity** is **Pokemon/Slay-the-Spire** inspired
  - Card mechanics are easier to turn into NFTs
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Magic Has Similarities to eSports

• Tournaments were designed from the beginning
  • Organized play was a major part of the business model
  • Prizes became an expected feature early on

• Tournaments exist at many different levels
  • Friday Night Magic at game store
  • Star City Games Conventions
  • Magic Pro Tour

• Prize money ultimately comes from players but....
  • Player expenditure is capped (attendance fee)
  • Events are branded as a convention (e.g. ComicCon)
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More egalitarian than leagues

Avoids charges of betting
Interesting Aside: Card Alters

- Players like alternate art
  - Draw/paint on the card
  - There is a market for this
  - Read the MTG Reddit

- Can **play in a tournament** if
  - Name is not covered
  - Mana (resource) not covered
  - Doesn’t alter weight/stiffness
  - Judges approve beforehand

- Generally okay in casual play
More Controversial: Proxies

- Proxy: stand-in for a card
  - Typically on a common card
  - Used to represent a rare
  - No attempt at actual art

- Can **play in a tournament** if
  - Replace card damaged at that tournament
  - Replace a rare foil with no non-foil version

- Or if your play group allows
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  - Replace card damaged at that tournament
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Proof of ownership is what is important. And this is what NTFs are use for!
Why Are *Magic* Cards Worth Money?

- **Very old cards** are collectible due to rarity
  - Ultimately not very useful in the game
  - Banned from all but **Vintage** (w/ few players)

- **More recent cards** can have value because
  - Help players win games/tournaments
  - Have an art style a player particularly likes
  - Allow a player to make a themed deck

- **Even newer cards** are counterfeited!
But the Line Does Not Go Up

Oko, Thief of Crowns

 Throne of Eldraine

Banned!
But the Line Does Not Go Up

Misty Rainforest

Reprinted!
What Is Going On Here?

- Value is a product of **rarity** and **demand**
  - Either or these can change at any time
  - Wizards can **reprint** more cards (rarity)
  - Wizards can **ban** a card from a format (demand)

- Wizards distances itself from secondary market
  - Because otherwise card packs are gambling
  - They only make money from the first sale
  - Though Secret Lairs operate as a loop hole

- Wizards cares about **Magic** as a game (**yes, really**)
This Is a Big Difference With P2E

- Most *Magic* players play **to enjoy a game**
  - Money spent is balanced against other entertainment costs
  - The market is at best a way to defray some of this cost

- P2E gamers play **to earn money**
  - View the income potential as the primary selling point
  - Design choices that favor fun over reward are unpopular

- But the business model is **not sustainable**
  - Players buy resources to make money, not have fun
  - Means they should make more than what they paid
  - But can only sell to other (potential) players
One Of Two Things Must Happen

Inflation

Pyramid Collapse

1
10
100
1,000
10,000
100,000
So On & So Forth, Until...
10,000,000,000
One Of Two Things Must Happen

Inflation

Pyramid Collapse

In terms of game assets, not money
Crypto Just Has Bigger Problems

- All NFTs are built on top of crypto coins
  - Right now, Ethereum is the major platform
  - Sometimes a side coin to reduce transaction costs

- Ethereum is a **deflationary currency**
  - There are a fixed number of tokens available
  - As more people come in, tokens more expensive

- Deflation sucks; it is much worse than inflation
  - Seems weird, since value of money goes up
  - But unspent money is worthless
  - Once you spend money, too hard to get more
Are NFTs Useless for Gaming?

- Making money the focus is problematic
  - If earnings from *player money*, problems with *law*
  - If earnings from *internal economy*, often *collapses*
  - If earnings from *tournaments*, need sponsors

- To make them work, *must focus on tech*
  - Flexible transferability (trading, selling)
  - Persistence and validation w/o central server
  - But *transaction costs* cannot be ignored
What is the Strength of *Magic*?

- *Magic* has a unique **bipartite design**
  - **Meta rules** that define goals and play sequence
  - **Card rules** that define interactions
  - Continually evolving game with new interactions
- This is what made the variants possible
  - Change the meta rules, keep the card interactions
  - Balance in one format often carries over to others
  - In unique cases banning in new format is required
Bipartite Design of Magic

Card Rules

Questing Beast

Legendary Creature — Beast

Vigilance, death touch, haste
Questing Beast can't be blocked by creatures with power 2 or less.
Combat damage that would be dealt by creatures you control can’t be prevented.
Whenever Questing Beast deals combat damage to an opponent, it deals that much damage to target planeswalker that player controls.

Meta Rules

Example of Combat

1. **Declare Attackers**
The attacking player attacks with his three biggest creatures and taps them. He doesn’t attack with the smallest because it’s too easy to destroy, and it might be useful for blocking on the opponent’s next turn.

2. **Assign Blockers**
The defending player assigns blockers to two of the attackers and lets the third attacker through. Blocking choices are up to the defender.

3. **Combat Damage**
The unblocked attacker deals 3 damage to the defending player. The blocked attackers and the blockers deal damage to each other. The smaller creatures die and the bigger creatures live.
Apply This to Open-Source Gaming

- Have a basic **open-source** online **game client**
  - Allow users to make own servers
  - Allow users to modify the game code
  - Allow users to ban/accept certain items

- But **game items** are **commercialized**
  - Items purchased/minted through a third-party
  - Game client validates and leverages game items
  - Individual clients can ban certain items for balance

- Currently easiest to do with online CCG
How Do You Make Money?

- You could be the **item developer**
  - Need guarantees that you don’t break the balance
  - Reputational trust is a major factor here
  - Why Wizards focuses on the game, not the market

- You could **run tournaments**
  - Again, need to make sure not run afoul of the laws
  - Fixed cost w/ prize pools announced ahead of time
  - In-person cons mix in other events and content
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**Income stream requires constant design work**

**Income stream requires constant marketing/hosting**
Wouldn’t This Be Centralized?

- Item creation would see some consolidation
  - Game R&D benefits from economy of scale
  - Branding helps convince customers of balance
  - Easier for clients to blacklist/whitelist companies

- But decentralizing items still has value
  - Permits (small) competing groups of item designers
  - Items are still usable if original designer folds
  - Designers are not liable for issues with selling
But This Will Never Happen

- Item designers/sellers have **no market** w/o client
  - Someone must make the client first
  - Usually the group that plans to sell the items

- Initial creation of the game takes **time and money**
  - If anything more than a CCG, probably a lot of money
  - Developer (item seller) needs to recoup that cost some how

- Immediate competition makes **recouping difficult**
  - Other companies benefit from all their work
  - Their product has same value, without start-up cost
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A lot of work for less revenue than a normal game
Summary(?)

- P2E and NFTs are about players **extracting money**
  - Charging labor costs to generate a resource (gold farming)
  - Appreciation of a rare resource over time (old *Magic* cards)

- But the tech is no protection from **the law**
  - Anything that is zero-sum runs afoul of UIGEA
  - Most else is either inflationary or a pyramid scheme

- In order to be useful must **focus on the tech**
  - Need a compelling reason for **decentralized items**
  - Need a compelling reason for **cross-game support**