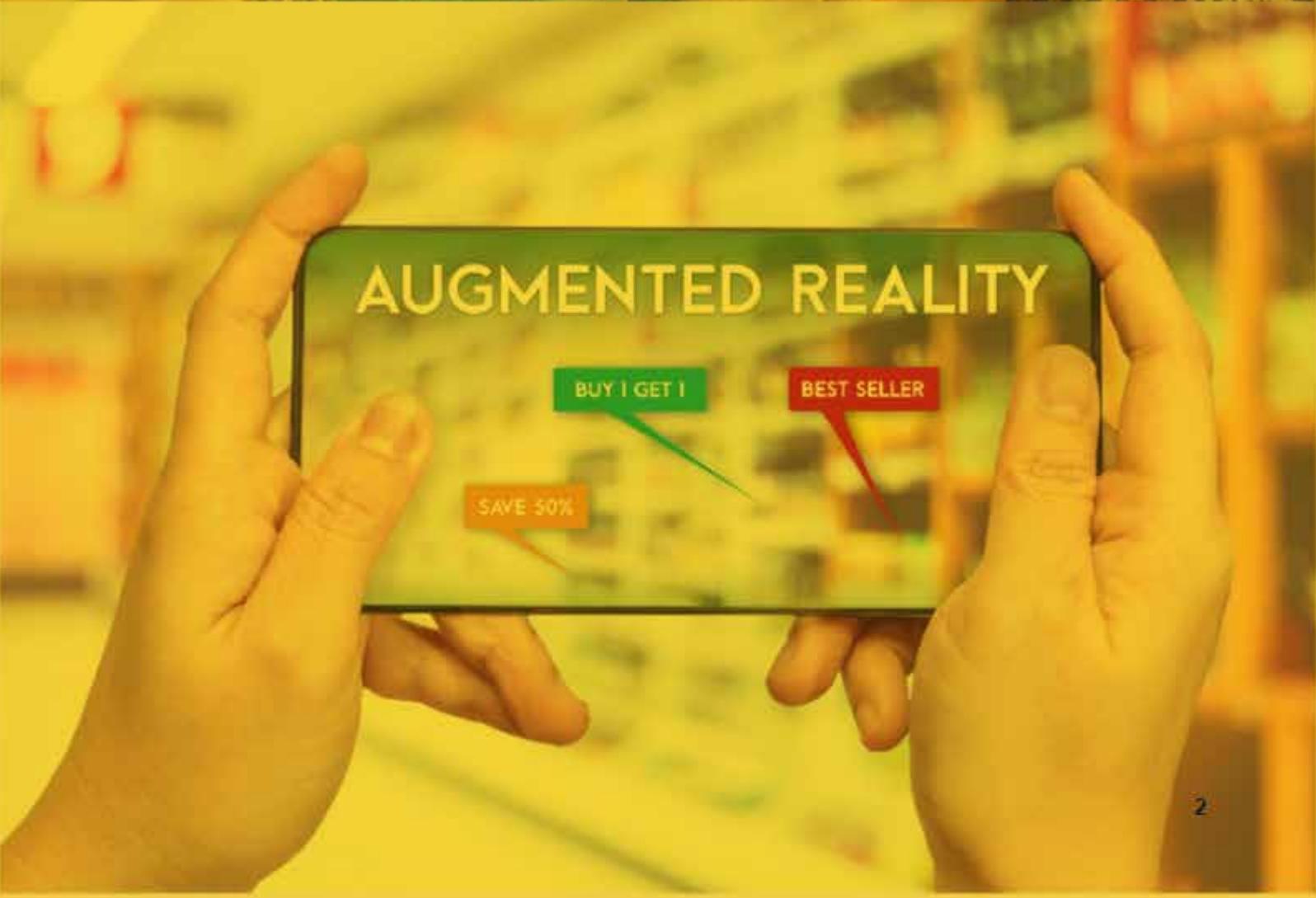


XRUN PROJECT

An air drop advertising platform in which everyone can participate. XR, NFT, Metaverse

Anyone can participate. XR NFT, Metaverse





CONTENTS



Abstract

1. Introduction	03	4. XRUN NFTs Carbon neutrality Exchange	76
1. Background	05	5. XRUN TOKEN MODEL	77
1-2. Investment Status of the AR Market	07	1. XRUN TECHNICAL SPECIFICATIONS	78
1-3. Metaverse and NFT Preparing for the New World	17	2. TOKEN SALE PLANNING	79
1-4. Collaboration of NFT and Metaverse (NFT X Metaverse)	26	3. TOKEN ALLOCATION	80
1-5. Relevant policies by country	36	6. ROADMAP	81
1-6. Social/technical issues pending	37	7. KYC Certification	85
1-7. What is XRUN?	39	8. Disclaimer and Precaution	86
2. XRUN Technical Specifications		9. PARTNER	87
2-1. Core Technologies of XR Contents	41	10. Core Technologies and Awards	
2-2. Metaverse on XRUN	45	1. Patents	88
2-3. XRUN NFTs	50	2. Program Registration	91
2-4. Security and Authentication Methodology	52	3. Awards	91
2-5. XRUN AD-Platform Service Algorithm	55	11. Terms	92
2-6. Relationship of Relay Server and Participant-Blockchain	58	12. References	95
2.7. Facial Blockchain ID Verification System	59		
2.8. XFACE	64		
2.9. After Life	68		
3. XRUN Ecosystem			
3-1. XRUN Wallet Ecosystem	71		
3-2. XRUN Metaverse Ecosystem	72		
3-3. CLUBX (XRUN Metaverse)	73		
3-4. XRUN NFTs & NFTs Exchange	75		

XRUN Summary

1. XRUN Wallet

The XRUN Wallet offers a unique reward system where users can earn XRUN tokens by watching ads and completing missions. Users are rewarded for engaging with various ads and completing missions within the XRUN ecosystem.

PoD (Proof-of-Discovery): This mechanism verifies the process in which users discover or provide data through ads, allowing value to be created without significant energy consumption.

Blockchain-Backed Trust: All data related to ads and interactions are stored on the blockchain, ensuring immutability and preventing tampering. This guarantees the transparency and reliability of the ads.

2. CLUBX

CLUBX creates a virtual ecosystem where users can dance, engage in voice and text chats, and meet others in a social club environment. Beyond just a social platform, CLUBX enables users to own and manage virtual clubs through NFTs, generating income and employment opportunities.

NFT Ownership of Clubs: Users can purchase or acquire NFTs to own virtual clubs, which they can manage or trade as digital real estate.

AI and Facial Authentication: CLUBX incorporates AI-powered facial recognition to enhance the reliability of user identity verification. The system analyzes facial data, encrypts unique facial features, and securely stores them on the blockchain to provide secure identification.

NFTs of Faces and Authenticity Verification: Users' faces can be converted into NFTs and compared with video and character data to verify authenticity. This important feature strengthens digital identity protection and asset security in the metaverse.

3. Virtual Memorial: After LIFE Project

The virtual memorial, part of the After LIFE Project, combines AI and blockchain technology to offer a new way to honor and remember loved ones. This memorial goes beyond a simple digital space by enabling emotional interaction with deceased individuals.

AI-Driven Memorial Experience: AI recreates the likeness of the deceased based on facial data, bringing their expressions, voice, and behaviors to life through a digital avatar. Users can interact with this avatar within the metaverse, reliving memories and engaging in a personalized, emotional memorial experience.

Blockchain Data Protection: All data and interaction records related to the deceased are securely stored on the blockchain, preventing any unauthorized tampering. This ensures that the personal and emotional aspects of the memorial are protected, with the data preserved permanently.

4. The Convergence of Blockchain and AI

One of the key innovations within the XRUN ecosystem is the convergence of blockchain and AI technologies. AI analyzes user data in real-time to provide tailored experiences, while blockchain ensures this data is securely stored, ensuring trust and protection.

AI's Role: AI analyzes facial Authentication and user behavior to enable personalized avatar interactions, maximizing customized experiences within the metaverse.

Blockchain Security: Blockchain ensures that all data is recorded in a transparent, immutable manner, providing users with confidence that their activities and identities are safely protected from tampering or manipulation.

Conclusion

The XRUN Wallet APP, CLUBX, and Virtual Memorials are innovative platforms combining blockchain and AI technologies to offer enhanced digital asset management, identity verification, and immersive experiences within the metaverse. XRUN Wallet's PoD mining, AI-powered personalized experiences, blockchain-based facial Authentication, and the virtual memorial are core features driving the evolution of the XRUN ecosystem. These integrated technologies ensure robust security while delivering deeply engaging digital experiences, redefining the future of metaverse interactions and digital asset management.

1.1 Background

Recently, the augmented reality(AR) and virtual reality(VR) technologies have developed, and various contents using both technologies are being produced and consumed. Here, augmented reality (AR) is a hybrid reality that combines reality with virtual reality. Representative examples of domestic and overseas applications which have brought sensations around the world since their release as a new mobile game for Nintendo, is "Pokemon Go". Pokemon Go is one of Nintendo's most popular products which sold over 240 million copies across the world.

What is unique about the mobile game version of the series is that it is a game that allows participants to collect and cultivate various Pokemons while moving around reality by applying Augmented Reality(AR) and GPS technology. The participants' reaction was explosive, and Pokemon Go ranked first in the US iOS and GooglePlay in approximately 3 days after its launch, and ranked third and sixth in sales in Australia and New Zealand, each respectively. Further more, since the launch of Pokemon game in various countries, there have been accidents, and people who tried to catch Pokemon at restaurants, among the attracted users. Reflecting this popularity, Nintendo's share price rose 35.7% over the two days since its launch.

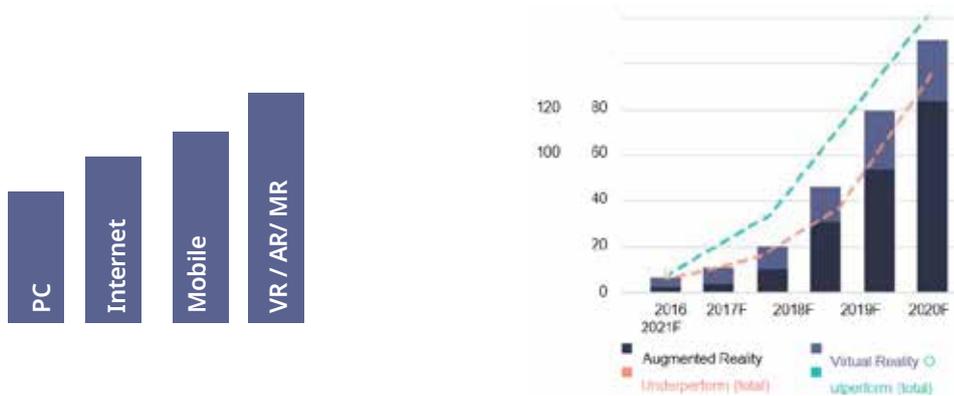


[Figure 1] PokemonGo

XRUN Introduction

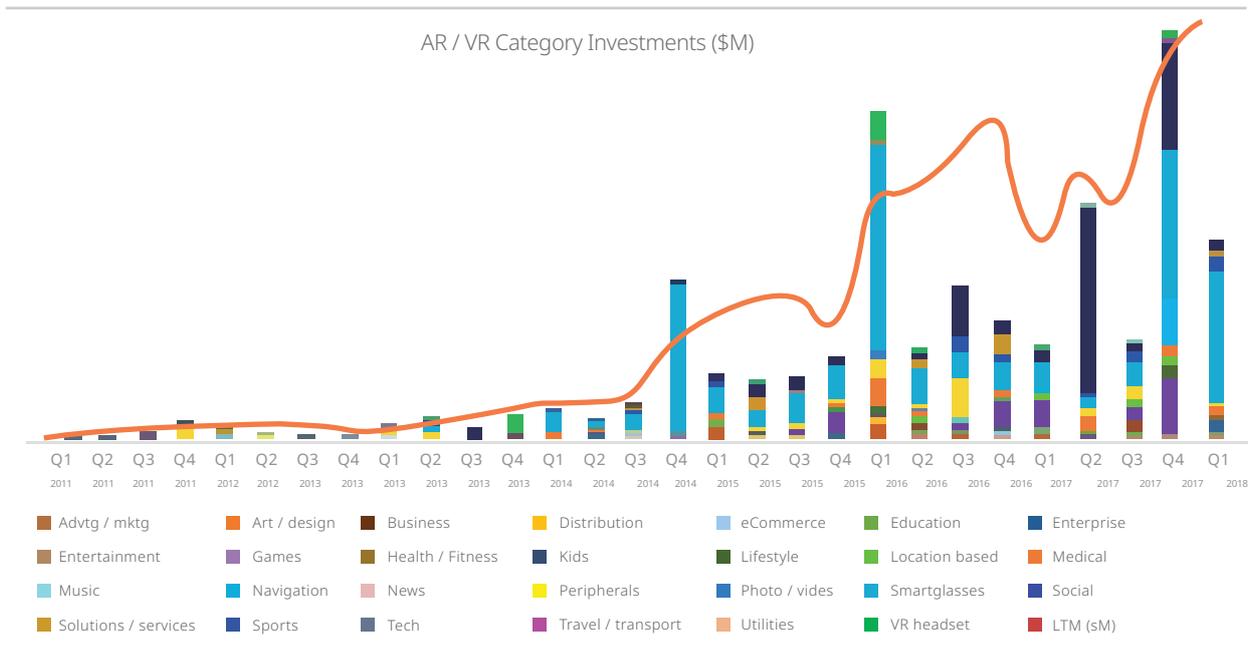


Eventually, Pokemon’s popularity proved that participants in the global market are very thirsty for new technologies that change the paradigm such as virtual reality(VR) / augmented reality (AR), and VR and AR are proven to be technologies that can tear down the boundaries between realities, and we believe that fact that the participants can be more immersed in the game is proved through the popularity of Pokemon Go. Therefore, it presented to us the possibility that the market could grow faster than the time when we looked at the existing virtual reality and augmented reality. XR content is evolving to enable the production of immersive contents by introducing high performance HMD(Head Mounted Display) devices such as those made by Sony, Oculus and HTC. HMD equipment is being studied constantly, and if the weight reduction and miniaturization of HMD equipment is realized, the revolutionary paradigm of digital contents is expected to change. Currently, XR content is highly utilized for smartphones, but various devices are rapidly developing, and consequently, the content utilization of XR is likely to increase rapidly. In addition, augmented reality(AR) means that through a computer, the user creates an artificial environment as if it were actually in the situation and environment. As we can experience situations that are difficult to experience through devices, many contents are created and provide different experiences to the consumers. According to Digi-Capital, a consulting firm, as for the XR market’s size, the AR application programs will be installed in 3.5 billion mobile devices over the next five years, with the revenue expected to reach \$90 billion.



[Table 1] Digi - Capital VR / AR revenue(\$B)

1.2 Investment Status of the AR Market



[Table 3] AR / VR Category Investments(\$M)

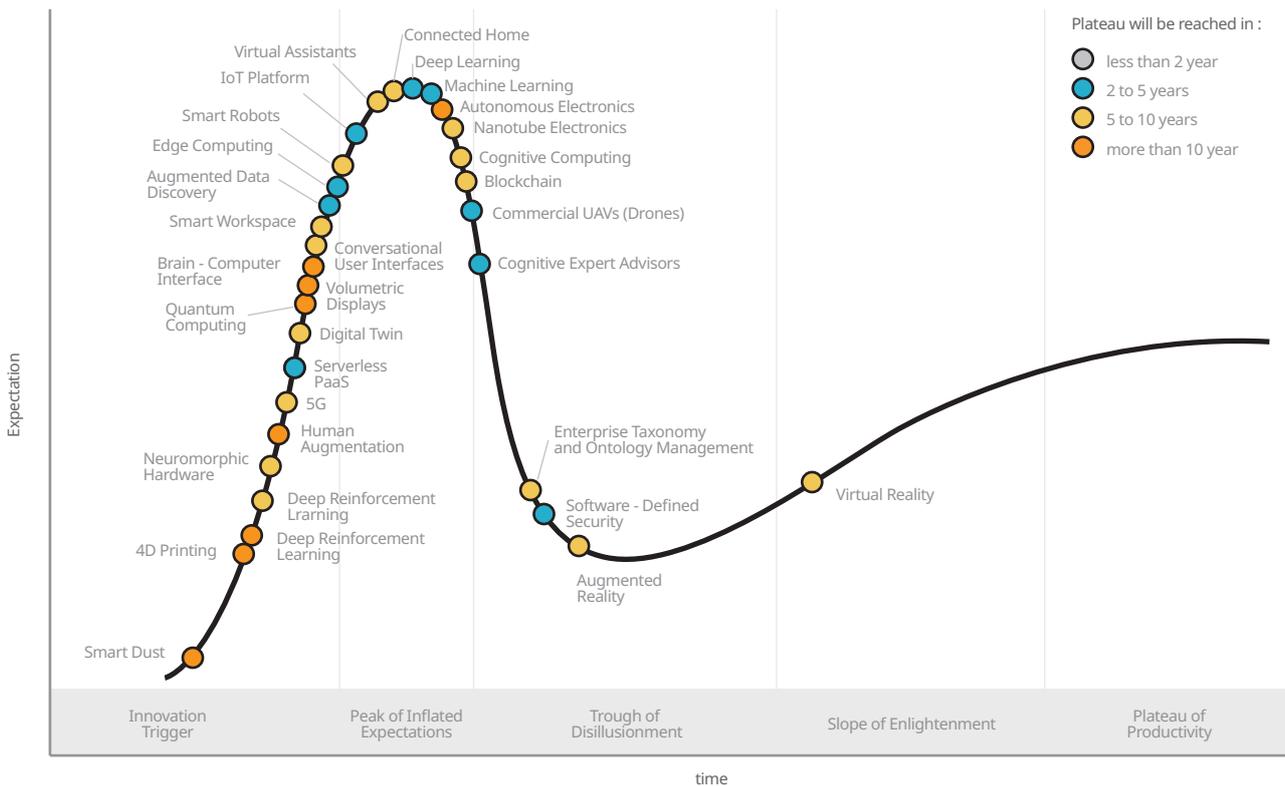
Venture capital investments made in AR / VR / XR start-ups from April 2017 to April 2018 attracted \$3.6 billion in investment. Among them, over \$1.5 billion was made in the fourth quarter of 2017. Meanwhile, IT companies such as Google, Apple, Samsung, and Facebook all invested in the AR areas.

According to the Gartner's Hype Cycle model, AR technology is at the top of the list for investment targets. AR is now entering the "productivity stability cycle" and companies will launch 2nd and 3rd generation products, and market penetration of AR technology will now reach 5% to 30%. Currently, aggressive companies like Google and Apple are actively adopting pilot projects.

XRUN Introduction

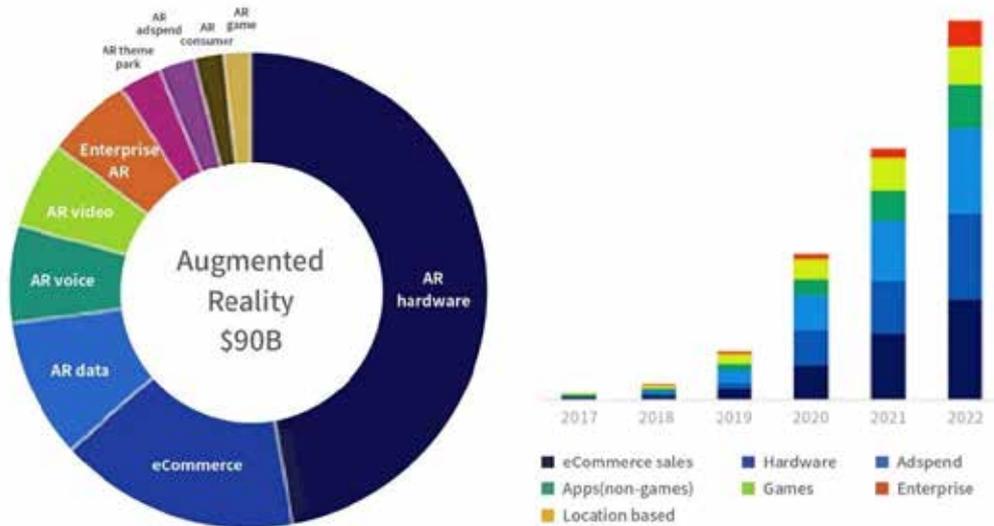


Such a phenomenon can also be seen in a study conducted by eMarketer.com, the largest marketing research aggregator which researches over 1,500 marketers in the world's largest enterprises. Research has shown that the use of augmented reality increases 6% over the year to 24% compared to other experimental advertising technologies in the marketing field, meaning that large business operators and advertising agencies around the world are aggressively adopting augmented reality.



[Table 4] Gartner Hype Cycle for Emerging Technologies, 2017

XRUN Introduction



[Table 2] AR Sector Revenue

The combined spending of virtual and augmented hardware, software and related services is expected to reach \$13.9 billion in 2017 and \$144.3 billion in 2020 from \$6.1 billion in 2016, respectively. In addition, as the content market is expected to grow at a large scale in connection with the fourth industrial revolution, such as around content search and context awareness, focusing on virtual and augmented reality technologies, the size of the virtual and augmented reality market will increase rapidly to reach \$151.3 billion in 2022, while the market for image recognition is expected to grow from \$15.95 billion in 2016 to \$38.92 billion in 2021, with the context recognition computing market is expected to grow from \$56 billion in 2016 to \$125 billion in 2023.

XRUN Introduction



In the virtual and augmented reality market, virtual reality is currently driving growth, but in or after 2018, the augmented reality will lead the growth. In 2020, the augmented reality market will account for more than 70% of the total market. If the initial virtual reality industry is growing around hardware such as HMD, the software and services market, such as platforms including contents will capture an even larger share after the basic dissemination of the virtual reality(VR) equipment. The virtual and augmented reality device market is expected to grow as the augmented reality' HMD unit is further segmented, and the functions of the application platform are expected to diversify according to the augmented reality application environment.

In particular, the market for an augmented reality's HMD which can operate as an independent type like HoloLens is expected to explode. Domestic technological levels related to virtual reality(VR) and augmented Reality(AR / MR) application technologies show technical gaps of 1.6 and 1.5 years with 80.8% and 81% relative to the US, which is one of the world's top technology holder countries.

XRUN Introduction



[Figure 2] Status of Augmented Reality(AR) Devices

The devices and networks that play an important role in the growth of the virtual and augmented reality market have global competitiveness, but software and contents are more vulnerable than those of the developed countries and require intensive investment. In the case of virtual and augmented reality, mobile AR / VR attract quite a bit of attention due to the popularization of smart phones, miniaturization of augmented reality technologies, and the demand for the users immediacy and convenience.

In addition, when hardware devices spread to the public, this market is expected to grow significantly. The smart phone-based HMD-type devices (such as Samsung Gear VR) currently have a global competitiveness, yet the competitiveness of the augmented reality's EGD (Eye Glasses-type Display) anticipated to take over the equipment market in or after 2017 is still short.

The development of the smart glass technology equipped with multi-camera, multi-sensor (depth, gyro, etc.), high-performance computing power, light weight, high resolution, and high-speed wireless communication function is required because it requires objects, background and gesture separation.

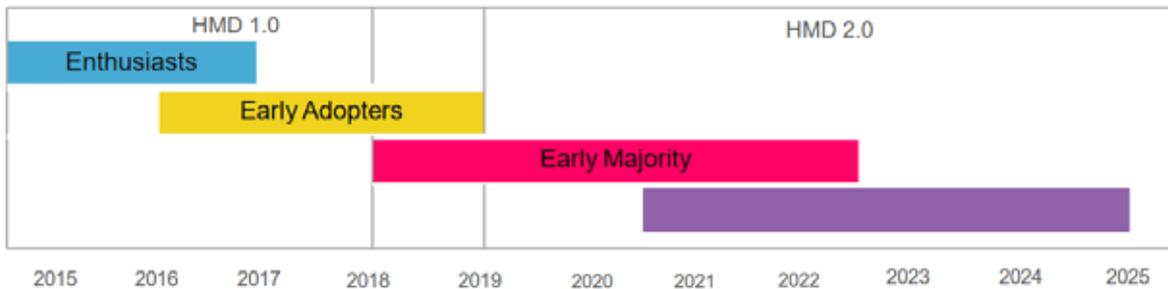
In the case of Magic Leap, massive investments from global corporations such as Google, Qualcomm, and Alibaba are being promoted and development of AR glass technology is under way on a confidentiality basis. Microsoft is also promoting glass-type Augmented Reality (AR) technology with "HoloLens" to accelerate the device development competition.

XRUN Introduction



Expanding Metaverse Device is a device that supports and expands the metaverse experience with VR HMD under full-scale R&D, where while the existing metaverse experience was based on PC, mobile, and console the recent spike in the sales of Oculus Quest2 foreshadows an era of VR popularization.

- Oculus Quest2 released in October 2020 sold 1.4 million units that year and has an estimated count of 5 million units sold until February 2021, which is at a similar level to the iPhone sales in 2007 of 1.39 million units.
- It is also an incredible number considering Playstation 5 released in November 2020 by the console gaming giant Sony hit 4.5 million units sold that year.
- This suggests that VR equipment has gone past the innovation adoption stage to reach the public and become an important access point for metaverse Log In.



[Image] Spread of Next-gen HMD devices

* Reference : Gartner(July, 2019) "Competitive Landscape: Head-Mounted Displays for Augmented Reality and Virtual Reality"

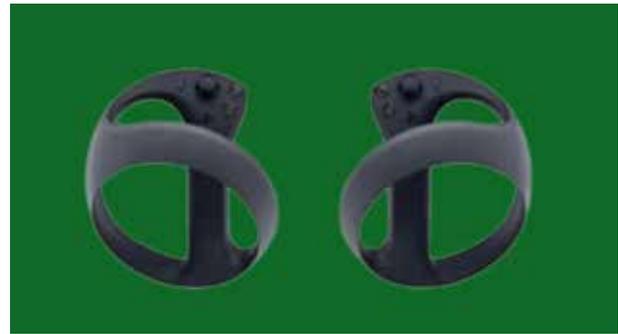
VR devices are expanding and advancing metaverse experience in combination with PC, console, and mobile services. The ROBLOX platform can be accessed via PC, mobile, console, and VR, and while the proportion of VR use has been low due to high price, weight, etc., this proportion is expected to increase with the popularization of VR devices.

The mobile proportion out of all current ROBLOX users is 73% (as of '20). Meanwhile, Oculus Quest2 is more than 10% lighter than its previous version (503g) and around 100 dollars cheaper (\$299). Sony is planning to release PS5 VR in '22 6 years after releasing a VR for PS4 (PSVR) in '16. This is projected to increase the opportunities of metaverse access via VR along with Sony's recent release of a next-gen VR controller than goes into PS5 (Feb '20).

XRUN Introduction



ROBLOX VR



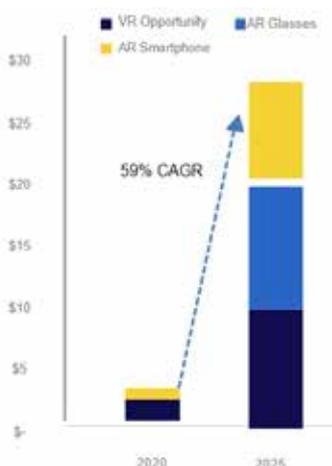
Sony PS5 VR Controller

[Image] ROBLOX VR and Sony PS5 VR Controller

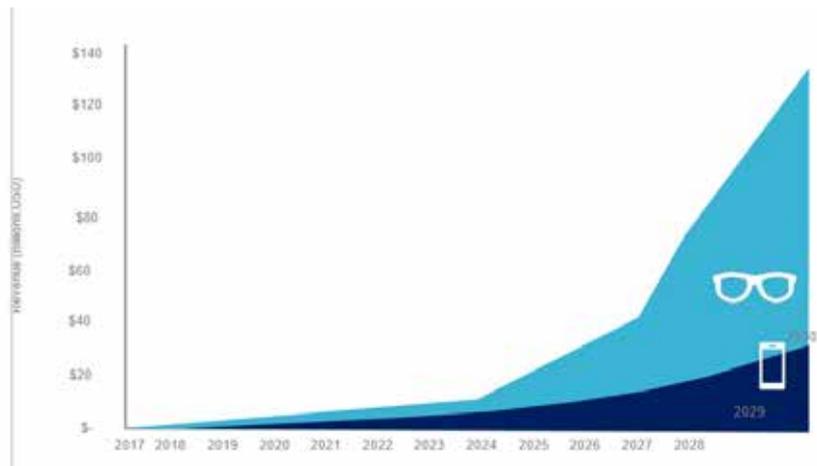
* Source : ROBLOX(February 26, 2021) Investor, Sony Homepage

Also, along with VR HMD, AR Glass is also expected to rise as a key device that supports metaverse experience after '22. The AR/VR market is expected to have an average annual growth rate of 59% to reach \$28 billion in '25, while the AR market is expected to grow up to \$130 billion in '30.

Global AR/VR market size



AR Market Opportunity

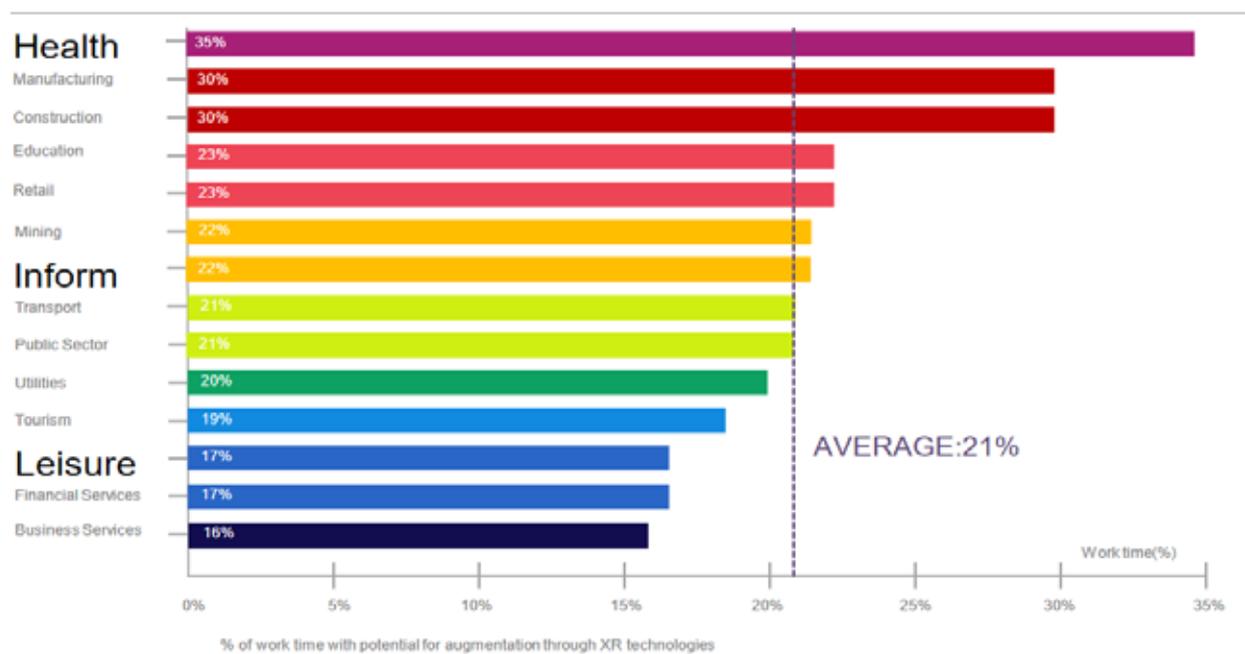


[Image] Global AR/VR market size and AR opportunity

XRUN Introduction



With metaverse going beyond games to spread to all industrial areas, AR Glass will act as a key tool for productivity innovation, while XR(Extended Reality) devices are utilized 21% on average across all industries.



* Reference : Accenture(2019), Waking up to a new reality : Building a responsible future for immersive technologies
 [Image] XR use proportion per industry

The production operation management interface applied in the overall industrial area has constantly evolved from papers in the past to computer screens, smart phones, etc. and the next-gen interface AR Glass is applied in the overall production operation management process including inventory management, checking defects, work training, etc.



With each evolution, the interface becomes more intuitive and closer to the point of activity.

With each evolution, the interface becomes more intuitive and closer to the point of activity.

XRUN Introduction



On the other hand, CTRL Labs is striving towards developing and commercializing advanced technology used in controlling computers using the mind.



Virtual Object Control



Virtual keyboard input

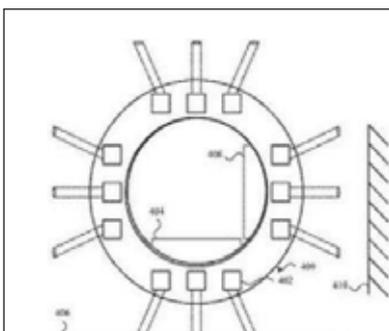


Virtual situation control

[Image] Facebook's AR wristband

* Reference : Facebook reality lab homepage

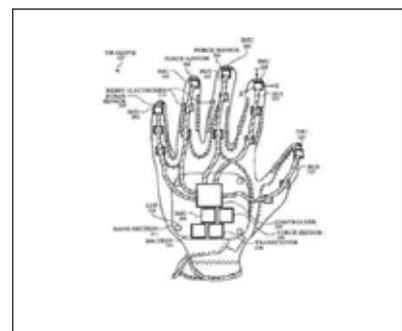
Also, Apple released a patent for using rings, gloves, etc. as an interface connecting the virtual to the reality.



Ring patent



Virtual keyboard input



Virtual situation control

[Image] Apple's ring and glove patent

* Source : Electronic News (2021.01.13.) "Lord of the Rings Apple, Smart Ring patent appears"; the guru(2021.01.05.), "Apple, gained VR glove patent... Preparing for the 'metaverse' era"

XRUN Introduction



Various forms of metaverse devices such as mirrors, towers, treadmills, etc. are developed and released for efforts towards popularization.

Type	AR Market Opportunity
 <p>Care OS Poseidon (Mirror)</p>	<ul style="list-style-type: none"> Residential, smart mirrors for bathrooms focused on personal hygiene, skin care and well being Analyzes the skin health of the user to recommend required functional cosmetics (including clean teeth maintenance, hair recommendations)
 <p>Gate box Grande (Tower)</p>	<ul style="list-style-type: none"> The subsidiary of Naver 'Gate box' recently released 'Gate box Grande' which is a larger version of the previous AI hologram Assistant 'Gate box' placed on tables (March '21) Large character summoning device of 2m height developed for guest receptions Uses a depth sensor to respond to approaching people
 <p>HaptX Gloves (Gloves)</p>	<ul style="list-style-type: none"> Gloves that magnified the tactile experience of VR 133 tactile feedback sensors attached to give an experience of touching actual objects in VR
 <p>Virtuix Omni One (Treadmill)</p>	<ul style="list-style-type: none"> Residential walking VR device expected to release late 2021 Supports free movement of the user in the virtual space such as crouching, squatting, leaning back, jumping, etc. Matches the line of sight with movement to reduce 'cognitive dissonance' resolving one of the issues with VR equipment of motion sickness

1-3 Metaverse and NFT Preparing for the New World

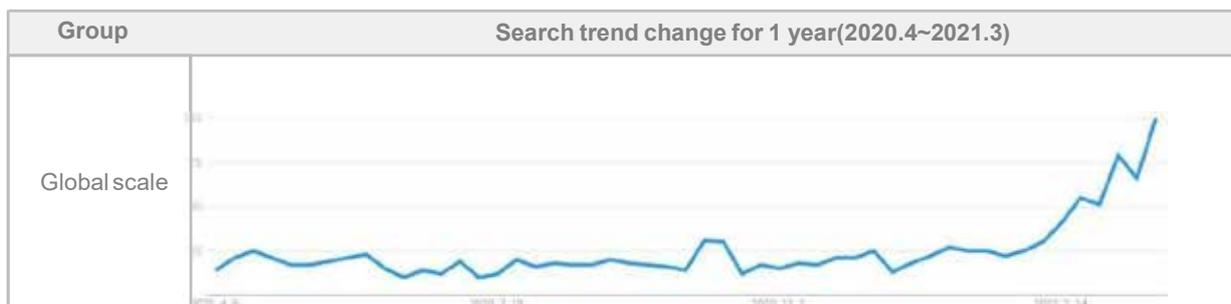
The main issues related to technology that are widely discussed in media and online would be Metaverse and NFT(Non Fungible Token). Metaverse in particular has gone beyond the range of games, life, and communication service to also be applied in work platforms. There are already multiple metaverse work platforms present which are rapidly growing in the untact era, with more innovative work platforms expected to continuously appear. Also, game engines that were previously used in creating games, life, and communication metaverses will be expanded to all industries and social areas to increase the influence of metaverse.

Metaverse

AR Glass is also expected to rise as a key device supporting metaverse experiences starting '22, and innovation is expected to accelerate with various metaverse experience devices such as wrist bands, rings, gloves, etc. continuing to be developed and released. The game engines that were previously used in creating games, life, and communication metaverses will be expanded to all industries and social areas to trigger the growth of metaverse.

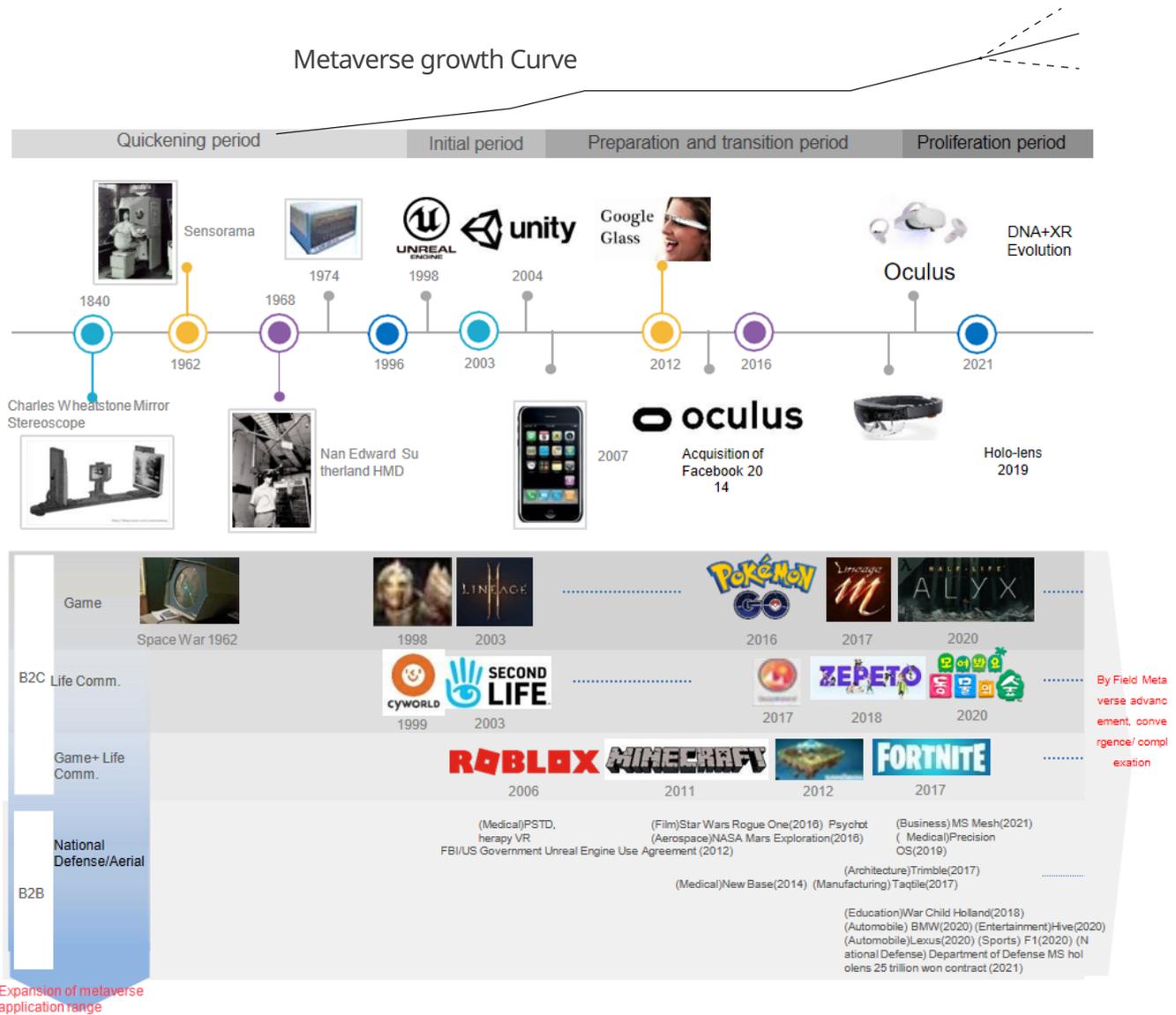
Game engines such as Unreal, Unity, etc. is expected to expand from the B2C area based on game, virtual life/ communication to B2B and B2G areas. While the application of key gaming engines in B2B and B2G is relatively late compared to its application in the game, life, communication based B2C area, the range of application and intensity is rapidly growing. The B2C gaming, life/communication metaverse platform which started its growth since 2010 is receiving attention after 2020, and metaverse growth is expected to go past the inflection point with growth in the B2B and B2G areas after 2021. Unity is pursuing expansion of business to areas such as construction, engineering, car design, self-driving cars, etc., and the market potential of the individual industrial areas will exceed the gaming industry (Ricciello, Unity CEO)

XRUN Introduction



[Image] Metaverse search trend
* Source : Google Trend based SPRI Analysis

XRUN Introduction



[Image] Metaverse growth curve and all industry proliferation trend

Growing Digital Human is increasing the use of digital humans with spreading of various metaverse services. While a lot of time, money, and professional technologies as required in the production of digital humans in the past, the recent technological development such as AI, Cloud, CG, etc. relieved the technical constraints in digital human production to increase usage.

XRUN Introduction



The range of digital human use is expanding to all industries such as entertainment, distribution, education, finance, broadcast, etc. Metaverse collaborating with various IP(IP×Metaverse) and metaverse platform companies are forming partnerships/cooperative relationships with various Intellectual Property business operators to rapidly expand its business range. There is also an increase in the number of cases where the IP operator establishes their own new metaverse platform based on their IP, and thus cooperation and competition is expected between metaverse platform companies that seek to expand their partnership with IP operators and IP operators that wish to establish metaverse platforms.

ModelingCafe, 'Imma'(Virtual Influencer/Model)	Dob Studio, =RUI'(Virtual Singer)	EVR Studio, Project TH (tentative name) (Game Character)
		
ModelingCafe, 'Imma'(Virtual Influencer/Model)	Dob Studio, =RUI'(Virtual Singer)	EVR Studio, Project TH (tentative name) (Game Character)
		
Samsung Electronics, 'Neon'(Customer Guidance Service, etc.)	LG Electronics, 'Keem Reah'(Product Promotion, etc.)	WHO 'Florence' (Consultations to quit smoking)
		
IP Soft, 'Amelia'(Customer Consultation Service, etc.)	Soul Machines, 'Will'(Education Service)	Money Brain, 'AI Announcer'(Broadcast Service)
		

[Image] Digital Human Cases (Example)

XRUN Introduction



Virtual Influencers

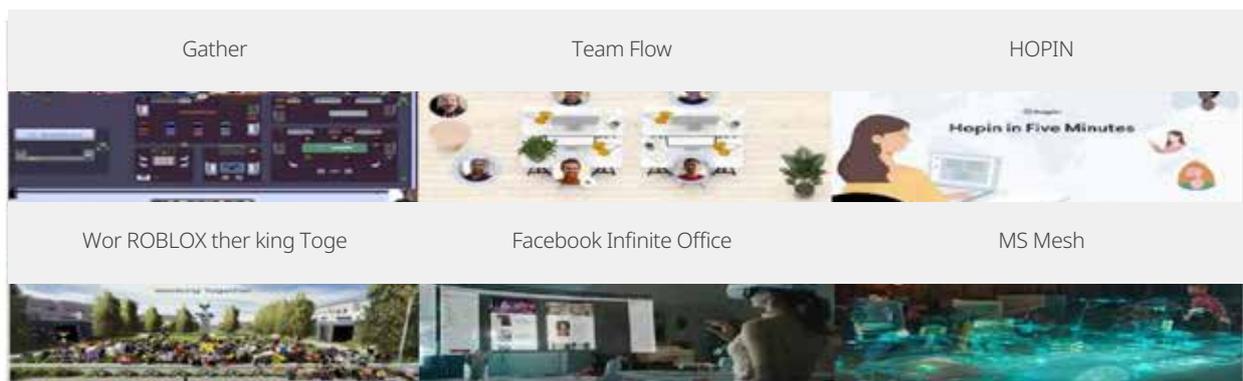
Increase in virtual influencers created using digital human technology .Virtual influencers use SNS platforms such as Instagram, etc. to post pictures like real people, and chat with SNS followers to communicate. Higher recognition leads to role expansion into actual company promotion models, virtual singers, actors, etc. to generate revenue. No space/time restrictions in activities, and can optimize into image necessary for company promotion.



- Name: Lilmiquela
- Manufacturer: Brud
Instagram Followers: 30.5 million('21.4.12.)
- Activity : Chanel/Prada model, released a single album (UK Spotify 8th)
- 2020 Revenue: 13 billion won

* Source : SPRI analysis based on key relevant media posts and homepage data

With the growth of talking AI service such as AI Chatbot, etc. and the virtual assistant growth market, the digital human use has increased to grow the conversational AI market by annual average of 21.9%. The market size of 4.8 billion USD in 2020 is expected to grow to 13.9 billion USD in 2025 with 50% of knowledge workers using virtual assistants everyday. The growth trend is expected to be similar to that of the UGC (User Generated Contents) market where it experienced rapid increase with the generalization of easy video production technology.



[Figure] Metaverse Work Platform * Source : SPRI Analysis based on company homepages

NFT

NFT(Non Fungible Token) has tokens with unique value where A token cannot be replaced by B token. In other words, unlike virtual assets issued such as Bitcoin, Ethereum that can be traded with the same value and are replaceable, NFT refers to “unique assets where each token has a different value”. This was introduced to the public through the blockchain based game ‘Crypto City’ released in 2017, and there is rapid growth in relevant markets from 141.55 million USD in 2019 to 338 million USD in 2020.

With such market flow, various companies such as Microsoft, NIKE, etc. are entering the NFT market, and there are also movements to try and use such NFT in transactions in the metaverse. Meanwhile, because of the characteristic of NFT that it cannot be replaceable, the copyright work market is actively using NFT mainly in the trading of paintings.

Difficult to forge	Difficult to track
Difficulty in duplication assures scarcity and makes sure that the value does not deteriorate due to forgery	Blockchain data is open and transparent where anyone can see the source, issued time/count, owner history and other information regarding NFT
Partial ownership	Increase in circulation
Partial ownership is allowed where the token can be divided in the form of 1/n and purchased (traded)	Taking games for example, if items are created using NFT the player will gain true ownership of the items and freely trade within the NFT auction market

[Table] 4 Advantages of NFT

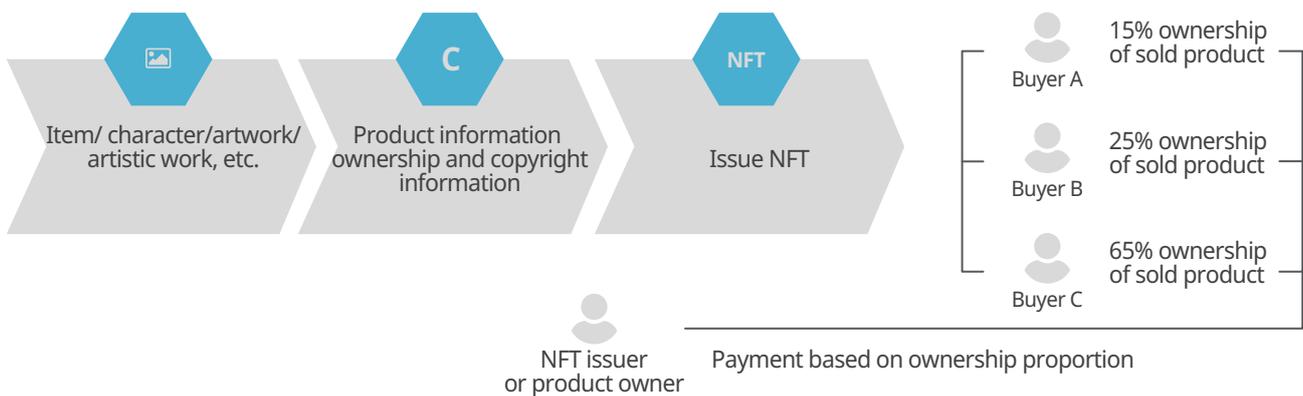
NFT is issued through ERC-721 and the recently developed and applied ERC-1155, where ERC-721 issues NFT for artwork, antique, virtual real estate, and character to create tokens, and it can be traded as virtual assets when the unique price of the token is decided. There are new methods appearing in artwork transactions where tokens are partially owned.

ERC-1155 is a protocol designed by combining the advantages of ERC-20 and ERC-721 to allow trading with two tokens in conjunction, reducing transaction costs by simultaneously applying trading and transfer of ownership through a single transaction.

XRUN Introduction



Another feature is multi-transfer where two or more tokens can be sent to one or more recipients. In June 2018, a global online game community platform and blockchain-based game developer 'Enjin' released a standard code ERC-1155 that can replace ERC-721 and researched issuing of new NFT and the compatibility with existing NFT. Comparing the GAS(fee) occurring from transactions using ERC-20, ERC-1155 transactions can be processed with GAS 60% of that value to improve network bottlenecks and efficiency.



[Image] Concept map for Non Fungible Token

Also, due to the irreversibility of blockchain, even if ERC-20 and ERC-721 tokens are deleted, the previous codes are remaining which causes large storage space, high specification nodes, and power loss. This was suggested to relieve such issues and increase efficiency. NFT assures scarcity of the asset and proof of originality, while also preventing forgery of data such as ownership information and transaction history, etc., acquiring integrity. NFT can be created for assets in all areas such as artwork, real estate, digital contents, etc., and it is a technology that assures value and scarcity of digitally transformed assets that distributes and saves the meta data and information of the digital asset in the participation node through the blockchain network. This makes forgery impossible and allows the tracking of all transaction history from the first issuer to the current owner.

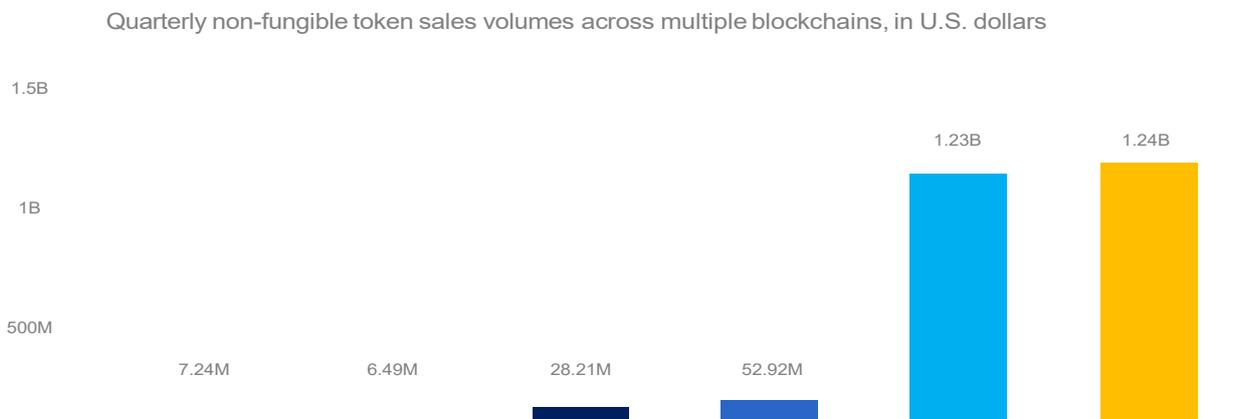
XRUN Introduction



However, for blockchain networks with large meta data size, the storage and management is done in a trusted external storage to prevent the decrease in network performance. Meanwhile, while general tokens have a risk of the asset itself disappearing when the platform storing the asset disappears or stops operation, storage in NFT has compatibility regardless of the platform in which the token was issued, meaning the value of the asset and the created market can be maintained without any dependence on a single platform. For NFT that is not issued through general standards such as ERC, there could be issues such as platform compatibility, standard transactions, additional costs, etc. Therefore, it is recommended that NFTs are issued from places that operate standard systems such as Ethereum.

Virtual Influencers

After its appearance in 2017, it experienced slow growth up until 2019 before starting explosive growth from late 2020. According to the “2021 1st quarter cryptocurrency trend report” by CoinDesk, the NFT transaction volume went from 9.3 million dollars in December 2020 to 226 million USD in March 2021 to grow 25~26 fold. The NFT transaction volume of the first quarter of 2021 already exceeded the total amount in 2020. Global exchange DappRadar reported that “NFT transaction volume in the first half of 2021” is “2.5 billion USD”.



Note: DappRadar is company which tracks on-chain NFT sales across multiple blockchains including Ethereum, Flow, Wax, and BSC. Source: DappRadar

[Image] DappRadar 2021 first half NFT transaction volume report

XRUN Introduction



While development of services, infrastructures or businesses using NFT are being developed in various areas, there are also cases of them being used in actual businesses.

Field	Name of Business	NFT related business
Sports	NBA	NBA Top Shot
	MLB	MLB Champions
	Formula 1	F1 Delta Time
Fashion	NIKE	CryptoKicks
	LVMH	Released blockchain 'AURA' to prove authenticity of luxury items
	BREITLING	Certify authentic products using Ethereum systems including NFT
Entertainment & Film	Turner Sports	Blocklete Games
	Warner Music Group	Invested in blockchain based gaming company Dapper Labs
Tech & Infra	AMD	Partnership with Robotcache BGA
	Microsoft	Azure Heroes
	IBM	NFT Support Customized Blockchain
	HTC	Exodus 1
	Samsung	NFT Support E-wallet
Video game	Ubisoft	Rabbid Tokens
	CAPCOM	Street Fighters
	ATARI	Atari Token

[Table] NFT implementation research companies and relevant business cases
 * Source) Nonfungible.com, KOTRA Silicon Valley trade building summary restructure

1-4 Collaboration of NFT and Metaverse (NFTXMetaverse)

NFT X Metaverse that combines NFT with metaverse can provide scarcity/ownership to various User Generated Contents (UGC). The metaverse user uses NFT to make their digital creations into products and sells them in exchange for value such as cryptocurrency, etc. to generate revenue, after which they can reinvest in other creative activities. Although there is an increase in interest towards the advantages of NFT, utilization in metaverse, and investment value, there are also risk factors with the vitalization of NFT use such as violation of copyright, etc.

A Metaverse Transformation strategy in response to the new world is required. The width and depth of the change brought by metaverse will be very big, with the amount of time spent in the metaverse increasing. Multilateral effort is required to discover new opportunities in the metaverse era. Individuals will be able to discover and use new opportunities in life through new jobs and startups arising from the metaverse era. Companies will have to seek innovative plans in productivity in the metaverse era and discover cooperative business models. Innovative plans for productivity must be searched using metaverse environments in each area and the innovation in the way of working using metaverse work platforms. The government must review public/ social innovative plans using metaverse and inspect risk factors in the approaching metaverse era.

1-4 Collaboration of NFT and Metaverse (NFTXMetaverse)

Various events, concerts, fan meetings, etc. such as virtual entrance ceremonies, graduation ceremonies, company MOU agreement ceremonies, etc. are hosted in the metaverse

- With all events moving virtual due to the COVID-19 pandemic, online meetings or conferences (Zoom, Webex, etc.) are changing into events using metaverse platforms
- College campuses, company conference rooms, etc. are materialized in the metaverse so that participation can be done as if they are present in the actual site

XRUN Introduction



In the virtual space of metaverse, the user creates their own avatar to communicate with other users or create and trade digital contents

- More finance, education, entertainment, and ICT areas are using metaverse where NFT can be utilized to use and purchase contents and services
- Also, entertainment companies are issuing and selling metaverse avatar, goods, music, etc. of their celebrities in NFT

The cases using NFT in the metaverse include “Decentraland”, “The Sandbox”, “Upland”, etc.

- “Decentraland”, “The Sandbox”, and “Upland” are the main blockchain-based metaverse game platforms
- (Decentraland) The ownership of land in the game virtual space can be recorded as NFT and purchase d/sold, uses Decentraland cryptocurrency “MANA”
- (The Sandbox) The users create virtual space and items in the game using NFT to acquire ownership, can be traded with The Sandbox cryptocurrency “SAND”
- (Upland) Virtual real estate market game service where virtual real estate certificates based on real addresses can be made using NFT and traded using Upland cryptocurrency “UPX”

(Key forms) Metaverse is mainly classified into augmented reality, mirror world, life logging, and virtual reality, the forms are not clearly separated but rather the border between forms are falling apart

- Augmented reality : Mixed reality created by overlapping virtual objects and interface, etc. to the physical environment the user recognizes in their daily lives

XRUN Introduction



Main Service	AR Market Opportunity
<p>Pokemon Go (Niantic)</p>	<ul style="list-style-type: none"> Residential walking VR device expected to release late 2021 Supports free movement of the user in the virtual space such as crouching, squatting, leaning back, jumping, etc. Matches the line of sight with movement to reduce ‘cognitivedissonance’ resolving one of the issues with VR equipment of motion sickness Niantic is a company that grew based on EarthViewer, previous version of Google Earth, based on expertise in spatial information, 3D modeling, and augmented reality technology. They released the first location-based augmented reality game Ingress in 2012, with Poke-mon Go developing into a key game appealing to various uses with the story of the previous version combining with cultural sensitivity
<p>Zepeto (Naver)</p>	<ul style="list-style-type: none"> Augmented reality avatar service provided by Naver after separating the augmented reality camera app SNOW into a separate corporate body. Acquired 190 million accounts worldwide until Jan 2021 since its release in 2018 Went beyond creating 3D avatars through the AI-based facial recognition technology to establishing the Zepeto world and adding communication features with celebrity avatars and social media features, thereby expanding into an integrated service of augmented reality, virtual world, and life logging

- Mirror world : “Informationally enhanced” virtual world where the physical world was recreated as realistically as possible while also adding additional information

XRUN Introduction



Main Service	Main content
<p>Google Earth (Google)</p>	<ul style="list-style-type: none"> • Previously known as the Earth Viewer service of KeyHole acquired by Google in 2004, the main mirror world service that recreates satellite images in 3D to provide actual spatial information • Creating videos, identifying spatial changes over time, collecting landscape/climate data, and VR experience possible through application services such as Earth Studio, Earth Engine, Earth VR, etc.
<p>Upland(Uplandme)</p>	<ul style="list-style-type: none"> • Virtual real estate game released by Uplandme in 2019 that allows real estate investment and trading using NFT • The linkage with the real world increased to expand the business such as putting the Trump Tower in auction on Upland on the US election day in 2020, and allowing transaction between actual currency and real estate on Upland starting October of the same year

- Life logging : Recording information such as human body, emotion, experience, and movement and recreating them in the virtual space

XRUN Introduction



Main Service	Main content
<p>Facebook360 (Facebook)</p>	<ul style="list-style-type: none"> Facebook implemented the Facebook360 service allowing posts of 360 degree images and videos in 2016, and launched the official app to use the contents through the Oculus device in 2017, a subsidiary of Facebook Facebook is pursuing systematic connections between platform-3D device-user contents such as releasing a 3D video camera in 2018 joined with a digital video camera manufacturer RED
<p>Training Club (Nike)</p>	<ul style="list-style-type: none"> Service that is an extension of the Quantified Self movement that emerged since the late 2000s, an app released by Nike in 2009 Provides individually customized fitness programs with the user sharing their individual records through social media

- Virtual world : Expanding the real economic/social/political world to establish a similar or alternate world using digital technology

XRUN Introduction



Main Service	Main content
<p>Second Life (Linden Lab)</p>	<ul style="list-style-type: none"> • Online virtual world service released by Linden Lab in 2003, an early sandbox type service before Roblox, Minecraft, etc. • Provided the initial form of metaverse business models such as establishing digital twins of government institutions, private companies, educational organizations, etc. hosting concerts/exhibitions, providing virtual jobs, implementing exchange systems with real world currency, etc.
<p>Fortnite (Epic Games)</p>	<ul style="list-style-type: none"> • Third person shooting game released by Epic Games in 2017 that grew into a noteworthy metaverse service recently • Has gone beyond just a game to grow into a comprehensive cultural/life service connecting reality and virtual such as hosting concerts in collaboration with actual musicians, releasing skins through license agreements with fashion brands (Nike, Louis Vuitton, etc.), providing work meeting spaces, etc. • Tim Sweeney, CEO of Epic Games, is a supporter of open metaverses that seeks to grow Fortnite into a cross-platform game while also spreading discussions to establish metaverse ecosystems where free movement is possible from the user's perspective
<p>STRIVR</p>	<ul style="list-style-type: none"> • Started from a research project by Stanford University in 2014 with official establishment of the company in 2015. Provides services that grafted VR technology to real life • The main example is the situation based learning/training for Walmart employees, with application cases increasing such as training for athletes, customer reception training, machinery operation training, safety training, etc.

XRUN Introduction



Key Grafted Areas

- (Education) Opportunities such as exploring identity, situational learning, expanding experience, enlarging immersion, problem solving, systematic thinking, etc. are provided to perform development tasks for each age group and effectively expanding knowledge
- With the educational effect of metaverse proved by learning branches of education, game, HCI, Interactive media, etc. the grafting in the educational field is in an expanding trend



[Holocaust museum built within Second Life] key educational case using metaverse that provides indirect experiences of the situation during the war and establishes a learning environment based on sympathy via memorials, etc.



[Developing augmented reality teaching aids using Metaverse Studio] Metaverse Studio is an augmented reality content development app by GoMeta which allows the instructor to create game-type teaching aids with location-based technology without any coding skills

(Culture/Art) While increasing the competitiveness of the industry by attracting audiences in the culture and art areas with spatial/time restrictions, also used to enhance the interaction between the audience and exhibits/performances

- Advancing from services that simply provide the exhibition/performance space on the digital platform into expansions in interactions and space/time



[ChicagoProject] The Chicago History Museum uses AR/VR technology to recreate museum exhibits such as photos, movies, auditory data, etc. in locations with that particular history to allow interactions and immersive experiences



[Fortnite Concert] Opened a concert in collaboration with DJ Marshmello in 2019 which was watched by more than 11 million users online, with rapper Travis Scott hosting a virtual tour for each continent in 2020 which was watched by 27 million users

XRUN Introduction



(Promotion/Marketing) Overcomes the limitation of one-way communication in traditional and some online media while providing opportunities for immersive advertisements and organic marketing

- Sandbox type games have low costs which increases the degree of grafting in various areas such as companies, public/public benefit, culture/art, political world, etc.



Gucci X Tennis Clash, Louis Vuitton X League Of Legends] Gucci sold Gucci design tennis clothing for avatars on Tennis Clash, while Louis Vuitton released the Louis Vuitton design skin that was demonstrated in League of Legends as an actual product



(Entertainment) Used to diversify the interaction between fans and power celebrities, the main assets of the entertainment industry

- In particular, celebrity avatars are materialized to provide specialized communication opportunities for each individual and sell products through partnerships with companies

XRUN Introduction



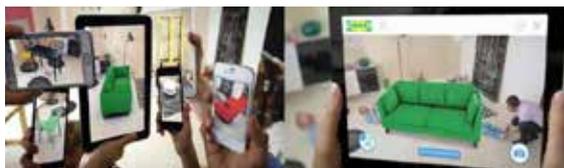
[Celebrity avatar recruited by Genies] Genies is a 3D avatar creating platform that operates a celebrity avatar agency to provide proxy social media management, event hosting, discovering sponsorship brands, and sale of digital goods, etc.



[Girl group aespa active with avatars] SM Entertainment debuted the girl group aespa with the concept where real life idols and virtual world avatars are active together in 2020, and has the storytelling where actual members and avatars go across each other's world

(Daily life) Services using augmented reality technology in various daily life areas such as cooking, healthcare, interior, navigation, beauty, etc. are gradually increasing

- While the utility is currently not high, 3D sensors such as LiDAR Scanner, etc. and enhanced AP will be applied in mobile devices along with the popularization of 5G to increase contents and usage



[Furniture arrangement app IKEA Place] IKEA released an augmented reality app in 2017 which materializes IKEA products with the same proportion in 3D so that furnitures can be placed in the surrounding space



[U+Kakao Navi augmented reality navigation] Provide Kakao Navi's augmented reality navigation service on some smartphones where 5G use is possible

XRUN Introduction



(Production/Manufacturing) XR technology is applied in enhancing efficiency and accuracy of manufacturing processes, employee training, remote maintenance, work sharing, etc. to seek innovation in production/manufacturing

- Global manufacturing/distribution/logistics companies such as GE(General Electronics), BMW, Walmart, DHL, etc. implemented XR technology at work to verify the effectiveness, leading to projections of increase in the number of application cases



[Samsung Heavy Industries' VR training system]
Samsung Heavy Industries implemented virtual reality training systems for ship painting work where acquiring practice opportunities is difficult with low practical effect, lowering time and costs in nurturing labor force with painting capabilities



[Hyundai Motor Company implemented virtual process]
with VR technology in the entire process of vehicle manufacturing from design sketch - 3D modeling - design evaluation - verification of design suitability and design structure - verification of component behavior, etc.

1-5 Relevant policies by country

(Korea) While paying attention to XR as the driving force for industrial innovation and economic growth, making a comprehensive approach from a technical, social, and cultural perspective through cooperation between relevant departments

- Technology/Society : Established 「Virtual convergence economy development strategy in 2020 to spreading use of XR in the overall economic society, expanding key infrastructure for advancement and spreading of XR, and acquiring global competitiveness for XR companies as the direction of propulsion
- Culture : MCST greatly increased the budget for growing tangible contents between 2019~2021 (26.1→97.4→135.5 billion KRW) and established a basis for content production in the culture/tourism/sports areas

(Pan-Europe) The European Union divided areas into organization/support and research/innovation to pursue initiative for Europe's XR industry growth

- Organization/Support : The European Commission established the XR4ALL platform in 2018 to perform roles of XR technical community organization, discovery of XR technology and research agenda, support of innovation projects, and support of investment/technology transfer
- Research/Innovation : Invested around 23.4 million Euros since 2019 to start XR technology development that will be applied in areas such as education, care, health, construction, Industry 4.0, etc.

(England) While growing XR technology and contents industrially/culturally, pursuing balance to protect users from potential threats of the service

- Industrial growth : InnovateUK researched/analyzed industrial status of XR technology since 2018 while also spreading relevant content development through Creativity Cluster
- Protective measures : Digital/Culture/Media/Sports department announced the government stance and future plans on age restrictions, probability items, false information, regulations, etc. in the report on immersive/addictive technology in 2019

XRUN Introduction



(United States) Pursued XR technology policies since the 1990s based on the NITRD (Networking and Information Research and Development) program consisting of government departments such as DoC, DoD, HHS, DHS, etc. and independent organizations

- With original technology development support stage in the 1990s and the VR technology proliferation stage between the 2000s~mid 2010s, currently focusing on AR system and AI fusion to seek innovation in Science/Engineering/Education areas

1-6 Social/technical issues pending

(Open metaverse) Rise in the need to establish user-focused open metaverse ecosystems where free movement of virtual currencies, avatars, objects, platforms, etc. is possible

- The British company Crucible has human-focused technology development and user sovereignty as the business philosophy to develop Emergence SDK where open metaverse can be established while also operating 「Blueprints for the Open Metaverse, consortium for establishment of open metaverse

(Law/System/Standard) Discussions required to identify whether laws/systems/social standards in the real world can be equally applied in the metaverse, thus establishment of metaverse governance which leads such discussions and decisions is required

- Issues present include ownership of contents distributed within the metaverse, illegal acts through avatars, providing personal rights to NPCs (Non-Player Characters), advertisement/fraud, etc.

(Data ethics) With range of sensitive information collection such as vision, brainwaves, vital signs, etc. expanding and confirmation of personal information that allows exercise of control rights becoming difficult, the legal/ethical issues regarding personal information collection/use and protection are arising

XRUN Introduction



- In the survey targeting key companies of immersive technology, the most concerning legal threat during development of relevant technology and contents is identified as user protection and data security

(Receptivity/Diversity) With XR technology going beyond purposes of recreation/leisure to plans of utilization in public services, the need to acquire receptivity based on the diversity of users and implementation of inclusive services is suggested

- Stanley Pierre-Louis, CEO of the Entertainment Software Association emphasized the importance of acquiring diversity in manpower within the industry and creating inclusive leadership and company cultures to attract users without discrimination

(Metaverse labor) With new forms of labor being created such as production/sale of items in the metaverse, management of virtual world regulations, investment/trading of virtual real estate, etc., current labor issues such as guarantee of work rights and taxation duties are created

- The community leaders that performed monitoring activities in chatrooms of AOL(American Online) in the 1990s filed a lawsuit to receive compensation for their activities, with AOL agreeing to pay a total of 15 million dollars in 2010. Arguments on the concept and value of digital labor are continuing in the present

1-7 What is XRUN?

XRUN is a blockchain wallet using XR(Extended Reality)+RUN that can mine various cryptocurrencies. XCA(XRUN Consensus Algorithm) is XRUN's applied consensus algorithm where PoD(Proof of Discovery) allows mining and Staking through the XRUN dApp with compensations provided via XRUN on a daily basis.

Based on GPS, XRUN employs a ERC-1155 protocol to add fungible ERC-20 and NFT token ERC-721 into on the smart contract for transactions and resolved the issues of real estate development investment in a revolutionary method through a real estate development algorithm. With the process of real estate development applied, the calculation of XRUN NFT value with public confidence calculates the value for each degree in the 1st~Nth sessions of NFT share sale to create value for XRUN NFT.

By providing the user with clear value for each degree, the user is able to make accurate profit calculations while the exit strategy using XRUN cryptocurrency in each degree improved the loophole in existing real estate development.

Also, you can gain tokens by catching augmented advertisements using XRUN AR camera and performing missions by the advertiser. The possessed tokens can be used to purchase digital contents, real estate, paintings, jewel cultural assets, etc. through the XRUN NFT exchange and create more valuable profits.

The XRUN team can link to external metaverse contents with Metaverse Platform applied to establish expand ability of contents. XMP (XRUN Metaverse Platform) allows users that have acquired citizenship to gain identities and positions, while users without citizenships can enter with traveler status.

XRUN Introduction



XRUN cryptocurrency is used as key currency in XMP, and even without purchasing XRUN cryptocurrency they can be gained by mining of the XRUN Wallet.

XMP has politicians, public workers, business owners, builders, workers, mafias, and travelers, with the balancing done based on the identities and positions of the characters.

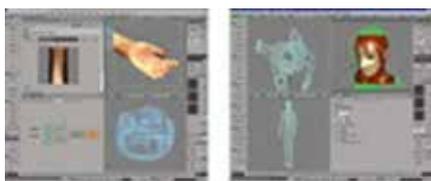
You can work and run businesses to gain monetary profits via the business profits and labor compensations. With the link between the virtual and real worlds, the shopped products are delivered in real life. In the fascinating XRUN Metaverse Platform, experience a new Metaverse for adults where virtual success can be made into real life success.

2-1 Core Technologies of XR Contents

Augmented Reality (AR) is a technology applied to mobile augmented reality, and core technologies can be divided into 3D modeling, display device, camera calibration, tracking, and matching technology.

3D Modeling: It is a technology for creating virtual models of digital contents. The creation of 3D modeling is performed by using tools such as SoftImage, Maya and others. Generally, this is a popular method for creating 3D models. To reconstruct 3D images from images, 3 images are basically taken and 3D coordinate values are calculated from the 3D images. This method has the disadvantage that clear images can not be obtained due to errors of the respective image coordinate values

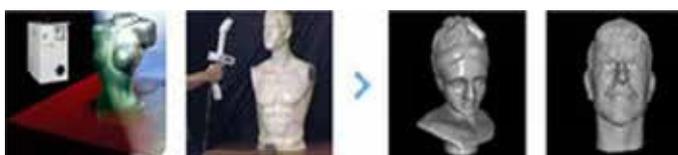
Finally, there is a method of using Range Finder. This method is a method of creating an object into 3D by receiving the data that is received by the laser. This method is widely used because there is no mechanical error, but the disadvantage is that the equipment is expensive.



3D Model design tools (softimage, Maya)



3D Reconsttruction from images



Ranger Finder (Laser scanner)

[Figure 3] 3D Model

XRUN Technical Specifications



[Figure 4] Acquiring Cryptocurrencies via Location Marketing

Display device is a device that represents an augmented reality. Generally, the HMD(Head Mounted Display) is a device that displays virtual objects on the face. In this white paper, XR contents produced with low polygon for dApp and quick response is registered and augmented through CMS (Content Management System) of XRUN AD-Platform. By using "location marketing" (or "proximity marketing"), the advertising buyer can see the location value and the content, which is the object of the target, in various geographical target locations and acquire the cryptocurrencies after the mission.

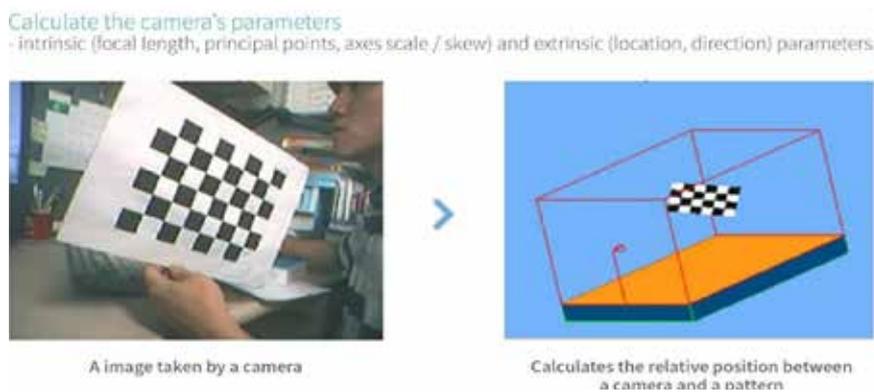


[Figure 5] Camera Calibration

XRUN Technical Specifications



Camera calibration is one of the key technologies that can be used to position a virtual object in the correct position by calculating the focus of the actual camera. If the camera is out of focus, the 3D coordinate values may be erroneous, so the virtual objects may not be found by the buyers and so they must be accurate. To calculate this method, use the camera calibration by using patterns. Use a lot of methods to make the camera calibration using a vanishing point using a line in a pattern. This method is easy to calculate and does not cause a large error, so it is widely used for the augmented reality camera calibration method.



[Figure 6] camera's parameters

Tracking is a technology that can enable tracking the location, direction, and movement of an advertising buyer. Tracking technology is possible because it is equipped with a GPS device capable of transmitting and receiving geographical and location information, a gravity sensor, a location information system and a mobile device capable of receiving detailed information and applying it to the realistic background. One can insert virtual models into the real world using mobile devices. The virtual model of digital contents can be traced through the mobile app to track advertisements hidden by the advertising buyer, which can increase immersion. XRUN's content provides coins based on difficulty, and advertising merchants provide high advertising efficiency based on the immersion of the advertisements.

The matching technology minimizes the heterogeneity between the real world and the virtual to increase the immersion level. It detects the change of the real world environment, generates the mixed image with minimizing the boundary mismatch between the real object and the virtual object, synthesizing a virtual image on the actual image.

XRUN Technical Specifications



It is also a technology implemented along with tracking technology, which is one of the core technologies of XRUN contents that combines high immersion and fun elements for finding virtual objects with tracking and navigation of advertisements.



Augmented reality requires intuitive interaction and the ability to intelligently track the head, hands, and eyes of an advertising buyer over the content of an XR to provide a sense of immersion. As for the head, responsive and accurate * 6-DOF head tracking technology can meet world-class VR motion to photon(MTP) delay conditions. In most XR environments, such as hands, games, motion, etc., the best control is to control movement with human hands without control, and track / navigate hands in the AR mode.

XRUN Technical Specifications



For the users of room-scale 6-Degrees of Freedom, simultaneous location awareness, and mapping(SLAM), additional features such as wall collision detection are provided. Finally, in the case of the eyes, eye movement tracking technology for automatic calculation of inter-pupillary distance(IPD) and more efficient 3D graphics and video rendering for the improved visual quality(Foveated rendering) are provided. To ensure a new user interface that creates a more natural intent-based interaction, such as the ability to reduce the throughput of graphics by processing high-resolution portions and low-resolution portions of the background, delivering enjoy connected and realistic high-quality service, a fast Internet environment like 5G has to be integrated. Metaverse using XR or extended reality world is a new word that has combined 'meta' meaning virtual, transcendence together with 'universe' meaning world, space. The first form, augmented reality, augments and provides the external environmental information of the real world. Second, life logging world is materialized based on the real lifestyle information of individuals/entities. Third, mirror world refers to a virtual space that has imitated reality based on external environmental information. Fourth, virtual world is a virtual space established similar to the economic/social environment in reality where activity of various activities by individuals/entities are possible such as education, shopping, work, etc.

2-2 Metaverse on XRUN

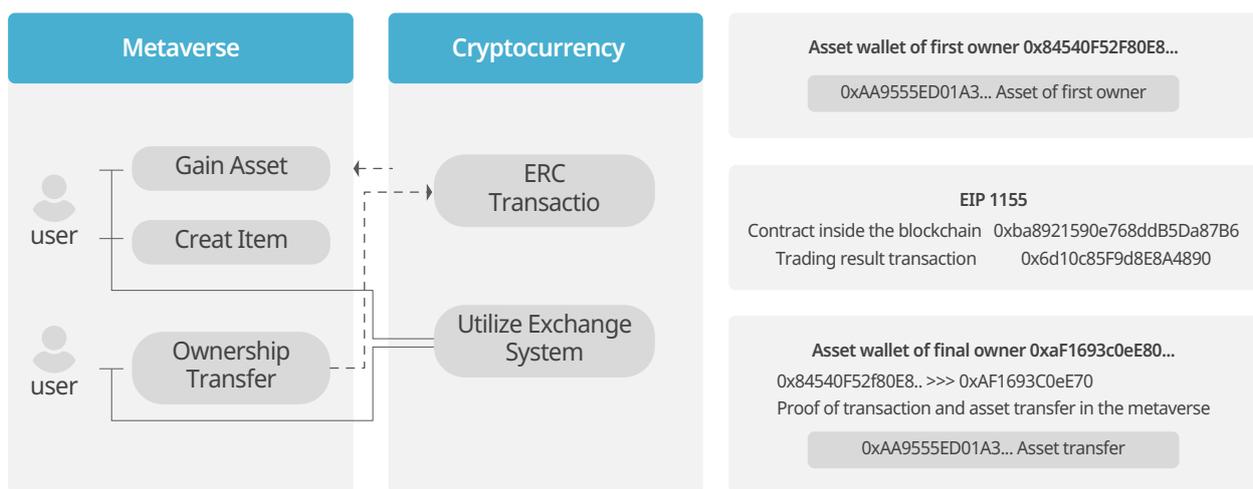
XRUN materializes the metaverse world that combined augmented reality with mirror and virtual worlds. Meetings and entertainment that are impossible in real life can be materialized in the metaverse, and famous gaming companies are mainly challenging this market. The metaverse XRUN wants to create is a world not just for entertainment but rather one where direct interaction and real life reflection are possible. Immersive metaverse is used with VR equipment in materializing a second reality. Blockchain plays an important role in games where life logging is realized. With real and metaverse currencies regarded the same, NFT that can record this in blockchain to prove its actual value at all times and locations along with ERC-20 based XRUN token that can determine their price become the basics of the service.

XRUN Technical Specifications



It is not just a materialization of a genre called metaverse, but it rather becomes a reality where blockchain based economy is used to create and exchange actual values. The smart contract included in the ERC-20(Ethereum Request for Comments) standard can be used to trade assets or items created in the metaverse. The linearizability that some of these items have start their life cycle from the point they are created in the metaverse via NFT.

The moment where the first owner of a unique item gains the asset in the metaverse, they gain owner Of (uint256_tokenid) in the EIP721 standard with real-time registration in the blockchain. If the items created or gained in the metaverse are not unique, mint in the EIP20 standard is used to be provided as normal tokens that can be traded in the item's contract. Thus, items that are provided in the metaverse are classified into NFT and ERC20 based on their uniqueness. An interesting point here is that the currency distributed through ERC 20 transactions can be used in purchasing or selling NFTs. Using closed currency was the basic transaction method, but the system where ERC 20 based coin is used to purchase items with uniqueness makes it easy for the user to utilize items and enhance convenience.



[Image 7] Metaverse and cryp tocurrency structure

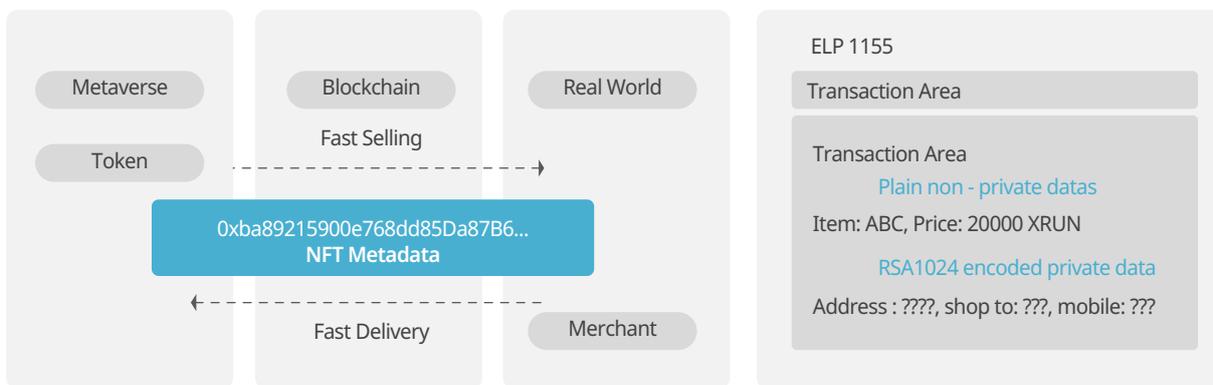
Transactions are the same as trading of NFTs and can be expanded outside the metaverse based on the accessibility that blockchain has. The user can use or deliver the token at all times if they have devices or applications that can access the network.

XRUN Technical Specifications



Although the metaverse is considered separate from the reality, they can also be used to purchase items in real life. Through the service with a national distribution network, the products or services purchased in the metaverse can be provided quickly in a very short time, for instance within an hour. This means that metaverse and real life are materialized into one, so a structure where the currency of the metaverse is connected to actual currency is set and created, unlike existing shopping malls.

If trading is started using ERC20 token, the seller checks the order in the blockchain with NFT created, with the created meta data delivering both address and product information. XRUN delivers the product through the shipping point immediately after such order is created, and can announce the start of EIP20 contract fulfillment in this process. EIP20 contract is completed as soon as the seller’s product is delivered, with the NFT and ERC20 token delivered to the seller’s account so that they can receive corresponding value.



[Image 8] Link between metaverse and real world

[Image 9] NFT transaction security

NFT transaction occurs in the Ethereum-based main net owned by XRUN. While this is open to the public, EIP’s metadata is encoded so that personal information, particularly address or contacts, is not revealed to the public with decoding possible using open key based algorithm such as RSA1024. Such encoding method can be separately designated for each metaverse, and is done within an Ethereum network with network ID starting with “0x2476” and chain ID of 2476. This network is separately operated from the existing Ethereum network, and can have more than 6 units of server and verification system.

XRUN Technical Specifications



With powerful encoding, the details are not known except to the actual issuing entity, but the information will be clearly available if necessary. The NFT transaction is accumulated in the meta data and can perfectly specify the initial creator to increase reliability of the transaction.

XRUN Metaverse Platform uses various digital humans to create avatars. Digital human refers to 3D virtual humans with similar appearance and action as humans, with hyper-realistic forms materialized using high-level Computer Graphics to a point where it is difficult to distinguish from actual human faces. Voice recognition, natural language process, voice synthesis, etc. using AI technology is used to aim towards a level where response and conversation like actual humans is possible. The virtual characters are advanced to faces, expressions, and actions similar to actual humans for effective communication. Language only accounts for 7% of the communication between humans, and the remaining 93% includes voice(38%), and other non-language parts(55%) such as gestures, facial expressions, postures, etc. Since non-language information including emotional responses such as smiles, frowns, etc. are delivered to connect emotions and form sympathy with the other person, thus digital humans having similar faces and expressions will act as service access points that people can interact with more comfortably.



[Image] Digital Human production tool example

* Source : Unreal engine, Metahuman Creator introductory video capture

Unreal engine released Metahuman Creator can decrease the digital human production time, which took months in the past, into less than 1 hour, allowing development of digital humans.

XRUN Technical Specifications



It is an integrated development tool collection combined within Unreal Engine that runs all features provided by Unreal Engine in UnrealEditor to perform tasks within the editor. UnrealEditor has all tools such as animation tools, character tools, map tools, texture tools, script tools, etc. working in connection.

With perfect matching to all features of the Unreal Engine, since it was created along with UnrealScript- blueprint based on the core of Unreal Engine, the editor features can easily be expanded and modified based on changes when specific features are added or modified on the engine.

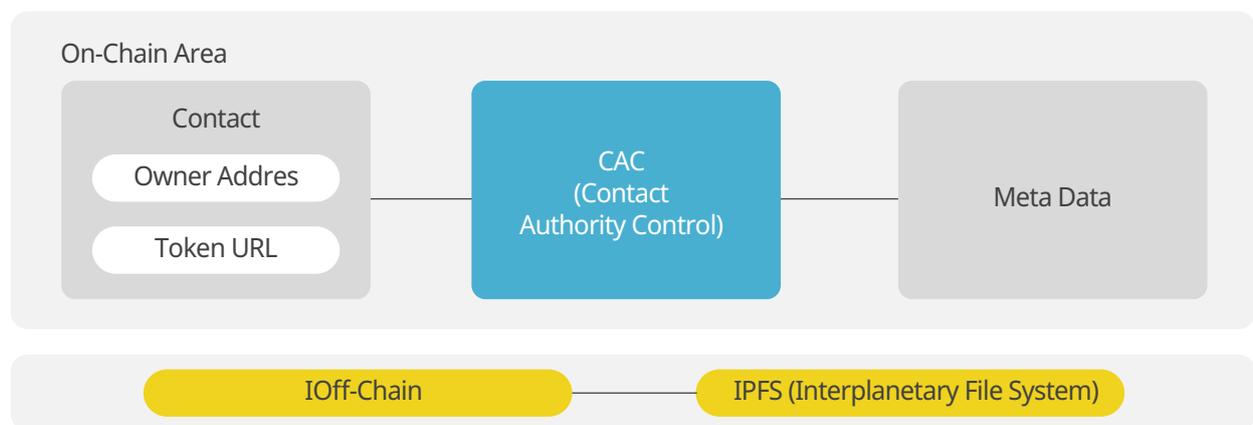
In the most recent version of UnrealEditor provided in Unreal Engine 3, visual script tool, powerful cut scene creating tool, visual material shader editor, powerful particle editor, visual sound editor, etc. were added, with new tools and improvements in existing features continue to be added in updated versions.

XRUN Technical Specifications



2-3 XRUN NFTs

(Open metaverse) Rise in the need to establish user-focused open metaverse ecosystems where free movement of virtual currencies, avatars, objects, platforms, etc. is possible



Type	Key factor	Description
On-Chain Area	ERC-721	<ul style="list-style-type: none"> ERC-721 based token Owner information Contents key information TAG (various content information TAG such as image, music, game, etc.)
	ERC-721 Contract	<ul style="list-style-type: none"> Gain address information of owner Gain URL information for connection with metadata
	Metadata	<ul style="list-style-type: none"> Detailed TAG on token's contents Limits in capacity to save actual data inside the blockchain
	CAC (Contract Authority Control)	<ul style="list-style-type: none"> Transaction closing and starting can be controlled for NFT's equity transaction, with value calculation standard used to control the variability of NFT value.
Off-Chain Area	Off-Chain	<ul style="list-style-type: none"> Technology to save token's actual data externally
	IPFS	<ul style="list-style-type: none"> File system to save data in the dispersive environment

XRUN Technical Specifications

Lorem ipsum



[Image] XRUN NFTs

XRUN NFTs is the standard interface using ERC (Ethereum Request for Comments)-721 that is issued and traded in the XRUN blockchain network. While there are various ways to make NFT, we will explain based on creating through the XRUN NFTs exchange.

To create NFT, we need real estate/works, etc., and XRUN coin's XRUN Wallet. Minting fees occur in XRUN NFTs and the registered NFTs can be uploaded by paying the fee in XRUN. XRUN NFTs determine value in connection with appraisal/assessment institutions and accounting firms of public trust, and the value changes by each degree.

$$\text{XRUN NFTs Valuation} = \text{Appraisal/Assessment} + \text{Accounting firm (DCF)} / 2$$

2-4 Security and Authentication Methodology

The most uncomfortable and disturbing factors participants feel in the cryptocurrency market are security and authentication. There is a need for a solution that is convenient and has a strong security and authentication solution to solve the problem of authentication market, electronic finance, and security area. XRUN has developed XR UN's security authentication method with years of experience and research to find a methodology to secure and solve these problems.

XRUN's security authentication method logs in through the user's credit card to simplify the membership process. The authentication process uses the IC card to match the PIN number, mobile phone number, and server information to expose the resident registration number, ID, and password.

Instead of using a large number of IDs and passwords, one can use real cards(check and credit cards) and a higher level of security than OTPs, thereby eliminating the need for OTPs. Because of the physical security that can not be followed by software alone, XRUN has a SOTP (Save One Time Password) source technology. In addition, it improves the recognition that it is inconvenient when the security is strengthened, and it reduces the steps of log in, withdrawal, transfer, etc., and has the one and the only SSO (Single Sign On) technology in the world and secures usability, reliability and safety of XRUN AD-Platform. XRUN's security authentication technology is based on a patent (Registered Patent No. 10—0982253), and this security patent is based on the "Online Information Input and Financial Transaction System and the Online Information Input and Financial Transaction Method Using It, and Recording Medium for Recording the Program for It".

It was registered as the technical standard of Korea Information & Communication Technology Association in 2014. We developed a password wallet with XRUN security and authentication technology. Hot Wallet is an online connected wallet for the primary storage and trading of cryptocurrency mined by the PoD method. Cold Wallet is a wallet that disconnects from online to safely move and secure secured cryptocurrencies.

The cold wallet's authentication and authorization is a security related technology that uses NFC(Near Field Communication) of smartphone by utilizing IC card(credit card and check card, etc.), which is also used as an optimized wallet for security of token.

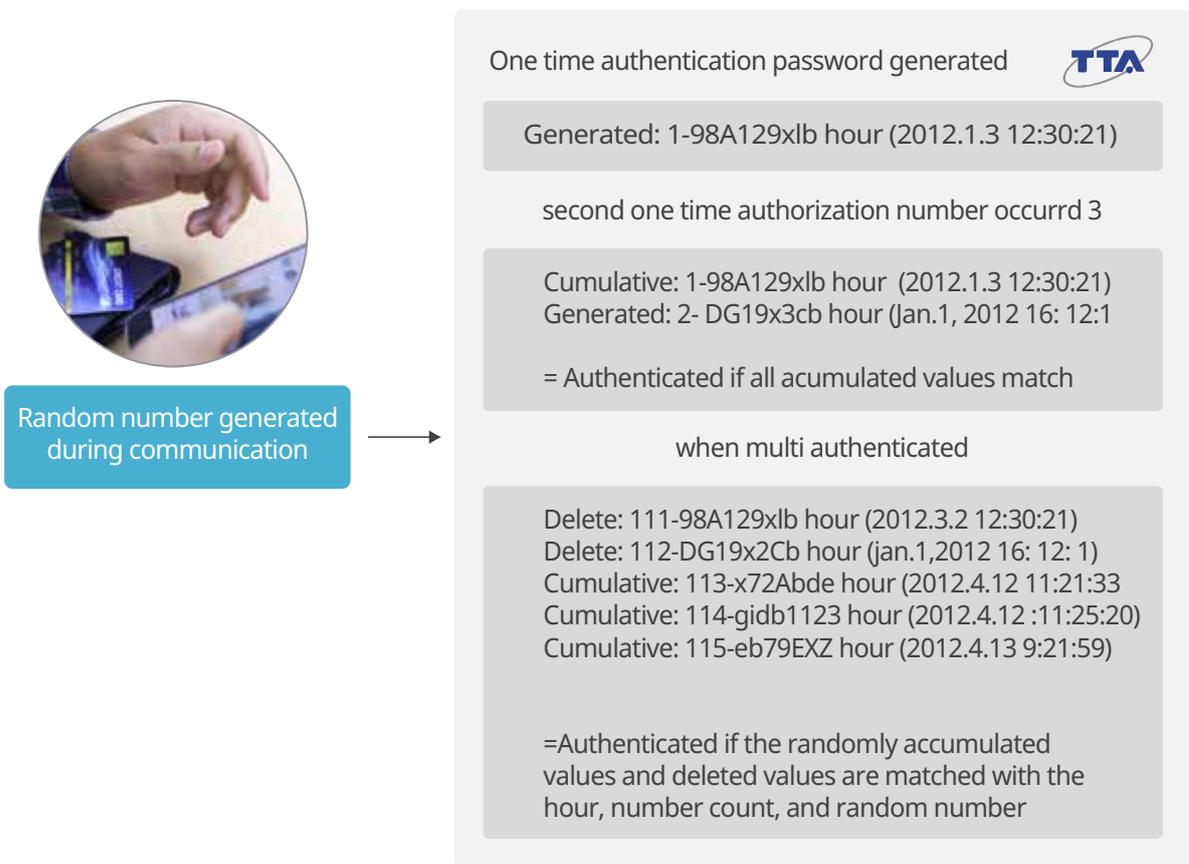
XRUN Technical Specifications



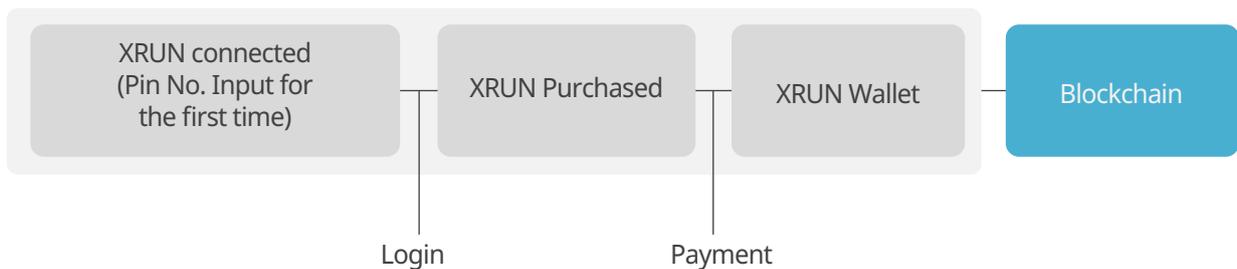
It is a high level SOTP (Save One Time Password) security that replaces membership, resident registration number, authorized certificate, login, OTP, electronic transaction, real name verification, personal authentication and the Internet ID. The Serverside stored cryptocurrencies are also a VPC (Virtual Private Cloud) methodology with bank level security, which creates a separate cloud cryptocurrencies' storage space to prevent access from the outside Internet. A security policy that puts only a part of the hot wallet 's private key (encrypted virtual key that identifies a person for bit coin transaction) in a separate storage system, Virtual Private Cloud (VPC), applying the blockchain multi-signature technology to build strong security with a third party authentication system.

Personal authentication

Login, Payment, Exchange, Transaction

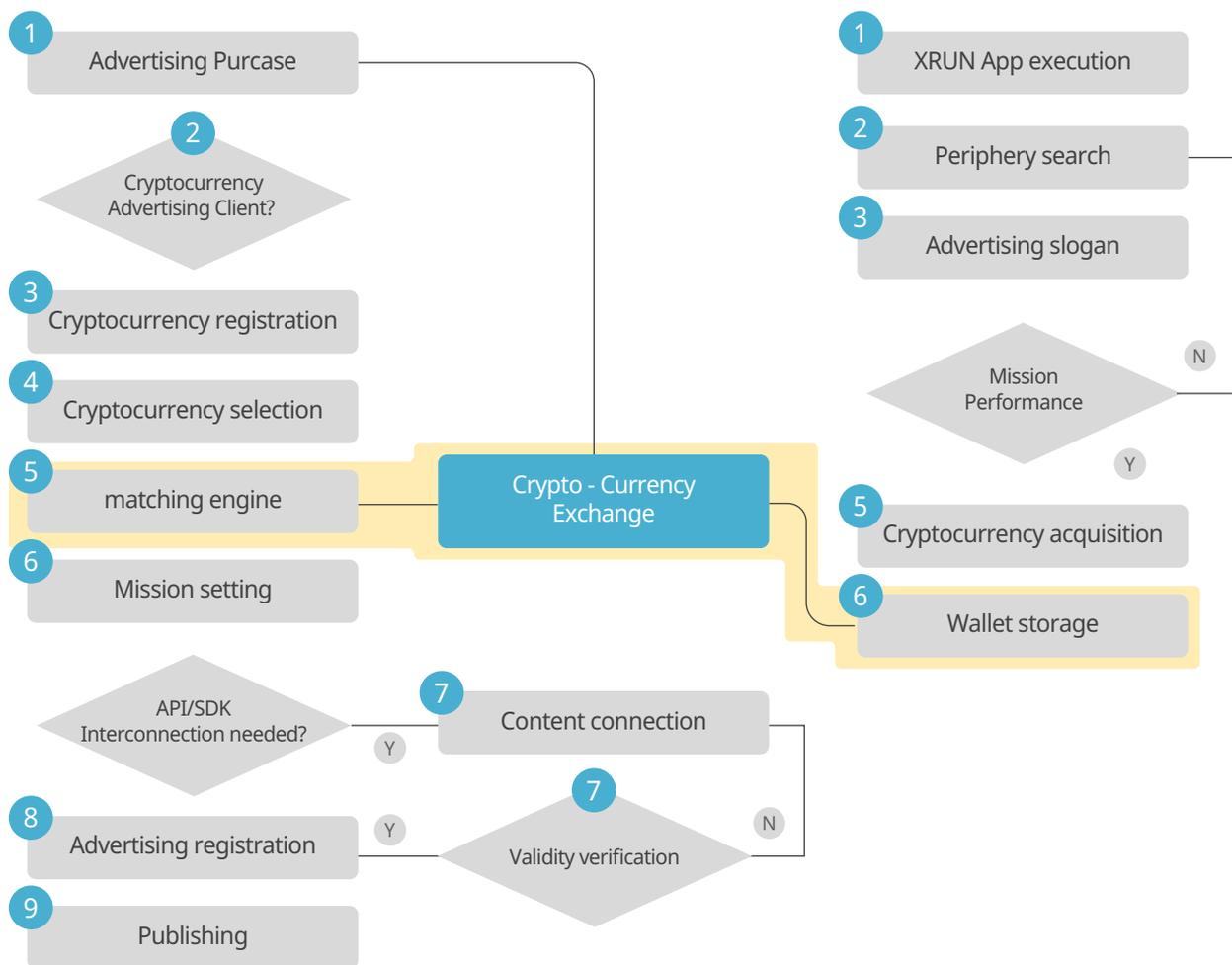


[Figure 8] Standard Certification for PROCESS FLOW SOTP TTA



2-5 XRUN AD-Platform Service Algorithm

The technical contents for XRUN are as follows. The XR's core content technologies include 3D modeling technology to create virtual models, camera calibration technology to match real world and virtual models, tracking / matching technology to explore and track real world and virtual models after camera calibration.



[Figure 9] Service Algorithm

XRUN Technical Specifications



Smartphones have a GPS device that calculates 3D coordinates, augmented reality dApp and for quick response. Low Polygon made XR content is registered and augmented through the XRUN AD-Platform Content Management System(CMS).

Through the XR content, the advertising buyer and the advertising merchant are mined the token according to the following service algorithm flow chart. XRUN has developed a high level of immersion, fun factor introduction, high reward system, fair advertisement, and a reliable advertisement ecosystem for the best success case in the cryptocurrency advertising market that combines XR and launched the XRUN Blockchain AD-Platform service to meet the needs of the new business of the fourth industrial revolution. Now is the time to invest in technology and new services in the XR field.

Personal authentication

- A general advertiser buys XRUN cryptocurrencies from the cryptocurrency exchange within the XRUN platform
- Cryptocurrency advertising clients set the number of air drops to the ratio of XRUN
- Cryptocurrency advertising clients move to the password currency registration step and the general advertising clients move to the cryptocurrency currency selection step
- Steps for registering cryptocurrencies
- The tokens that have received the air drop token from the advertising clients acquire and select 20% of the advertising revenue
- The stage where the number of selected tokens matching the ratio of XRUN is determined (only 50% of the total revenue is air dropped).
- Steps to set up a mission (creating wallet: securing users, survey, voting, question, video, and advertising exposure)
- If API and SDK connection is required, it is validated after establishing connection with external contents. If connection is not required, go to advertising registration step.
- Step for registering advertisement The corresponding advertisement will be exposed in line with the setting of the advertisement.

Advertising buyer

- Step for executing the XRUN App
- Step for executing a peripheral search to retrieve the surrounding air drop password information and retrieving the location
- After searching around, move to the place where the password is located and activate the XR Engine's camera of XRUN dApp at the advertisement point
- Step for performing the mission
- Step for acquiring the password and storing the password in the wallet after completing the mission
- Step for moving and storing cryptocurrencies acquired by Cold Wallet for optimal security
- Step for moving to the exchange for exchange with different cryptocurrencies and storing in the wallet the exchanged cryptocurrencies after adjusting the number according to the ratio of XRUN cryptocurrencies in the Matching Engine

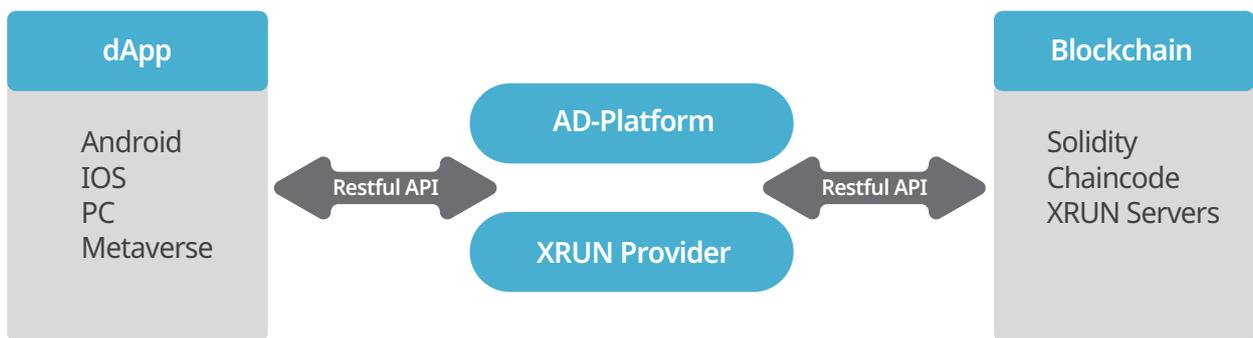
Blockchain and Decentralized Application(dApp)

The XRUN advertising platform is built with a decentralized dApp and uses the blockchain technology to demonstrate fairness and reliability. Through the blockchain, transparent auditing and reporting are enabled. Blockchain P2P network is a node and the blockchain P2P network is consisted of a number of nodes, which are electronic devices belonging to people participating in the network. These are personal computers, tablets, smartphones, etc. connected to the network. Each node connects to the blockchain P2P network, downloads the block chain, shares all transactions, verifies and stores them. It is also its role for the node to perform to identify and approve new blocks, finalize the block, then proceed to mining it as a reward.

It uses Distributed Ledger Technology and all nodes participating in the network share information. In addition, through the agreement algorithm, multiple nodes have verified the transaction according to the principle of majority vote. That is, every time a transaction occurs, a block is issued and distributed to all participants. The XRUN advertising platform dApp is a de-centralization application with a blockchain, enabling reliable and accurate reporting strategies.

2-6 Relationship of Relay Server and Participant-Blockchain

The XRUN AD Platform is built with Node.js (Severside Language), and Node.js is used as a relay server between dApp and P2P network with blockchain and improves the processing speed of the network section. In addition, various platforms (Android, iOS, etc.) communicate with the relay server(Node.js server) via dApp by communicating RESTFUL API.



[Figure 10] Blockchain System Architecture

2-7 Blockchain-Based Identity Verification and Information Management System Using Facial Key Points and Unique Data

The blockchain and NFT-based authentication system utilizes facial images captured through smartphone cameras for identity verification, securely storing and managing related data on the blockchain. This system leverages the unique characteristics of facial key points to generate asymmetric encryption data, which encrypts personal and facial information. Additionally, it enables the transformation of this data into NFTs (Non-Fungible Tokens), allowing for secure management as digital assets, with potential applications in detecting deepfakes and fraudulent videos.

Traditional identity verification methods rely on passwords, biometric data (fingerprints, iris scans), and two-factor authentication. However, these methods remain vulnerable to data breaches and manipulation. This invention introduces a more secure multi-factor authentication method, combining facial key points with phone numbers, UDID, email, and SMS verification, and provides a system capable of detecting manipulated content like deepfakes.

System Components

- **Facial Key Point Extraction Module**

This module extracts key points from a facial image captured by a smartphone camera, generating coordinate data that uniquely transforms the face into a distinctive dataset.

- **Unique Value Matching Module**

Facial key points are matched with a user's unique information—such as phone number, UDID, device information, and email—to generate asymmetric encryption data. This data is used to securely encrypt the user's facial information. coordinate data that uniquely transforms the face into a distinctive dataset.

2-7 Blockchain-Based Identity Verification and Information Management System Using Facial Key Points and Unique Data

The blockchain and NFT-based authentication system utilizes facial images captured through smartphone cameras for identity verification, securely storing and managing related data on the blockchain. This system leverages the unique characteristics of facial key points to generate asymmetric encryption data, which encrypts personal and facial information. Additionally, it enables the transformation of this data into NFTs (Non-Fungible Tokens), allowing for secure management as digital assets, with potential applications in detecting deepfakes and fraudulent videos.

Traditional identity verification methods rely on passwords, biometric data (fingerprints, iris scans), and two-factor authentication. However, these methods remain vulnerable to data breaches and manipulation. This invention introduces a more secure multi-factor authentication method, combining facial key points with phone numbers, UDID, email, and SMS verification, and provides a system capable of detecting manipulated content like deepfakes.

System Components

- **Facial Key Point Extraction Module**

This module extracts key points from a facial image captured by a smartphone camera, generating coordinate data that uniquely transforms the face into a distinctive dataset.

- **Unique Value Matching Module**

Facial key points are matched with a user's unique information—such as phone number, UDID, device information, and email—to generate asymmetric encryption data. This data is used to securely encrypt the user's facial information. coordinate data that uniquely transforms the face into a distinctive dataset.

- **Blockchain-Based Data Encryption and Storage Module**

This module encrypts the facial data using asymmetric encryption derived from the facial key points and unique values, securely storing it on the blockchain. Metadata such as video, character data, or URLs associated with the facial data are encrypted with a public key and stored on the blockchain. coordinate data that uniquely transforms the face into a distinctive dataset.

- **Identity Verification and Decryption Module**

Users must undergo a multi-factor authentication process (such as OTP or phone number verification) to decrypt their facial data. This module matches the facial key points with the user's unique identifiers to decrypt and provide access to their data stored on the blockchain.

- **NFT Generation**

A unique NFT is generated based on the user's facial recognition data, representing their digital identity. The NFT is securely recorded on the blockchain and managed as a digital asset, ensuring immutability and tamper-proof security via decentralized ledger technology (DLT).

- **Deepfake and Fraudulent Video Detection Module**

This module employs facial data managed by smart contracts to identify deepfakes or fraudulent videos. It analyzes facial key points in real-time, comparing them with data stored on the blockchain and IPFS, ensuring the authenticity of the content.

XRUN Technical Specifications



- **API Integration Module**

This module enables seamless integration with various online services and platforms to authenticate facial recognition data, verifying content through blockchain-stored facial data. In live streaming or video uploads, only verified data is recognized as authentic, preventing the use of manipulated images.

System Components

- The user's facial image is captured by a smartphone camera, and key points are extracted.
- These facial key points are matched with unique user information (e.g., phone number, UDID) to generate asymmetric encryption data.
- The encrypted facial data is stored on the blockchain.
- The user can decrypt their data via multi-factor authentication, accessing the stored information.
- The facial data can be issued as an NFT and managed as a digital asset.
- Deepfake detection occurs through comparison of facial key points with data stored on the blockchain, verified by smart contracts.
- The system integrates with various services via APIs, ensuring that only authenticated facial data is recognized as genuine.

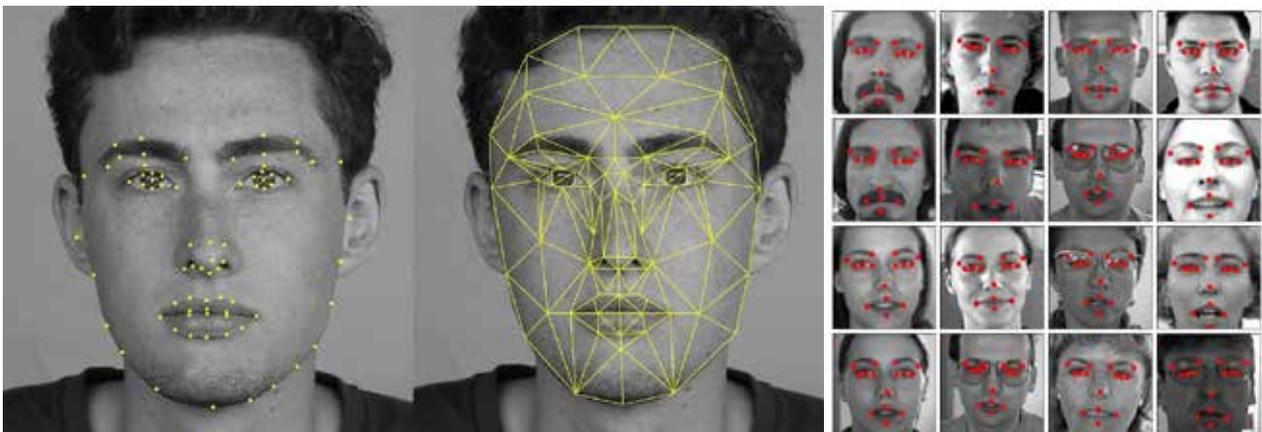
Key Features and Benefits

- Provides a secure identity verification system using facial key points and unique user data.
- Encrypts and stores facial data on the blockchain and IPFS, ensuring secure management.
- Enables the conversion of facial data into NFTs, creating verifiable digital assets.
- Utilizes smart contracts to detect and prevent deepfake and fraudulent videos.
- Facilitates seamless integration with various online platforms for authentication and content verification.

XRUN Technical Specifications



This technology securely stores data on the blockchain by combining facial key points with unique user information, enabling advanced identity verification and NFT creation. It is particularly effective for detecting manipulated content like deepfakes and provides a high level of security for identity verification processes.



[Image] Facial key detection

2-8 XFACE: Applying 2D Facial Images to 3D Character Creation

XFACE is a sophisticated technology that generates high-quality 3D facial models from single or multi-angle 2D images. This process automatically extracts key facial landmarks—such as the eyes, nose, mouth, and facial contours—from the 2D images and uses them to construct precise 3D meshes. The resulting 3D models reflect the intricate spatial structure of the face, ensuring natural and lifelike expressions from various angles, and enabling real-time use across diverse applications.

Facial Landmark Extraction and 3D Mesh Generation

The automated feature extraction function detects essential facial elements, including the eyes, nose, mouth, chin, and ears. These extracted data points not only contribute to the creation of 3D meshes but also allow for dynamic animations, ensuring that facial movements are accurately represented in real-time.

Real-Time 3D Modeling and Animation

XFACE leverages deep learning algorithms to meticulously detect facial landmarks in 2D images, which are then transformed into high-precision 3D meshes. The technology is designed to handle various challenges, such as lighting changes, facial angles, and expression variations, delivering robust and accurate results.

Motion Capture and Texturing

By integrating with real-time motion capture systems, XFACE tracks facial movements and applies them directly to 3D avatar animations. The technology also includes high-resolution texturing and rendering capabilities, enabling detailed skin textures, wrinkles, pores, and hair to be applied to the 3D models, greatly enhancing realism.

High-Quality Rigging and Animation

The rigging process defines the skeletal and muscular structures of the face, allowing for more natural facial muscle movements. The automated rigging system provides the foundation for real-time animation, enabling the creation of diverse facial expressions with precision.

Core System Components

- **Face Detection and Landmark Extraction:** Detects facial features from 2D images, extracting key points such as eyes, nose, and mouth. These landmarks determine the structure of the 3D mesh.
- **3D Mesh Generation:** Builds the 3D mesh based on the extracted facial landmarks, representing the contours, volume, and depth of the face in a three-dimensional space.
- **Texture Mapping:** Applies textures—such as skin, wrinkles, eyes, and lips—to the 3D mesh, completing the realistic representation of the face. Custom textures tailored to the user enhance the avatar's realism.
- **Rigging and Animation:** Configures a virtual skeletal framework for the 3D mesh, allowing for natural facial movements and expressions. This also enables real-time animation of the model.
- **Real-time Motion Capture Integration:** Tracks the user's facial movements in real-time, reflecting these motions in the 3D avatar. This integration can be achieved via smartphones or specialized motion capture equipment.

Data Processing and Blockchain Integration

When a 2D facial image is input, an AI-driven algorithm automatically extracts key facial landmarks and generates a 3D mesh. This mesh is then textured and rigged, resulting in a fully functional 3D character. Real-time motion capture data can also be incorporated to reflect the user's facial movements on the avatar.

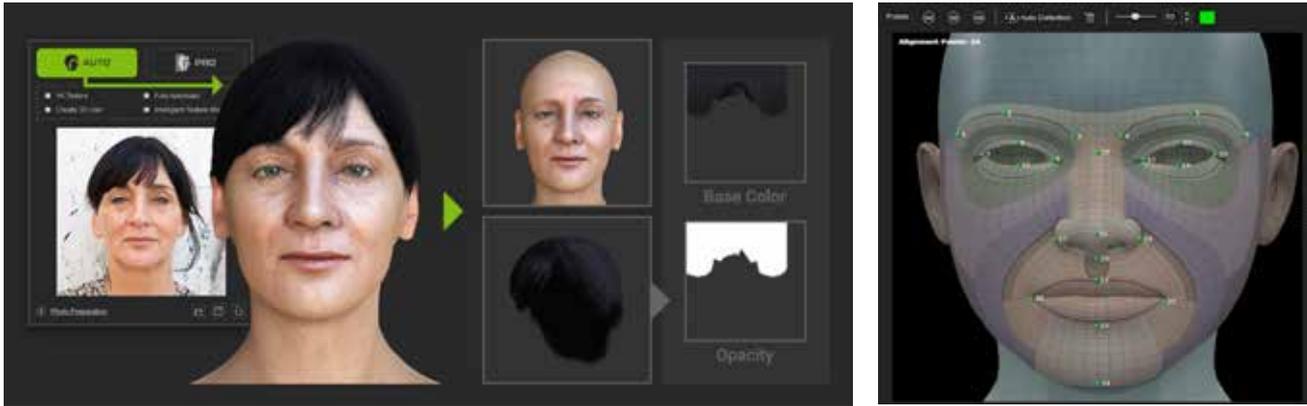
In the system, users scan their faces using a smartphone camera, and AI extracts the unique facial feature coordinates. These biometric data points are encrypted and securely stored on the blockchain. Given that the extracted facial coordinates are sensitive biometric information, blockchain ensures the integrity and immutability of this data, protecting it from tampering or falsification. This blockchain-based authentication process guarantees trusted user interactions within the metaverse.

Smart Contract-based Authentication

The CLUBX platform stores the user's encrypted biometric coordinates on the blockchain and compares them in real-time with facial coordinates collected through a smartphone. This comparison is automated through smart contracts, ensuring secure and seamless authentication. The result of this process is a 3D avatar that accurately represents the authenticated user, allowing trusted interactions within the virtual world. This innovative authentication method simultaneously ensures user privacy and data integrity, while providing a trustworthy basis for interactions in the metaverse.

Conclusion

XRUN's blockchain-based facial recognition and authentication technology integrates AI-powered 3D modeling, smart contracts, and blockchain encryption to enable secure and trusted user verification and avatar creation in metaverse environments. By ensuring both data security and real time responsiveness, the system facilitates seamless, trust-based interactions within virtual spaces, empowering users to engage confidently in the digital world.



[Image] Facial character creator

2-9 After LIFE Virtual Memorial

Through advanced deepfake technology, it is now possible to recreate a departed loved one's facial features, gestures, and voice, mimicking their presence in life. By leveraging AI deep learning, the system analyzes photos, videos, and audio data of the deceased to generate a virtual character that moves and speaks as though alive. This offers families and friends the unique opportunity to engage in conversations within a virtual memorial, with the AI replicating the loved one's language patterns and voice.

AI deep learning models meticulously study the departed's personality, speech patterns, and expressions, enabling a near-authentic conversational experience within the metaverse. As users interact with the AI-generated avatar, they can engage in natural dialogues based on shared memories, conversations, and topics that were significant in life. The AI can recreate familiar phrases, jokes, and expressions, deepening the emotional connection for those left behind. Furthermore, using deepfake technology, crucial moments from the past—whether through voice or video—can be restored, allowing families to re-experience important memories. Documentary-style videos about the deceased's life can be crafted with heightened realism, thanks to AI enhancements.

This "virtual reunion" takes place in a metaverse environment where, through deepfake and AI technology, the deceased's avatar can spend time with family and friends. The AI learns and mimics the nuances of facial expressions and gestures, creating a highly interactive and realistic experience. By gathering data from social media, personal records, and external sources (such as public opinions or even MBTI profiles), the AI deep learning model offers a personalized emotional experience, making interactions feel as if one is truly conversing with the departed.

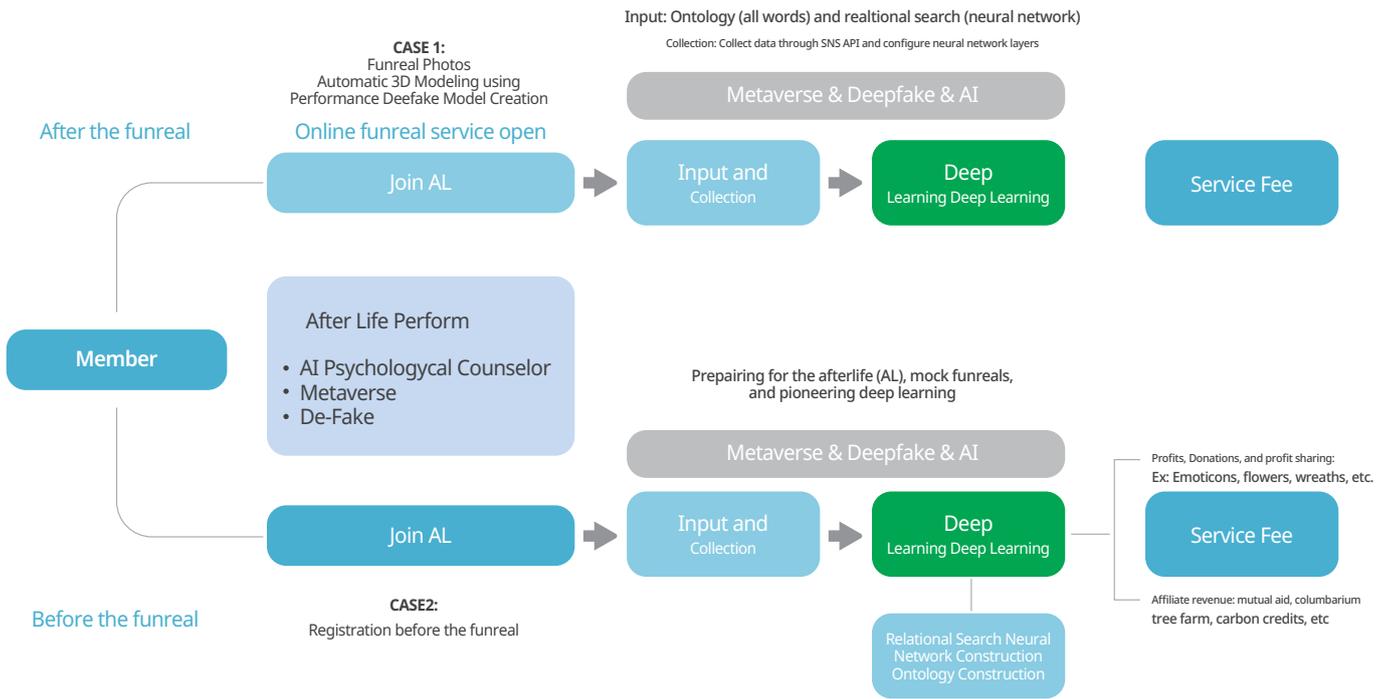
In addition, AI technology allows for the recreation of activities the departed enjoyed, giving families the opportunity to create new, special moments in a shared virtual world. The system also learns from emotional cues within the metaverse, responding appropriately to the user's emotions. For example, if a family member expresses sadness, the AI avatar can offer comforting words or even engage in a meaningful activity such as singing a favorite song, deepening the sense of emotional presence.

The AI deep learning algorithms also analyze past memories and relationships between the departed and loved ones, creating personalized memorial experiences that reflect each individual's unique connection. This offers a profound way to honor and cherish memories in a highly tailored manner.

Moreover, the digital recreation of the loved one's persona—powered by AI and deepfake technology—benefits from blockchain technology for robust data protection. Blockchain ensures the security and privacy of the deceased's digital likeness and personal data, safeguarding against unauthorized access and protecting their legacy. By leveraging blockchain, families can rest assured that their loved one's digital presence and memory remain protected and preserved long after their passing.

This integration of deepfake, AI, and blockchain technologies offers a revolutionary approach to memorializing the departed, providing a secure, emotionally resonant experience that bridges the past with the future.

XRUN Technical Specifications



[Image] After LIFE

3-1 XRUN Wallet Ecosystem



Search around: Check the location of the cryptocurrency

AR : Cryptocurrency Catch

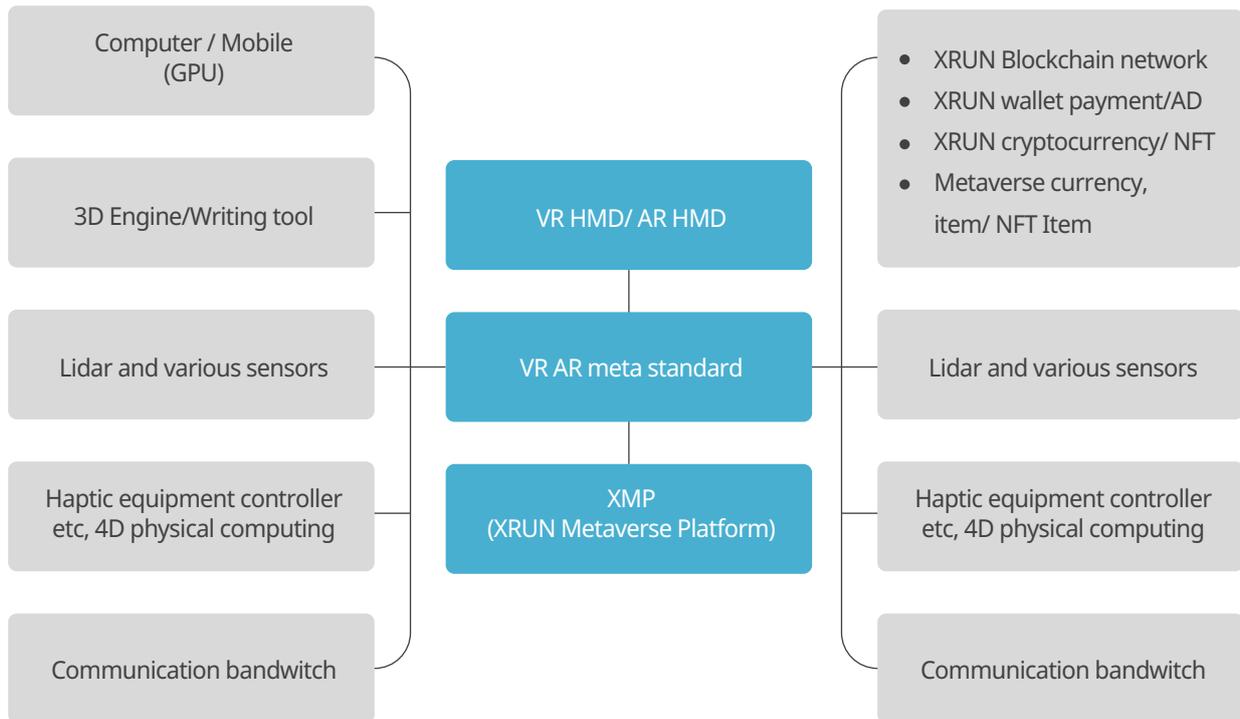
AR : Cryptocurrency Catch

[Figure 11] XRUN Wallet

XRUN Wallet catches cryptocurrency, and after completing the mission, the caught cryptocurrency (Advertisement) is stored in the wallet. There are various types of advertisements in XRUN advertisements, such as quizzes, cryptocurrency wallet creation, surveys, image uploads, and video verification. It can be cashed out by sending it to the XRUN cryptocurrency exchange, and it can also be exchanged for other cryptocurrencies. The XRUN cryptocurrency can use the contents of the XRUN Metaverse, and can be used on the XRUN NFTs and NFTs exchanges. The XRUN team will expand the ecosystem around the XRUN cryptocurrency and wallet.

3-2 XRUN Metaverse Ecosystem

XMP(XRUN Metaverse Platform) materializes the XRUN coin mined in reality (PoD) in 8K performance using Nvidia's most advanced Graphic Processing Unit, RTX 3080. CD engine and copyright solution company Unreal released the initial version of Metahuman Creator to allow creating avatars that are not like cartoon characters but rather identical to the user's appearance. The mined XRUN coin is registered in XRUN main net as a block and can be used in interacting with the metaverse. It is because from the moment cryptocurrency transaction is performed, the block is shared by the decentralized server and recognized as registered in the user's wallet. Along with the feature as a currency used in the metaverse, unique concepts will be added to the NFT. For modeling transmission between metaverses serviced by XRUN, connection is made through the IPFS (Inter Planetary File System) where a file once uploaded remains in one planet unless a special event occurs. The NFT field is generally uploaded to use images, artwork, and music, but adding modeling information necessary in the metaverse could be a very unfamiliar concept in the attempt itself. If the items that cannot be cloned which are purchased in the metaverse are created based on the items specified in XMP (XRUN Metaverse Platform), trading will be possible regardless of whether inside or outside the metaverse. While similar to CryptoKitties, mining is not automatic but rather active mining method is used with results that can be shared. Such services will exhibit their true values with further development of the metaverse.



[Image 12] XRUN Metaverse Ecosystem

3-3 CLUBX XRUN Metaverse

XRUN METAVERSE is a content to enjoy club music and dance non-face-to-face using an online HMD. XRUN cryptocurrency can be used as a key currency in the XRUN metaverse. XRUN METAVERSE uses XRUN cryptocurrency for payment. For example, purchase of goods, labor costs, It is used to build a new CLUBX, etc.

XRUN Ecosystem



[Image 13] CLUBX

Users who own XRUN cryptocurrency can pay construction costs to METaverse builders (3D modeling designers, Unreal Engine developers), own CLUBX, and earn profits from the club by hiring personnel and paying for items.

In addition, those who are employed (waiters, security guards, DJs, singers, dancers, etc.) can receive a salary with the XRUN cryptocurrency and are expected to create new jobs.

3-4 XRUN NFTs & NFTs Exchange

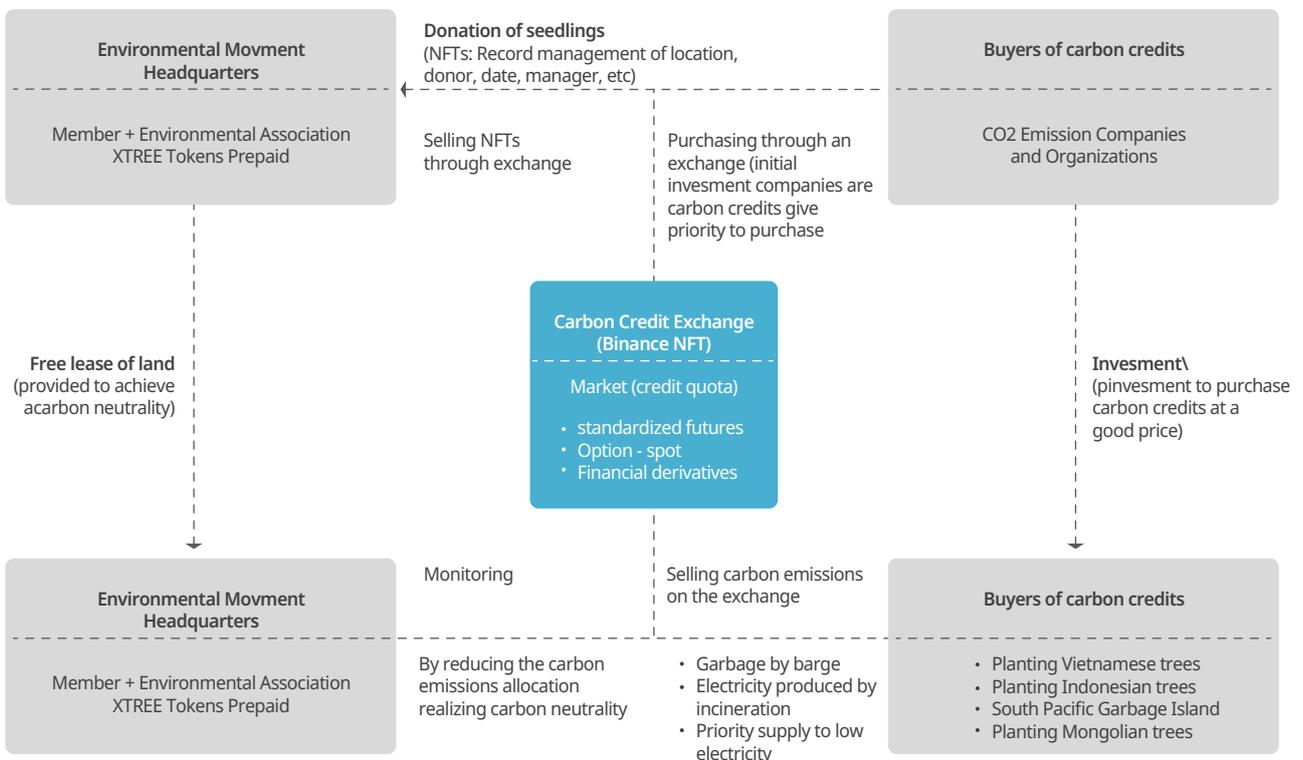
While creating NFT(mint) in general exchange or network takes time, separate XRUN fees are charged depending on this speed. While gas fees can be selected by the user, transmission might fail if the price is too low. Sending token from the XRUN NFTs network to another network or location is referred to as transaction, and connecting NFTs to works is also a form of transaction where costs occur regardless of the success of the transmission. In XrDex (XRUN main net), such fees are not separately charged but rather resolved through contributions by the participants. If costs are required in the network without transmission costs, this can be minted with no value existing for such costs.

Meanwhile, detailed settings can be done in this process such as work name/work description/high-quality image link (link if there is an original of the work to be sold)/split sale that can be received every time the work is sold (value determination by company), royalty rate (example. 10% of resale price), number of copies (editions, meaning how many works will be issued in a series) entered. Also, while there are differences depending on the marketplace, copyright transfer, author name/date created, etc. can be entered. When this is uploaded to XRUN NFTs, promotion and sale becomes possible through the AD-Platform of the XRUN Wallet.



[Image] XRUN NFTs Exchange

4. XRUN NFTs Carbon neutrality Exchange



[Image 11] XRUN AD-Platform Ecosystem

CER (Certified Emission Reductions) CER ETF Trading NFT

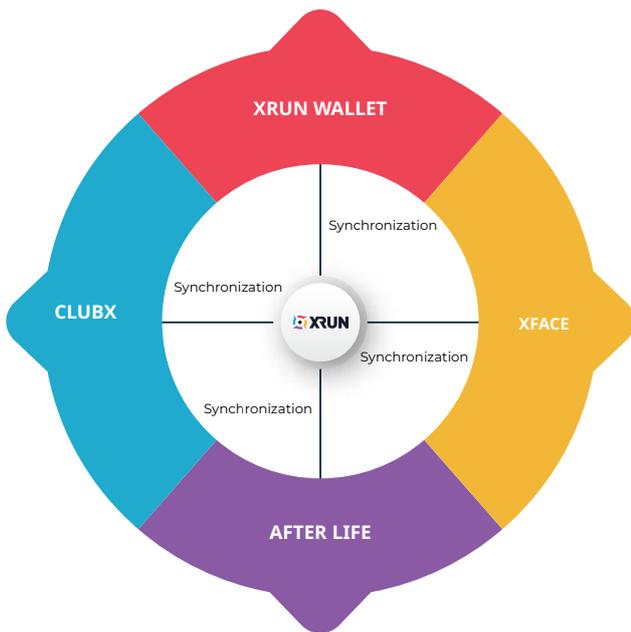
The right to discharge Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Perfluorocarbon (PFCs), chlorofluorocarbons (HFCs), and Sulphur hexafluoride (SF₆)

Six major greenhouse gases over a period of time Free allocation: Paid allocation

(30,200 won/1 ton: as of October 27, 2021)

7. XRUN TOKEN MODEL

The XRUN cryptocurrency is a medium to maintain and activate the ecosystem. As the number of participants in the ecosystem increases and the mutual activity of the participants increases, the value will rise, the ecosystem will operate smoothly, and the holders of XRUN cryptocurrency will be rewarded accordingly.



- PoD-based rewards for watching ads and completing missions, utilizing XRUN tokens through DApp integration.
- Identity verification and NFT creation through facial recognition, enhancing security and enabling trading and authentication with XRUN tokens.
- Managing digital legacies as NFTs with XRUN tokens, creating economic value through virtual memorials and AI interactions.
- A virtual world economy using XRUN tokens for owning and trading NFTs, accessing premium services, and earning activity-based rewards.

[Image 16] Token Economy

XRUN Token Model



- Advertising merchants buy XRUN cryptocurrencies from the cryptocurrency exchange and pay XRUN for the advertising costs. (Purchase)
- Cryptocurrency companies will pay 20% of the revenue of the registered cryptocurrencies to the cryptocurrencies selected by the advertising merchants in XRUN cryptocurrencies.

(Selected reward)

- Advertising buyers will be paid 50% of their sales if they succeed in PoD-type mining by using XRUN. (Discovery compensation)
- The cryptocurrency acquired and held by XRUN can be used in XRUN METaverse and NFTs.

7-1 XRUN TECHNICAL SPECIFICATIONS

BLOCKCHAIN PLATFORM	XRUN
CONTRACT TYPE	Polygon (ERC-20)
ISSUER NAME /TICKER SYMBOL	XRUN
TOTAL ISSUE AMOUNT	2,100,000,000
DIVISIBILITY(DECIMAL PLACES)	18
CONSENSUS ARGOLITHM	PoD (Proof of Discovery)

Related services

Mobile Wallet (Google play/App store) XRUN

Website <http://www.XRUN.RUN>

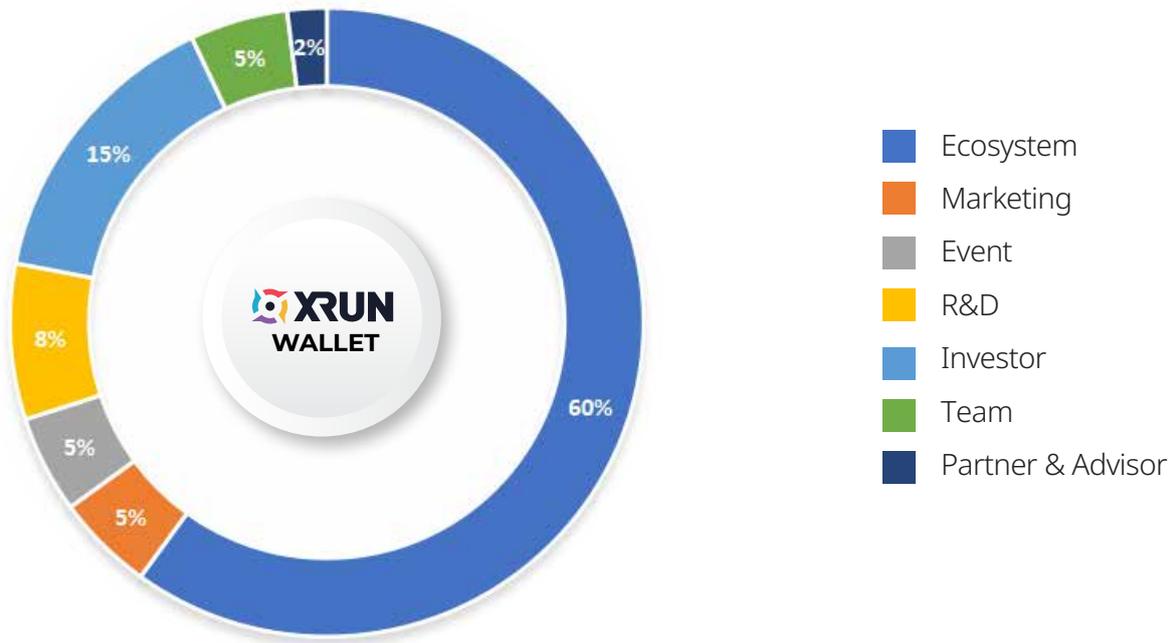
7-2 TOKEN SALE PLANNING

SALE DATE	Commenced on October 1, 2021
TOTAL TOKEN SUPPLY	2,100,000,000
TARGET	100,000,000 Tokens
TOKEN PUBLIC SALE PRICE(POL)	70,000 XRUN/POL
TOKEN DISTRIBUTION	After ICO completion
TOKEN ACTIVATION	After ICO completion
SALE DATE	Commenced on October 1, 2021
TOTAL TOKEN SUPPLY	2,100,000,000

XRUN Token Model



7-3 TOKEN ALLOCATION



Distribution Area	Quota	Circulation Supply
Ecosystem	1,260,000,000	60%
Marketing	105,000,000	5%
Event	105,000,000	5%
R&D	168,000,000	8%
Investor & Sales	315,000,000	15%
Team	105,000,000	5%
Partner & Advisor	42,000,000	2%
Total Sum	2,100,000,000	100,00%

ROADMAP

2018

XRUN PROJECT STARTED

- Founded XRUN
- White Paper ver1.0 introduced

2019

Established XRUN Singapore Corporation

- Established XRUN Singapore Corporation
- Launched XRUN Wallet (Mining)

2020

XRUN Mainnet Kick-off

- XRUN Mainnet Kick-off

2021

1st Quarter

Mainnet Kick-off XRC-1155

- Mainnet Kick-off XRC-1155
- CLUBX Metaverse Prototype Open

2022

Establishment of XRUN LLC headquarters in Saint Vincent and Granadins

- Establishment of XRUN LLC headquarters in Saint Vincent and Granadins
- XRUN Mainnet 1st prototype open
- Entered Indonesia (Establishment of Metaverse development company)
- Started development of next-generation XRUN wallet advancement
- Started development of next-generation CLUBX advancement

ROADMAP

2023

1rd Quarter

XRUN Wallet Plans Next Generation Advanced Development

- XRUN Wallet Plans Next Generation Advanced Development

2023

2th Quarter

Development of CatchRun XRUN Item Sales

- Development of CatchRun XRUN Item Sales System

2023

3th Quarter

XRUN service site development and conversion

- XRUN service site development and conversion
- Next generation CLUBX prototype open

2023

4nd Quarter

XRUN Item Development System Completed

- XRUN Item Development System Completed

2024

1st Quarter

Metaverse CLUBX Launched

- XRUN App Upgrade Version Release
- Listing on the domestic exchange

ROADMAP

2024
2th Quarter

Metaverse CLUBX Advanced Development

- CLUBX Mobile Upgrade Version Released
- XRUN's Conversation for Various Metaverse and Advertising AI
- Xrun AI (XAI v1.0 test ready, AI+metaverse)

2024
3th Quarter

XRUN App Expands Global Scope of PoD Mining Services

- Metaverse CLUBX Global Services Expansion
- Xrun app ios version 'XRUN GO' released

2024
4th Quarter

Switch Polygon Network

- Switch Polygon Network
- Real-Verified Avatar Integration

2025
1th Quarter

AFTER LIFE PROTOTYPE

- After Life Virtual Memorial Prototype Release (AI Integration)
Prototype launch of the After Life virtual memorial system.

2025
2th Quarter

AFTER LIFE LAUNCH

- Official Launch of the After Life Memorial Metaverse

ROADMAP



XFACE DEVELOPMENT

- Development of XFACE Blockchain Verification System (AI Integration)



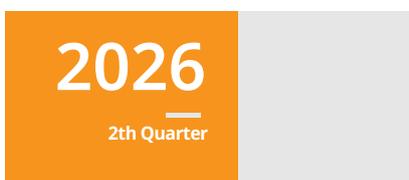
XFACE BLOCKCHAIN

- XFACE Blockchain Verification System Prototype Release



XFACE TECHNOLOGY SERVICE LAUNCH

- XFACE Technology Applied to CLUBX and After Life, Service Launch

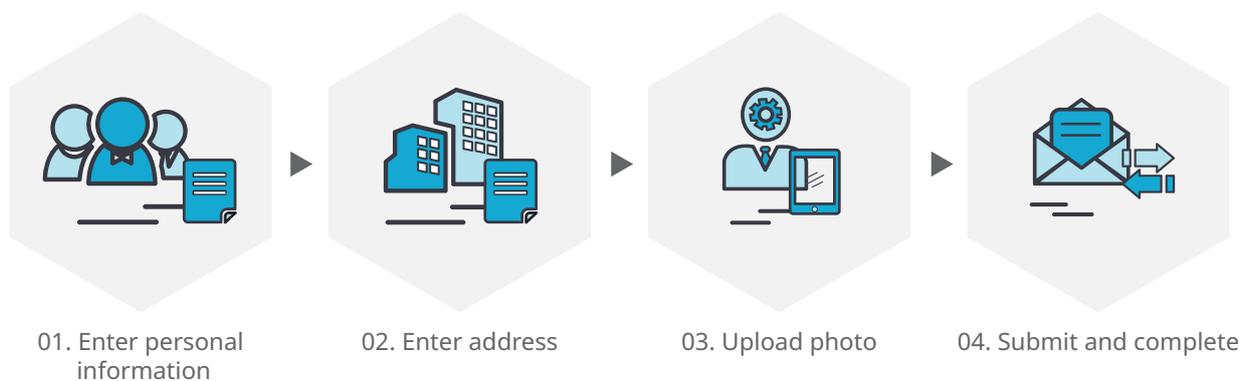


NEXT GENERATION XFACE

- Next-Generation XFACE Advancement Work

9. KYC Certification

KYC(Know Your Customer) means customer authentication and self certification. At anytime after completing the ICO program or the ICO, each buyer will be asked to provide his or her identity information. The buyers must accordingly provide identification(passport, resident registration card, driver’s license) and residence information. At our sole discretion, we also reserve the right to require the buyers to provide additional information(i.e., date of birth) on their address, source of funds, or the buyer’s account(i.e., form). The KYC authentication is an essential and basic requirement for the token distribution. All of the buyers must complete the KYC certification process in order to purchase the tokens.



[Table 9] KYC Certification Procedure

10. Disclaimer and Precaution

This white paper is a conceptual document specified in the project to help you understand the XRUN project. Business plans in this white paper may not be construed as advices or investment advices on the product and can not be used based on contracts or commitments, such as sales, subscriptions, securities purchases, and other participants for invitations or contracts or promises. This white paper is not reviewed by any national law enforcement agency.

All decisions made based on XRUN information are the sole responsibility of the decision maker. this white paper can not be interpreted as a representation or warranty. This white paper is used to describe Our proposed XRUN platform and its requirements, and specifies the following.

No representations or warranties are made as to the accuracy or completeness of the contents described in this white paper or any other aspect of the project. If without a precondition, no representations or warranties on fulfillment or justification of any future oriented, conceptual statements are provided. Nothing in this white paper shall be used as a basis for future promises or representations. We can not be held liable for any damages or losses incurred by any related individual or any other aspect of the white paper. To the extent of legal liability which can not be excluded, the maximum limit of applicable law is limited. The Team is not responsible for the accuracy of, safety of, or the correction of any error of the information. XRUN does not legally guarantee this white paper and all future modifications. Business and business platform launches may be subject to changes according to development and corporate circumstances, and we are not responsible for any damages or losses incurred by the investments made or any others related the retro. Participation in the XRUN coin issuance does not include any future earnings or damages or losses whatsoever. The XRUN Coin has no obligation to update or revise such forecast information under any circumstances other than those anticipated.

PARTNER



60.com



wonderbra



MVC



BitForex



BitZ



World Century



SM DUTYFREE



DIGIFINEX



Onestar proby



torilab



Bitget



TMTG



IKYNY



SNS



NUSAKU

12-1 Patents

1. Patent No. 10-1137523

Authentication Medium, Authentication Terminal, Authentication Server, and the Authentication Method Using Them This invention relates to, and includes the following steps of, a mutual authentication method by and between a user terminal and a server, and more specifically, the server receive the encrypted unique identifier information and password information from the user terminal, thereby storing the encrypted unique identifier information and password information onto a smart card, and issuing the encrypted unique identifier information and the password information, as a matter of a step. The user terminal transmits its unique identifier information and password information to the server and accesses the server, as a matter of a step. The server compares the unique identifier information and the password information of the user terminal stored in the smart card with the unique identifier information and the password information received from the user terminal to access the smart card, as a matter of a step. In addition, when the server determines that the user terminal desiring to access the client is legitimate, it builds a communication channel by establishing a session key between the user terminals determined to be legitimate, as a matter of a step. By this configuration, the method and system for mutual authentication between the user terminal and the server of the present invention are intended for the authentication by and between the user terminal and the server, and when the unique identification information and password information of a user terminal to be connected to the server are transmitted to the server via the server, unique identification information of the user terminal and password are stored onto a smart card for issuance. Therefore, even if the server is under attack by the attacker, the unique identification information and the password information of the user terminal can be prevented from being leaked to the outside.

2. Patent No. 10-0982253

Online Information Input Using Personal Identification Medium and Financial Transaction System and Online Information Input and Financial Transaction Method, and the Recording Medium Recording a Program for Them This concerns utilizing the personal information of the member registered in the personal information management institution by using the personal identification medium for member registration or login of the general website.

Thus, an online information input and financial transaction system using a personal identification medium according to the present invention using an individual identification medium that facilitates information input as well as a simple settlement procedure, and an online information input and financial transaction method using the them.

In this invention, the personal identification data read by the medium reader are transmitted to the personal information management institution, and the member personal information or the personal authentication service is provided by the personal information management institution. Thus, the login procedure and the payment procedure are combined to minimize the user input while performing the membership procedure or login procedure of the general web site. According to this invention, there is an advantage of having the possibility of simplifying member registration, log in, and settlement procedures, and minimizing the quantity of information that a user has to directly input.

3. March 12, Patent No. 10-0955625

Merchant's Financial Transaction Method and That Equipment A merchant's financial transaction method and that equipment are commenced. This invention stores the account information of the customer and the double card having the financial transaction function such as deposit and withdrawal function, payment, account transfer, credit card or cash service function and merchant account information, and is configured with the double card to enable the financial function between the merchant account and the customer account through the banks' common network, thereby giving the customers the advantage of being able to conduct financial transactions anytime, anywhere, as well as at an ATM terminal of any bank, further to delivering the effect of enabling financial services at low cost and design.

4. 2017 Patent No. 10-1205894

Electronic Commerce Method and System Using Personal Page Including the Price Bar Code This invention relates to, and includes the following steps of, an electronic commerce method and system using a personal page including a price bar code, whereas the electronic commerce method using the personal page including the price bar code includes the first step of the first user terminal accessing the commodity purchasing website using the wired / wireless Internet network. Whereas, the first user terminal may store the product purchase, as a matter of a step. Transmitting an authentication identifier including a personal identifier, which is a unique number or a phone number of the first user terminal, to the web server providing the web site, as a matter of a step. Comparing the authentication identifier received from the first user terminal with the authentication comparison identifier previously stored in the database of the web server to determine whether the first user terminal is authenticated, as a matter of a step. The web server may authenticate the first user terminal and may include the authentication identifier and the price barcode of the commodity if the received authentication ID matches the pre-stored authentication comparison identifier, as a matter of a step. Transmitting the personal page to the first user terminal, as a matter of a step. The fifth step in which a value-added network (VAN) server receives information from the first user terminal that has scanned the price barcode of the goods included in the personal page of the first user terminal and performs settlement, as a matter of a step. The VAN server requesting the web server to delete the personal page, as a matter of a step. In addition, the seventh step of the web server deleting the personal page.

12-2 Program Registration

No. S-2010-002628-3

Augmented Reality Solution

Promotional videos through publications such as guide books, books, and magazines through Augmented Reality using university / company logos, smartphone augmented reality applications, marker or object matching process' augmented reality through easy and convenient enhancement image replacement, when viewed through a web camera in connection with augmented reality, will present 3D videos and interact with videos following the user's behaviors.

12-3 Awards

2016 Excellent Trademark. Design Competition 'Won Prize1 (December 1, 2016 Korea Institute of Patent Information)

2012 Republic of Korea Invention Patent Competition 'WonSilver Prize1 (November 29, 2012 Patent Office)

2008 Chung-Ang University's Excellent Enterprise Award (December 16, 2008)

Blockchain: A blockchain is stored in a chain like distributed data storage environment based on the P2P method for the small sized data called “block,” which no one can arbitrarily modify, and is also a data forgery prevention technology based on the distributed computing technology.

Smart contract: A smart contract is a technology that can contract and modify contracts easily and conveniently with P2P without intermediation.

XR (Extended Reality): A term that encompasses augmented reality (AR), virtual reality (VR), and mixed reality (MR), meaning a new form of technology that supports them all.

VR (Virtual Reality): VR means a specific environment, situation, or a technology itself, which is quite similar to the real world created by artificial technology using computers, etc., but which is not real.

AR (Augmented Reality): AR is a computer graphics technique that combines virtual objects or information with a real environment and makes them appear as if they existed in the original environment.

MR (Mixed Reality): MR refers to a technology that interacts with the user by mixing a virtually created information with real world objects, such as computer graphic information, sound information, haptic information, and smell information on a real time basis.

dApp: dApp refers to the decentralized applications. Unlike the existing central server, it means an application running on an underlying platform such as Ethereum or Quantum.

Range finder: A camera which connects the distance meter and the focus mechanism of the camera. It is a camera that can confirm whether or not the focus is detected by moving the focus mechanism.

PoD (Proof-of-Discovery): Also called as a proof of contribution, it is an algorithm that selects the influential accounts through the ranking algorithm and receives the tokens as a reward for the block generation.

PoS (Proof-of-Stake): It is a mining method which is mined as a stake of the coins owned by a mining method without a mining machine, called a proof of stake.

Cold Wallet: An offline password wallet that is not connected online. It is more secure than Hot Wallet. **Hot Wallet:** It means a wallet of the form stored at an online storage.

Algorithm Flowchart: An algorithm which demonstrates the order of commands through different kinds of boxes and arrows.

ICO: A method of securing funds by selling virtual currency coins to investors for funding purposes at the beginning of a blockchain-virtual currency based project.

Key Currency: It refers to a currency that is the standard currency used for international settlements or payments or financial transactions.

Ethereum: A distributed computing platform for implementing smart contract functionality based on the blockchain technology.

Big Data: A technology which extracts value from large quantities of data beyond the capabilities of traditional database management tools and analyzes the results.

Air Drop: Literally as it reads, dropping something in the air, it is an act of paying virtual currency free of charge. It is mainly intended to promote new coins or secure the users to increase the volume of transactions.

Immersive Experience: Transparency between people-businesses-objects is introduced to mean that the interaction is more adaptive, contextual, and fluid.

HMD (Head Mounted Display): This is a display device to be worn on the head and is also used as a display device for implementing a virtual reality or an augmented reality.

Holo-Lens: This is an electronic device developed and released by Microsoft and is an augmented reality based HMD augmented reality device.

EGD (Eye Glasses-type Display): This equipment is one through which one views virtual objects by mounting it onto one's face.

Smart glass: One of the wearable devices, it is a computer device in the form of glasses.

Front-end: The screen shown to the users is collectively called the front-end (website, application, etc.).

Backend: It is called the back-end, which is the server, or the rear side of the program, or the front-end's functional areas. **Location marketing (proximity marketing):** It is a type of marketing that provides supplementary services by locating the users by using GPS, NFC, etc. of devices.

Range Finder: This is a method of making objects with 3D by receiving data from shooting lasers.

Low Polygon: This is a method of applying low polygon, which is a smallest unit used to express 3D graphic, to modeling. **Content Management System (CMS):** A management system that can create, delete, and publish contents.

Motion to Photon (MTP): The time difference, or delay time, updated between motions and the screen.

Room-scale: It means a method of transferring the space of reality into a virtuality as it is.

Six degrees of freedom: Six degrees of freedom refers to the six directions of movement. Includes the X-axis centered left/right rotation(roll), Y-axis centered front/back rotation(pitch), Z-axis centered up/down rotation(yaw) movements and forward/back surge, left/right sway and up/down heave translational motion in the 3-dimensional rectangular coordinate system. Used to measure movements such as location and direction of objects in robot engineering, virtual reality, etc.

Metaverse : New word created by combining 'meta' meaning virtual/transcendence and 'universe' meaning world/space, referring to a 3-dimensional 'virtual world'.

NFT (Non Fungible Token) : With the meaning of 'irreplaceable token', it cannot be replaced with another cryptocurrency as serial numbers are applied to each cryptocurrency.

ERC-20 : Standard token specifications decided by the Ethereum blockchain network This has the feature of 'replaceable' like currencies.

ERC-721 : Free disclosure standard that describes the method of creating unique or irreplaceable tokens in the Ethereum blockchain. This has the feature of 'irreplaceable'.

ERC-1155 : This is a combination of replaceable token ERC-20 and irreplaceable token ERC-721 into one smart contract.

IPFS(InterPlanetary File System) : Hyper media protocol processed with file and ID, a distributive file system created to connect all computer devices with the same file system.

References



- Digi-capital "Augmented/Virtual Reality revenue forecast revised to hit \$120 billion by 2020 January 13, 2016"
- Digi-capital Ubiquitous \$90 billion AR to dominate focused \$15 billion VR by 2022 January 26, 2018
- Ministry of Science, ICT and Future Planning, "The 2016 ICT R&D Technological Lewl Survey Report," IITP, February, 2017
- Ministry of Science, ICT and Future Planning, "The 2016 Technology Impact Assessment Report (Virtual Augmented Reality Technology)," Research Report2017-34 K, I S TEP, February 2017
- Hyundai Economic Research Institute, "Domestic and Overseas ARVR Industry Status and Implications", VIP Report 17-14 (Volume 687), April, 2017
- ETRI's Information Communication Trend Analysis Report Volume 32, Issue No. 2, ETRI, April, 2017
- IITP, ICT R&D Mid to Long Term Technology Roadmap 2022, October, 2016
- Ministry of Science, ICT and Future Planning, "Digital Contents R&D Innovation Plan," June, 2017
- IT Chosun, "[WWDC 2017] Starting up VR & AR Contents for Apple, Mac and iPhone / iPad", June 6, 2017
- Digital Times, "Global IT Dinosaurs : Set the Example... VR • AR preemptive competition is staged," May 18, 2017 (711)
- Seminar Today, "IDC, World Virtual Reality / Augmented Reality (VR / AR) Related Market2020 167, CHO March 12, 2017
- VR / AR Industries : 7 Business Opportunities", February 15, 2017 <<http://www.insightors.com>>
- R. T. Azuma, "A survey of augmented reality," Presence Teleoperators Virtual Environ. 6(4), 355–385 1997. Y.
- Ohta and H. Tamura, Mixed Reality-Merging Real and Virtual Worlds, Ohmsha Ltd. and Springer- Verlag 1999.
- A. Criminisi, I. D. Reid, and A. Zisserman, "Single view metrology," Int. J. Comput. Vis. 40(2), 123–148 2000. Z.
- Zhang, "A flexible new technique for camera calibration," IEEETrans. Pattern Anal. Mach. Intell. 22(11), 1–20 2000.
- R. Hartely and A. Zisserman, "Multiple View Geometry in Computer Vision", Cambridge Univ. Press 2000.
- <https://unity3d.com/kr/learn/tutorials/s/xr> XR development company's site (unity)

References



- <https://www.ismar2018.org/> AR / MR Conference: annually held conference
- <https://s2018.siggraph.org/> computer graphics related modeling conference
- Lee Jae-Hong. "The Prospects of Virtual Reality in the Age of the Fourth Industrial Revolution." *Media and Education*, 7.1 (June 2017): 41-53.
- Lee Kyung-Yong. "Microsoft's HoloLens : Going Beyond VR and AR Towards MR.." *Journal of the Korea Society of Computer and Information* 2,4 (December 2016): 1-5
- Lee, Gun A., et al. "Immersive authoring of tangible augmented reality applications." *Proceedings of the 3rd IEEE/ACM international Symposium on Mixed and Augmented Reality*. IEEE Computer Society, 2004.
- Youtube, "Immersive Authoring for Tangible Augmented Reality (2005)", <https://www.youtube.com/watch?v=ssuH2KICJpo>
- Kang Chang-Koo, Oh Sae-Jin, Woo Woon-Taek. "Augmented Reality System Supporting the Interaction Between Real Objects and Virtual Objects." *HIC Korea Academic Conference*, (January 2011): 4-6.
- Park Jae-Beom, Park Chang-Hoon. "A Cube Piecing Guiding System Using Augmented Reality." *HIC Korea Academic Conference*, (February, 2014) 133-136.
- Park, Jaebum, and Changhoon Park. "Augmented Reality Based Guidance for Solving Rubik's Cube Using HMD." *International Conference on Human-Computer Interaction*. Springer International Publishing, 2016.
- Park Jae-Beom, Park Chang-Hoon. "User Experience Evaluation of Augmented Reality Cube Piecing Guiding System Using HMD." *Asia-pacific Journal of Multimedia Services Convergent with Art, Humanities, and Sociology*, 7 (2017): 935-944.
- Youtube, "AR Guidance for Solving Rubik's Cube using - 37 -Wearable Devices", <https://www.youtube.com/watch?v=G7icWRp3ufY>
- Github, Microsoft Mixed Reality Toolkit, <https://github.com/Microsoft/MixedRealityToolkit-Unity>
- Fritzing, <http://fritzing.org/home/>
- Nielsen, Jakob, and Rolf Molich. "Heuristic evaluation of user interfaces." *Proceedings of the SIGCHI conference on Human factors in computing systems*. ACM, 1990.
- LG CNS. (2021.1.5.). Non-contact even with someone in front of you? The Beginning of XR!. <https://blog.lgcns.com/2454>
- https://alumentations.ai/docs/getting_started/keypoints_augmentation/

References



- Acceleration Studies Foundation(2006), "Meta verse Road map, Pathway to the 3D Web".
 - Gartner(July, 2019) "Competitive Landscape: Head-Mounted Displays for Augmented Reality and Virtual Reality".
 - VRSCOUT(2021.01.26.) "HaptX Launches True-Contact Haptic Gloves For VR And Robotics".
 - T Times(2020.10.22.) "Hoppin going past Unicorn in one year to become a 2 trillion won company".
 - Coindesk Korea(2021.4.1.), "Rapid growth of NFT market, greater forgery/copyright disputes".
 - theguru(2021.01.05.), "Apple, gained VR glove patent... Preparing for the 'metaverse' era".
 - UnrealEngine, "Unreal Engine 4 document Digital Human",
<https://docs.unrealengine.com/ko/Resources/Showcases/DigitalHumans/index.html>
 - VT Staff. (2021.2.4.). The blockchain-based virtual world that can help usher in the metaverse. <https://venturebeat.com/2021/02/04/the-blockchain-based-virtual-world-that-can-help-usher-in-the-metaverse/>
 - VentureBeat. (2020.4.29.). The Metaverse is coming.
<https://www.youtube.com/watch?v=rbhC6wokNGc>
 - VT Staff. (2021.2.4.). The blockchain-based virtual world that can help usher in the metaverse. <https://venturebeat.com/2021/02/04/the-blockchain-based-virtual-world-that-can-help-usher-in-the-metaverse/>
 - Unity. (n.d.). What is AR, VR, MR, XR, 360?. <https://unity3d.com/what-is-xr-glossary>
 - VRSCOUT(2021.01.26.) "HaptX Launches True-Contact Haptic Gloves For VR And Robotics".
 - Gartner Hype Cycle for Emerging Technologies, 2017
 - All hardware, software, methodology, and experience that allows augmented reality, virtual reality and mixed reality is referred to XR(extended reality) in combination, and while 'XR' is used with the same meaning in this report, it is referred to as 'XR technology' when emphasizing the technical side
 - Reference: www.care-os.com; www.gatebox.ai/grande ; VRSCOUT(2021.01.26.) "HaptX Launches True-Contact Haptic Gloves For VR And Robotics"; VRFOCUS(2020.10.09.) "The Virtuix Omni One Is A Consumer VR Treadmill For 2021"
- Diverse metaverse equipment are expected to link with existing PC, mobile, console, VR HMD, AR Glass, Smart watch, etc. to provide innovative metaverse experiences in the future.
- https://www.google.com/search?sca_esv=e93e60d6922639eb&sca_upv=1&sxsrf=ADLYWlJw2nRwC6pVgnfZf_LQC5fEt2veBQ:1727331104941&q=Using+Facial+Key+Points+and+Unique+Data&udm=2&fbs=AEQNmOCTI4ghiYmMI-A67QciKwhEVBZaKMmwXvCV-ZrcsMO5W6-jWm_vQO1P9OmlcnZua7wLZwyIVA8RxcSFr