Quantum Network Communication Based on Voice-Control Technology

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Abstract

Quantum network communication based on quantum entanglement properties has been realised. However, the realisation of a multi-horizontal and multi-vertical global network system is still difficult, and there is less relevant literature and reports on exploring the interconnectivity of quantum systems with people and everything. This paper explores the possibility of communicating with living bodies, non-living bodies through the human voice in the quantum induction network. This paper discusses the relationship between thinking consciousness and entangled quantum, and put forward the following point of view: that weak magnetic fields generated through a certain quantum spin waves can interact with magnetic fields generated by other quantum spins to produce induced waves, and then the induction waves are connected to each other to form a quantum induction network, so as to transmit information. And proposed that the human sound wave can resonate with the spin wave generated by a certain quantum and be instantaneously transmitted to another quantum with entanglement relationship with the quantum, no matter how far they are from each other. To achieve the purpose of communication between human body and life bodies and non-life bodies. A corresponding research plan is designed, taking the control of a remote device by people's voice as an example to conduct a thought experiment, and gives specific application scenarios to prove its feasibility and practicality. The analysis discusses the significance that based on the quantum entanglement effect, use the voice control technology to communication, so as to realise the interconnectedness of all things, and the problems currently faced.

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1. Introduction

The study of quantum mechanics encompasses areas such as quantum computing, quantum networks, and secure quantum-encrypted communications. Quantum information is a new discipline that combines quantum physics and information technology, and mainly includes two fields: quantum communication and quantum computing. Quantum communication mainly researches quantum cryptography, quantum invisible transmission, quantum long-distance communication technology and so on; quantum computing mainly researches quantum computer and quantum algorithm suitable for quantum computer [1]. In recent years, countries such as Europe and the United States have formulated national-level scientific and technological and industrial strategic development plans to vigorously support the development of quantum technologies such as quantum computing and quantum communication. For the first time, China has included quantum communication research in a major scientific plan in the "National Medium and Long-Term Science and Technology Development Plan (2006-2020)" [2]. Quantum communication is moving from point-to-point communication applications to network applications, including local area network and wide area network applications. A global wide area quantum communication network is also being developed [3].

The application of voice control technology can be seen everywhere in life. For example, voice-activated lights, voice-activated mobile phone systems, voice-to-text systems, voice-activated corridor lights, voice-activated mice, voice-activated music fountains and voice-activated car model systems, etc. This technology can convert human speech into control signals to make the machine work. These technologies not only make our lives easier, but also bring great convenience to the lives of severely disabled patients. For example, disabled patients can use sound to open doors and windows, televisions, electric lights and other appliances.

According to the entanglement exchange principle[4], the entanglement relationship between the transport particles can make two distant incoherent particles entangled in a similar way [5]. The ubiquitous quantum correlations in the quantum world, represented by quantum entanglement, are the fundamental correlations that make up the world. The purpose of this article is to use voice control technology to transmit information in a quantum induction network and interact with remote devices or people, thereby achieving interconnection between human beings and other life body, non-life body. Previously, in a series of related papers, I have proposed the idea of building a quantum induction network based on quantum entanglement technology, and using the principle of frequency resonance to transmit information, so as to build a universal network of interconnected things.

2. Quantum of Entanglement and Thinking Consciousness Influence Each Other

Both life bodies, non-life bodies in the universe are composed of microscopic particles such as atoms, electrons, and photons. The energy of the movement of substances such as atomic nuclei, electrons, and photons in the microscopic world is transmitted in the form of waves [6]. All things in the universe are interconnected on the basis of quantum entanglement. As shown in Figure 1.

Figure 1. All things in the universe are interconnected based on quantum entanglement

Consciousness is a fundamental property of matter, life body has quantum effects. Over the last 30 years or so, research on the neural correlates of consciousness has led to enormous and extraordinary achievements [7][8]. Using three-dimensional single-molecule tracking in living cells, the researchers have observed the migration behavior of keratinocytes and the diffusion dynamics of intracellular quantum dots [9]. Ritz et al. used high-performance computing to simulate light absorption processes in purple and photosynthetic bacteria in photosynthesis, showing that quantum mechanics can explain these processes. Gauger et al. found that birds navigate based on quantum entanglement, with durations of more than 20 microseconds [10]. In addition, scientists may have successfully created "Xue Dingzheng's bacteria". Some photons in the experiment will simultaneously combine and escape the photosynthetic pigment molecules in green sulfur bacteria -this is the sign of quantum entanglement. The results of the experiment are still very controversial, and if this interpretation holds true, it would be the first time that scientists have made a living organism achieve quantum entanglement [11].

Correlation studies based on the analysis of EEG signals have shown that different levels of consciousness have an impact the brain's processing of music characteristics, which provides a new model and research paradigm for exploring the relationship between music perception and consciousness [12]. The interactions between biologically important molecules in the brain can serve as the basis for the quantum meta-language that governs human and animal behavior [13]. Quantum information theory shows that there is a differentiation between the unobservable mind and the observable brain, providing a robust physical foundation for consciousness research [14].

The consciousness possessed by different life body varies in strength and weakness, and non- life body also have the

most basic form of consciousness. In my opinion, the number of entangled quanta in an object will affect the degree of induction between objects and it is proportional to it. In the same way, the number of entangled quanta in the human body will also affect the degree of induction between people, and is in direct proportion [15]. The fluctuations of the quanta in human body will have an impact on the vibration of the brain wave of this person, and then affect the thinking consciousness of this person. The magnitude of its influence is related to and is in direct proportion to the quantity of quantum in the human body and the quantity of quantum entangled with brain waves. When quanta in the human body collide due to the action of gravity, it may be in an entangled state. A quantum pair in an entangled state may exhibit non-local correlations with other life body, non-life body. And has an influence on the vibration of the quantum in other objects or life bodies with which it has an entanglement relationship. The magnitude of this influence is related to the number of quantum entangled with each other, the degree of entanglement and other factors, and is proportional to the level of mutual induction between them. Quantum fluctuations in other life bodies and non-life bodies can also impact their own cognitive processes and consciousness. Simultaneously, individuals can alter quantum fluctuations through autonomous thinking consciousness, thereby changing their thoughts and emotions. It is also possible to influence the consciousness of other people through the inductive relationship between the entangled quantum and other people, thereby affecting their thoughts and emotions.

3. Construction of Quantum Induction Network Based On Quantum Spin Waves

3.1. Quantum Induction Field, Quantum Induction Wave, Quantum Induction Network Concepts

In quantum mechanics, all particles exhibit wave-particle duality, existing not only as physical objects but also as waves. According to quantum field theory, all elementary particles correspond to a field, and interactions between particles occur through field-to-field interactions. For instance, an entangled state microwave field is a quantum entanglement phenomenon that occurs between two or more microwave modes (or subsystems) in the microwave frequency band. There is a magnetic field in life bodies. A study published in Eneuro on 21 March 2019 by a team from the California Institute of Technology suggests that humans not only sense magnetic fields but also that the brain strongly responds to changes in magnetic fields [16].

Spin is an intrinsic property of particles, whose operational rules are similar to the angular momentum of classical mechanics, and thus generates a magnetic field. Scientists at the University of Tokyo have observed a pure quantum mechanical process that affects chemical activity at the cellular level. The researchers stated, "This study suggests that the relationship between two electron spins can have significant implications for biology [17] after a single quantum spin generates a weak magnetic field, it can interact with magnetic fields generated by other quantum spins, thereby producing a quantum induction field. Just as the movement of charges changes the electric field, entangled quantum pairs can alter the quantum induction field and generate quantum induction waves with the fluctuations of the induction field, which are then connected to form a quantum induction network. Through resonance, information is transmitted to achieve communication with all things [18]. As shown in Figure 2.

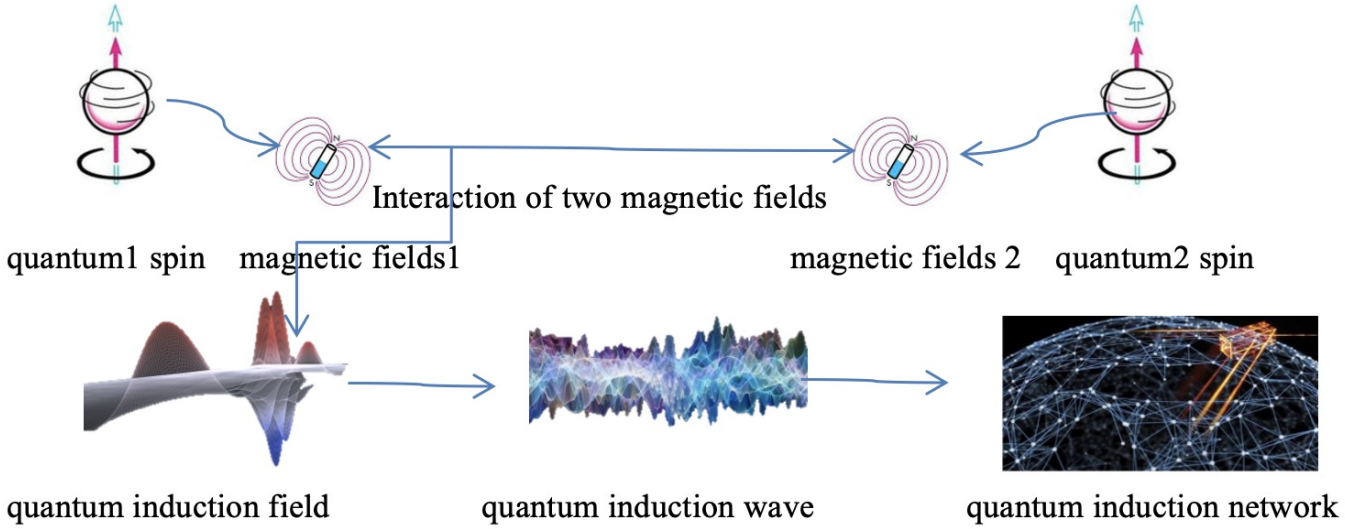

Figure 2. Schematic diagram of quantum induction network construction

A recent study published in Nature on 1 September 2021 found that spin particles can "sense" each other at distances many times greater than the interatomic distance [19]. The study suggests that the collective motion of spins generated by spin interactions, known as spin waves, can be used for information transport and processing [20]. And super-entanglement, in which multiple degrees of freedom are entangled simultaneously [21], can be used to transmit and process information in parallel, increasing the amount of information carried by photons [22]. Recent research shows that scientists have successfully entangled multiple ultracold atoms in laser traps and can connect these entangled pairs into more complex structures such as one-dimensional atomic chains and two-dimensional atomic squares [23]. Based on this, life bodies and non-life bodies can interact with each other at a distance without any contact.

3.2. Quantum Induction Network Architecture

The quantum induction network system utilizes entangled quantum pairs to generate spin waves. It utilizes the quantum induction field as a transmission medium to establish connection relationships and transmit information. For instance, for entangled quantum pairs A and B, if quantum A is disturbed, the spin wave generated by A will be immediately transmitted to quantum B using the quantum induction wave as the carrier. This transmission will trigger quantum B to spin accordingly, thus establishing a temporary correlation between A and B, and then creating a transmission channel. The process is vice versa.

The quantum induction network communication system is composed of a quantum state generator for creating entangled quantum states, a quantum measuring device, a quantum perturbation device, a quantum information source, and a quantum information. The basic topological structure of this network involves creating an inverted tree structure based on a star structure centered around a certain individual centered and then forming a more complex hybrid structure through interconnection[18]. There are three fundamental methods for sending and receiving information:

1. 1-on-1 Transmission: The sender and receiver transmit information in a 1-to-1 manner, as shown in Figure 3.

Figure 3. Sending and Receiving Information in a 1-on-1 Setting

2. 1-to-many transmission: Multiple/1 senders and 1/ multiple receivers transmit information, as shown in Figure 4 and Figure 5.

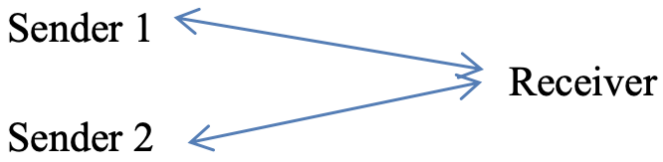

Figure 4. Multiple senders and 1 receiver transmitting information

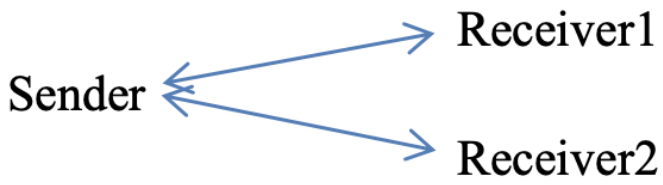

Figure 5. 1 senders and multiple receivers transmitting information

3. Many-to-many transmission: multiple senders and multiple receivers transmit information. As shown in Figure 6.

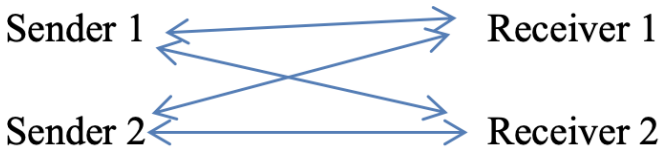

Figure 6. multiple senders and multiple receivers transmitting information

The storage of quantum entangled states is the most critical aspect of such networks. Currently, many systems, such as atomic systems [24][25], semiconductor quantum dots [26][27][28], superconducting circuits [29][30], etc., can be used as quantum storage. In this paper, the quantum storage device only stores the entangled states of quanta and does not require a quantum repeater for relay transmission of quantum information. A group of researchers at TU Delft and Element Six have successfully demonstrated a fully controllable ten-qubit spin register with up to one minute of quantum storage. Their findings, published in Physical Review X, could pave the way for the development of larger but controllable quantum registers [31]. Researchers at Sorbonne University in Paris have achieved efficient reversible transfer of quantum entanglement in two quantum memories, and a team of researchers at the Kastler Brossel Laboratory has demonstrated that "entangled" beams of light can be stored and retrieved in two quantum memories with a total efficiency of up to 85

percent [32]. In 2021, Chuanfeng Li and Zongquan Zhou's group at the University of Science and Technology of China (USTC), led by academician Guangcan Guo, demonstrated that a noiseless photonic echo quantum memory features spin-wave storage, ease of operation, and high storage fidelity [33].

The information transmission in this study is completely different from current quantum information transmission methods. Quantum information transmission includes quantum entanglement transmission, quantum invisible state transmission, and quantum state transmission. Regardless of the method used, what is transmitted is not classical information but quantum information carried by quantum states, which cannot be used to transmit actual matter or energy. In the information transmission proposed in this paper, a quantum induction network is first constructed through the induction wave generated by quantum entanglement. Then, the classical information to be transmitted is resonated with the spin wave generated by certain entangled quanta through sound waves or brain waves and instantly transmitted to another quantum with an entanglement relationship in order to realize the interconnection with all things.

4. Based on frequency resonance technology transmission controls sound signals

4.1. The Role of Resonance

In radio communications, the phenomenon of resonance is widely utilized to improve signal transmission efficiency. For example, by adjusting the length of an antenna to match the wavelength of an electromagnetic wave, higher signal transmission efficiency can be achieved. This matching process is essentially a resonance phenomenon. Manipulation of qubits involves resonance with a quantum system at a specific frequency to enable precise manipulation of the qubits and execution of quantum algorithms. The vibrations, rotations, and weak interactions between biomolecules such as proteins, DNA, RNA, lipids, and sugars in biological tissues (hydrogen bonds, van der Waals forces, etc.) are located in the THz frequency range. Electromagnetic waves (terahertz waves) with frequencies ranging from 0.1-10 THz and wavelengths between 3-0.03 mm can interact with these biomolecules to produce resonance [34] Brain waves generated by the human brain during thinking activities will exhibit a resonance phenomenon.

Similar resonance phenomena are equally generally in other animals as well. For instance, the transmission of brain waves among animals and the exchange of information are closely linked to resonance. Scientists suggest that mammalian consciousness is associated with a variety of neural synchronizations [35]. The frequency of large-scale neuronal firing in the human brain can be measured. When the frequency of the human brain is highly consistent with one or several frequencies of some entangled quantum pairs within the body, resonance occurs. Consequently, consciousness can affect this quantum through the fluctuation of the brain, and then affect the fluctuations of other quantum having entanglement relationship with this quantum so that a connection relationship can be established between them. In the quantum induction network, information can be transmitted and communicated through resonance between human brain waves or sound waves and the induction waves of other life body, non-life body. As shown in Figure 7.

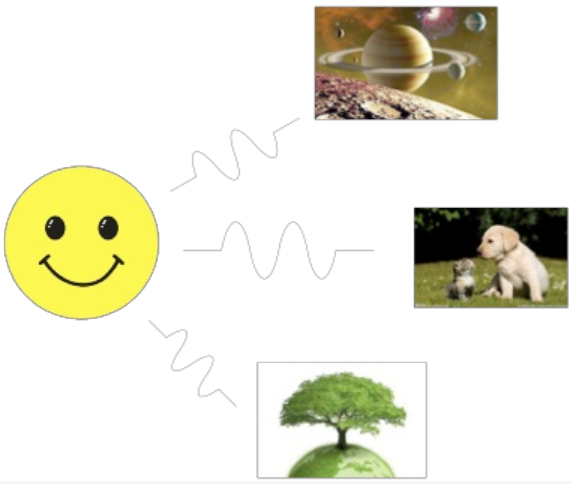

Figure 7. Human's brain waves resonate with induction waves of other living and non-living bodies

4.2. Transmission of voice control signals

Sound generally refers to sound waves generated by object vibration, which propagate through air or other media to the human ear or other receivers and are perceived as auditory signals. Voice specifically refers to the sound produced by human speech, which is a socially significant sound produced by the human vocal organs[36]. The Nature sub-journal Scientific Reports reported on a new technological advancement: by monitoring brain waves, AI can restore the sound you hear, and can convert brain activity into speech for playback [37]. Sound and its applications in communication have contributed significantly to shaping ecology, evolution, behavior, and ultimately the success of many animal species. Almost all communications rely on waves of some kind, and sound waves are one of the best examples [38].

In addition to this, people and objects can also communicate with each other through related equipment. The current sound control technology is the use of sound waves transmitted to the surface of an object, so that the material of the substance is charged, so that the sound waves are changed, so as to make sound-sensitive sensors, and then with a voice recognition system and some control devices, the formation of the sound control system [39]. An acoustic control system operates devices or executes tasks based on voice commands. Its functionality typically incorporates speech recognition technology, signal processing algorithms, and machine learning algorithms. These algorithms can perform feature extraction, pattern recognition, and command parsing on voice-controlled signals. While the latest voice recognition technology can distinguish the pronunciation of more than 92% of people, this does not indicate that users and voice-controlled electrical equipment can engage in natural conversations similar to those between people.

In solid-state physics, sound waves can be considered as quantized excitations, known as phonons. Quantized sound waves (mechanical waves) are referred to as sound quanta or phonons. Phonons are a type of quasiparticle. Some of their properties are similar to those of photons, obeying Bose-Einstein statistics and exhibiting wave-particle duality [40]. They can also interact with other particles such as electrons and photons. The research group led by Professor Li Pengbo from the School of Physics at Xi'an Jiaotong University has proposed a new mechanism for achieving spin-phonon chiral interaction, with research indicating that quasi-chiral phonon-matter interactions can occur when spin resonates with

energy bands [41]. Moreover, other research teams have made progress in the field of quantum acoustodynamics, developing a hybrid acoustic device that replaces acoustic resonators with phononic crystals or acoustic metamaterials, significantly simplifying the device structure. This device is capable of facilitating interactions between qubits and surface acoustic wave (SAW) phononic crystals, providing new devices for quantum acoustic research [42].

Different from the above communication methods, in the quantum induction network, the transmission of sound is achieved by the sender acquiring someone's language sound (sound wave). This sound wave then resonates with the spin wave produced by a specific quantum A, transmitting it instantaneously to the receiver instantaneously, and a certain quantum B, which is in a quantum entanglement relationship with A, generates an induced wave. Upon receiving the signal, the receiver receives the signal, it separated the sound (sound wave), and then communicates with the relevant person or thing. Vice versa. As shown in Figure 8.

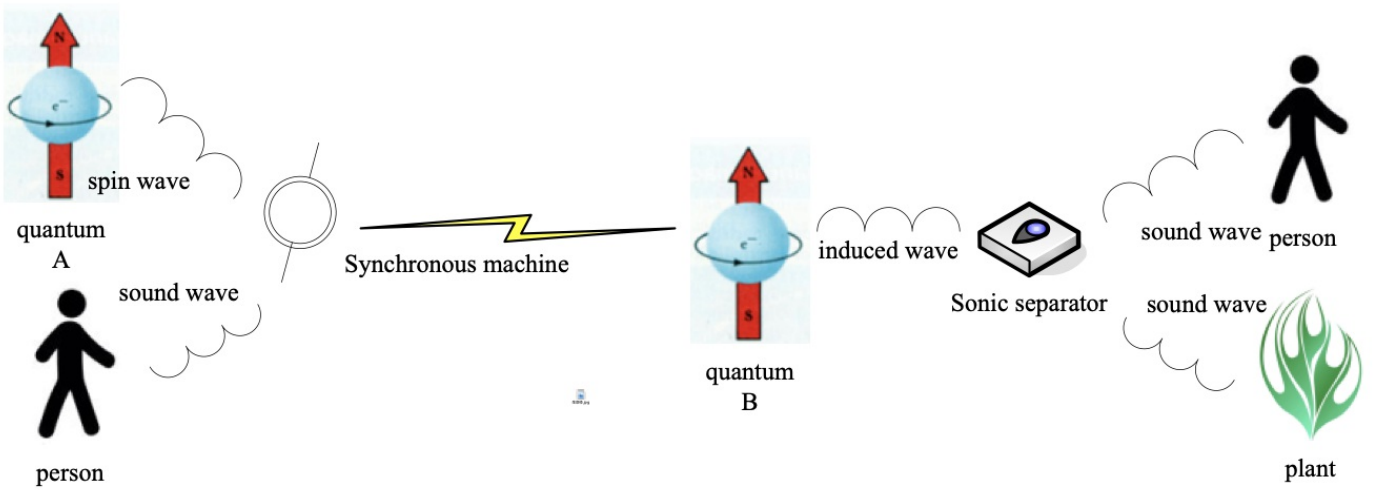

Figure 8. Transmission of voice control signals

The premise of realizing this communication is that there is at least one pair of entangled quanta between the sender and the receiver, with one on the sender's side and the other on the receiver's side. In this way, when one entangled quantum is perturbed to spin, the other entangled quantum can immediately sense changes for it, no matter how far apart. And generate fluctuations, establishes a connection, and facilitates the transmission of voice-controlled information. Vice versa. So as to achieve the purpose of two-way communication.

4.3. Acoustic Resonance and Spin Wave Resonance Model

The resonance phenomenon of waves involves the interaction of two or more waves at a specific frequency, resulting in a significantly enhanced vibration.

4.3.1. *Self -spin wave resonance model*

Spin wave resonance models describe the behavior of spin waves in magnetic materials when subjected to an external

magnetic field. In 1958, Kittel predicted [43] that as long as certain surface pinning conditions were met, magnetic thin films can observe spin wave resonance phenomena in a uniform alternating field. That same year, Seavey and Tennenwald were the first to observe multiple spin wave resonance excitations on permalloy thin films [44]. New models of spin wave resonance excitations include the asymmetric volume inhomogeneity (AVI) model and the surface-volume inhomogeneity (S-VI) model. These models utilize the W. K. B. Method and Weber asymptotic solution method to discuss the position and intensity of spin wave resonance spectra in magnetic thin films [45].

The spin wave resonance frequency f in a simple one-dimensional model can be calculated using the formula:

$$f = \frac{\gamma \hbar \omega}{2\pi}$$

Where:

- f is the spin wave resonance frequency.
- γ is the gyromagnetic ratio.
- $\hbar$ is the reduced Planck constant.
- ω is the angular frequency of the applied magnetic field.

4.3.2. *Acoustic resonance:*

In acoustics, resonance occurs when the frequency of sound waves matches the natural frequency of a cavity or pipeline, resulting in the enhancement of sound waves in that space. In a simple acoustic resonance model, the resonant frequency f can be calculated using the formula:

$$f = \frac{v}{2L}$$

Where:

- f is the resonant frequency in hertz (Hz), (Hz).
- v is the speed of sound in the medium (typically air) in meters per second (m/s).
- L is the effective length of the resonating air column in meters.

5. Research Scheme

5.1. Research objectives and research content

5.1.1. *Research objectives*

Analyzing and exploring the significance that based on quantum entanglement effects and utilizing voice control technology for network communication to achieve the interconnection of all things. Designing several schemes to

establish a quantum communication link through the resonance of entangled quantum spin waves and sound waves, transmitting human voice sound signals, and controlling remote devices or communicating with others in real-time within the quantum link. Constructing a quantum communication network system based on voice control technology.

5.1.2. *Research content*

The main contents of this study include:

1. Analyzing and exploring the significance that based on quantum entanglement effects and utilizing voice control technology for network communication to achieve the interconnection of all things.
2. Exploring the possibility and feasibility of transmitting information by interacting with other quanta through the weak magnetic field generated by quantum spin waves, generating induction waves, and then establishing a quantum induction network through the interconnection of the induction waves, thereby transmitting information;
3. To explore the possibility and feasibility of wireless electromagnetic waves resonating with the spin waves generated by a certain entangled quantum and transmitting them instantaneously to another quantum that has an entanglement relationship with that quantum;
4. To explore the possibility and feasibility of resonating the sound wave generated by the human being's voice with the spin wave generated by a certain entangled quantum and transmitting it instantaneously to another quantum that has an entanglement relationship with that quantum;
5. Designing a research plan to verify that no matter how far apart the sender and receiver are, the command can reach the receiver instantly, have an impact on the receiver, and the command is uncopyable, unalterable, and other characteristics of quantum entanglement.
6. Designing a research plan to manipulate remote devices in a quantum induction network using human being's voice, or to communicate with other living and non-living beings.

5.2. Research ideas

The research of this project is divided into two parts:

The quantum part: First, we need to make or find entangled quantum pairs to make quantum connections. Then the entangled quanta will be embedded in a particular object or human body to make a connection between them. And if one of the quanta is disturbed to produce spin waves, the corresponding other quantum will also change accordingly. Thus, a correlation relationship based on quantum entanglement is created between these people and objects.

Speech control section: mainly includes the acquisition and analysis of speech signals. How the spin wave of entangled quantum resonates with the acoustic wave. And how the acoustic wave signal from the sender is transmitted to the receiver through the quantum link. How the receiver separates the spin wave of the entangled quantum from the acoustic wave. How the receiver transmits the acoustic wave to the destination object so that it changes accordingly.

The main problems to be solved are:

The acquisition of entangled quantum pairs, the resonance of entangled quantum spin waves with sound waves, the transmission of sound wave signals, and the impact of sound wave signals on remote devices or people.

The key technologies to be broken include

1. Making or finding entangled quantum pairs and constructing quantum links.
2. The spin wave produced by the entangled quantum to resonate with the sound wave produced by the person's voice.
3. Through the person's voice, in a quantum link, to manipulate remote devices or communicate with others in real time.

5.3. Experimental basis

5.3.1. *Measurement of Matter wave related parameters*

The French physicist De Broglie proposed a hypothesis which point out that all microscopic particles have wave-particle duality, and any matter can fluctuate.

1) Formula for calculating wavelength of matter wave

The de Broglie formula shows that the moving particles with mass m and velocity V have fluctuation, which satisfies the following relations:

$$\lambda = \frac{\frac{c^2}{v}}{\frac{mc^2}{h}} = \frac{h}{mv} = \frac{h}{p}$$

Where: λ: wavelength; C: speed of light; V: speed; M: mass; H: Planck constant; p: momentum.

2) Matter wave frequency calculation formula

The frequency of a single photon can be expressed as: $f = \varepsilon / h = v / \lambda = 1 / T$

Where: f: frequency; ε: energy; h: Planck constant; v: speed; λ: wavelength; T period.

3) Matter wave phase velocity calculation formula

$$Vp = f\lambda = \omega / K = \omega / (2\pi)$$

Where: Vp: phase velocity; f: frequency; λ: wavelength; ω: angular frequency; K: wave vector

- By designing the experimental scheme, the phase velocity, wavelength, frequency and other parameters of the entangled quantum pair can be measured.

5.3.2. *Particle spin angular momentum calculation*

Each particle has the unique spin. The spin angular momentum of a particle follows the general law of angular

momentum.

Where s is the spin quantum number, $\hbar$ is the approximate Planck constant.

5.3.3. *Measurement of sound wave related parameters*

Sound waves are the form of sound propagation, and sound waves travel in all directions with the help of various media.

1) Calculation formula of wavelength of sound wave

$$\lambda = v/f$$

Where: λ is the wavelength, v is the speed of the wave, and f is the frequency.

2) Calculation formula of sound intensity

$$I = P/A$$

Where: P is the power, A is the area through which the sound wave passes.

3) Calculation formula of sound propagation speed

The propagation speed of sound in different media is different.

$$V = \sqrt{(P / D)}$$

Where: V is the velocity of the acoustic wave in the gas, P is the gas pressure, and D is the gas density.

- by designing the experimental scheme, we can measure the wavelength, frequency, sound intensity and other parameters of someone's voice.

5.4. Choosing quantum communication materials

Quantum is a collective term for fundamental particles such as photons, electrons and neutrinos, all of which have quantum states and can be used to store, transmit and process quantum information. Therefore, in theory, they can all be used for quantum communication.

Currently, the fundamental particles used for quantum communication are mainly photons, electrons and ions. These particles can be prepared into quantum states and transported, enabling applications such as information transmission and encryption in quantum communication. Among these, photons are one of the most widely used fundamental particles and have been applied in many fields such as quantum network communication. Physicists Alain Aspect, John F. Clauser and Anton Zeilinger were jointly awarded the 2022 Nobel Prize in Physics in recognition of their "breaking the limits of Bell's Inequality and pioneering the field of quantum information research through a series of experiments on photon entanglement". The Chinese Academy of Sciences at the University of Science and Technology of China has made significant progress in the study of molecular quantum entanglement, which allows molecules to convert quantum information between quantum bits of different frequencies to achieve hybrid quantum systems [46]. There have also been

significant breakthroughs in neutrino-based communication.

Neutrinos are one of the most fundamental particles in nature. Uncharged, extremely small in mass, with a spin of 1/2, very light in mass, moving at a speed close to the speed of light, with very weak interactions with other substances. This allows neutrinos to penetrate the Earth's crust, oceans and ionosphere, enabling communication that ignores media obstacles.The coherence length of neutrinos is also very long, with good directionality and no attenuation during propagation, making them the preferred material for secure ultra-long distance communication. In November 2012, American scientists used neutrino beams to transmit information that could pass directly through Earth or other planets, achieving the first communication using neutrinos [47]. In another study, scientists observed quantum entanglement between different particles for the first time, including entanglement between mixed neutrinos [48].However, most of the neutrinos on Earth come from nuclear fusion activities inside the Sun, so it is still difficult to obtain a neutrino beam with high beam intensity and energy using simple methods, as well as how to effectively control and ignite it.

Photons have better controllability and stability, and fast transmission speeds. Photons also have a very high number of quantum bits and can carry more information. Quantum communication using photons can achieve high-speed, ultra-secure communication, and applications such as quantum key distribution and invisible state transfer have already been realised. Although photonic communication also suffers from problems such as limited transmission distance and low transmission efficiency, this study proposes to use photons as the basic material for communication to conduct related research.

5.5. Implementation of the research

The research will be carried out in three phases.

- Phase I: Preparation and distribution of entangled quantum pairs

First, an entangled pair of particles will be prepared by some physical process (e.g. spontaneous parametric down-conversion, electron-hole pairs of quantum dots, etc.). The pair of entangled particles is then sent to two different locations. This can be achieved in a number of ways, for example by transporting the separated particles to different locations via optical fibres, free space or other media. In China's "Mozi" quantum science experiment satellite, entangled photons are generated and sent via a quantum entanglement transmitter to two separate ground stations on Earth, far away from each other.

- Stage 2: Wireless electromagnetic waves resonate with spin waves generated by entangled quanta to transmit information.

Wireless electromagnetic wave is the main technology for network construction and is widely used. We can verify the feasibility of quantum induction networks by resonating wireless electromagnetic waves with spin waves generated by a certain entangled quantum, and then conduct information transmission experiments.

- Step 3: Resonance of human sound waves with spin waves generated by entangled quanta for information

transmission.

Since most living bodies and non-living bodies can emit sound, and sound is one of the most basic means of communication in nature, the feasibility of connecting human beings with life bodies and non-life bodies will be verified by resonating human sound waves with spin waves generated by a certain entangled quantum.

5.6. Case study

Remote control of a device using a person's voice.

5.6.1. *Experimental procedure*

1. Embed the entangled quantum pair A, B in the human body P and the device T, respectively.
2. T is an active/passive intelligent device in which there is an automatic sound receiver/player.
3. Disturb the quantum A and measure the frequency at which A's spin fluctuates at this time (phase velocity, wavelength, angular frequency, and other parameters).
4. P gives a command to measure the frequency of this sound wave and other parameters.
5. Make this sound wave resonate with the wave generated by the spin of A at this time.
6. Observe quantum B, see if it changes, and measure its wave form, frequency and other parameters.
7. Separate the sound wave in device T and restore it to the sound of P.
8. Observe the device T to see if it can perform relevant operations according to the instruction of P.

5.6.2. *Example*

Xiao Li ordered a certain camera located 80000 kilometers away to rotate in order to monitor the situation on the scene at all times. As shown in Figure 9.

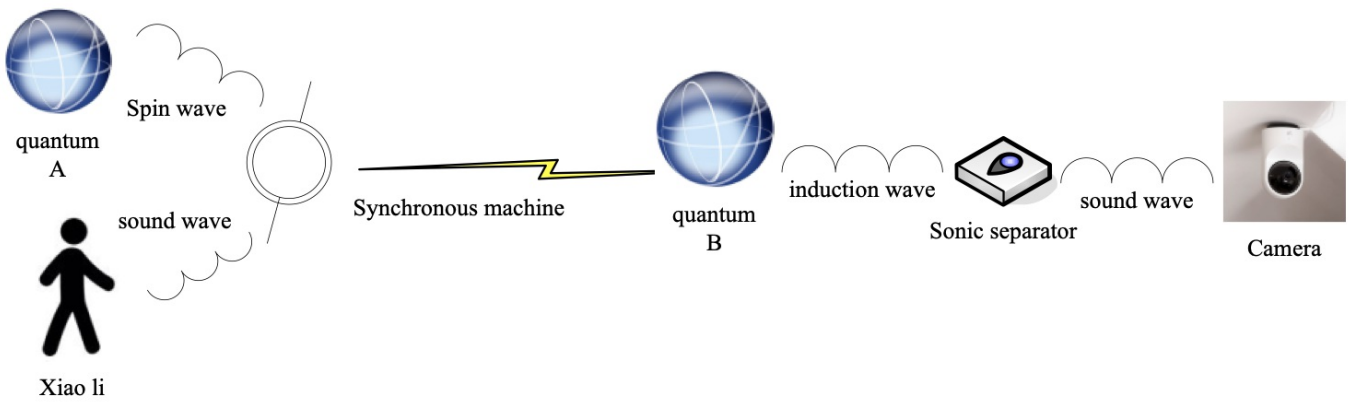

Figure 9. The person remotely controls the camera rotation

1. There are entangled quantum pairs A and B between Xiao Li and the camera. Among them, quantum A is embedded

in Xiao Li's body and quantum B is embedded in the camera.

2. Xiao Li instructed the camera to turn to the left. This disturbs quantum A inside Li, causing A's spin wave to resonate with Xiao Li's sound wave. Despite the distance, quantum B immediately senses the movement of A and spins, generating a spin wave and establishing a communication link with quantum A. Xiao Li's sound wave is then transmitted to the camera.
3. The acoustic wave separator in the camera separates Xiao Li's sound wave and reduces it to Xiao Li's voice, causing the camera to move to the left.

6. Application Scenario

Due to the properties of quantum entanglement, instructions given by sound can be received instantly, no matter how far away the two locations are, and are secure and reliable. This technology can be used in a wide variety of scenarios.

- Scenario 1: Space exploration.

For example, one quantum of the entangled quantum pair is sent to the spacecraft, and the other quantum is sent to the command centre on the ground. The commander then sends voice commands to instruct the equipment in the spacecraft to perform the relevant operations.

- Scenario 2: Protecting nature

For example, one quantum of the entangled quantum pair is sent to a volcano, and the other quantum is sent to a monitoring centre on the ground. The monitor then sends commands through the voice, collects the sound from the volcano and monitors the volcano for possible eruptions and warns of them.

Similarly, this technology could be used for deep-sea exploration, interplanetary exploration, earthquake detection and other scenarios.

- Scenario 3: Protection and communication of flora and fauna

Protection of plants and animals: one quantum of the entangled quantum pair is embedded in a device and placed around the animal or plant. The other quantum is sent to a monitoring centre on the ground. In the event of an adverse environmental situation, voice commands can be sent to operate the device to protect the animal or plant.

Communication with plants and animals: one quantum of the entangled quantum pair is embedded in an animal or plant and the other quantum is sent to the ground monitoring centre. Sending messages to plants and animals through sound, and collecting sounds from plants and animals for research. Wherever the animal or plant is, the situation can be quickly understood and communicated accordingly.

- Scenario 4: Military

One quantum of the entangled quantum pair is embedded in some weapons, and the other quantum is sent to a

command centre. The equipment could then be controlled by voice and attacked remotely. This would be independent of space, weather and other circumstances.

7. Problems faced

This research concerns the preparation, distribution, storage and transmission of quantum entangled pairs, quantum spin wave and acoustic wave resonance, the construction of quantum induction networks, and the transmission of information in quantum induction networks.

7.1. Problems associated with the preparation of quantum entangled pairs, etc.

The problems include the limitation of manipulability, the loss and noise in long-distance transmission, the stability and capacity limitation of quantum memory, and the influence of environmental factors on the coherence of entangled states, etc.

Regarding the preparation of quantum entangled pairs, quantum systems are susceptible to the influence of the external environment, leading to rapid decoherence of the entangled state. The prepared entangled states can be affected by various noises and distortions, reducing the fidelity of the entanglement.

With regard to the storage of entangled quantum pairs, the storage of entangled quantum pairs must be carried out in an extremely low temperature and stable environment, which requires extremely high fidelity and long coherence time. The current state of quantum memory development is not yet sufficient to achieve stable storage of large numbers of entangled quantum bits for long periods of time. This limits the scale and efficiency of quantum information processing and quantum communication networks.

Regarding the transmission of quantum entanglement pairs, although there is no need to transmit the state of quantum entanglement in this study, the distribution process of quantum entanglement pairs also faces the problems of loss and noise in long-distance transmission. Highly stable and precise control is still required, otherwise it will be susceptible to external environmental disturbances.

7.2. Problems related to quantum spin waves and sound wave resonance

How to timely and accurately measure the frequency of the spin wave of a single quantum in an entangled quantum pair.

When a person makes a sound, how to keep the frequency of the sound waves consistent with the frequency of the spin waves of the above quantum and create resonance.

How to separate the quantum spin waves from the sound waves at the receiving end.

How to interact with human beings or life bodies and non-life bodies through sound waves

7.3. Problems related to the construction of quantum induction networks

Based on the existing theories and techniques, this study proposes some new concepts, techniques and methods, which are the authors' own innovations and need to be further verified by experiments.

How to measure the quantum induction field generated by quantum spin.

How to confirm the existence of quantum induction waves.

How to determine that quantum induction waves are connected to form a quantum induction network.

7.4. The security problem facing information transmission in the quantum entanglement network

Although the communication technology based on quantum entanglement has extremely high security and transmission speed in theory, it still faces many practical problems and challenges.

1. Side-channel attack

Attackers can carry out attacks by analysing information leaked during the physical implementation or operation of a quantum system.

2. Quantum devices may have weaknesses that can be exploited.

There may be backdoors or vulnerabilities in associated devices and software, network management interfaces, etc., or quantum memory is less stable and can be exploited to attack the system.

3. Problems with sound waves in transmission

Sound waves are susceptible to interference from background noise during transmission, which may not only reduce the clarity of the communication but also mask eavesdropping.

Sound waves can easily leak and be picked up by eavesdropping devices.

Sound waves can be used as an attack vector to control or hack smart devices by sending sound waves at specific frequencies.

Acoustic waves are subject to energy loss, absorption loss and diffraction loss during transmission, which can limit the distance and quality of sound waves.

In particular, today's prevention measures, such as technical means like sound encryption, authentication, access control, etc., are not very useful in the quantum induction network. This is because the main purpose of transmitting information through the quantum induction network is not only to enable human-to-human communication, but also to communicate with plants, animals and inanimate objects in nature.

8. Discussion and outlook

Quantum Induction Field, Quantum Induction Wave, Quantum Induction Network are new concepts proposed by the authors, and the technology of information exchange through the resonance of entangled quantum spin waves and acoustic waves is not yet appear in the world. This study is proposed on the basis of the existing theoretical framework as well as related technologies. Quantum induction network is a kind of complex network system. Due to the special characteristics of the preparation and distribution of entangled quantum pairs, it will only be a useful addition to the existing network system in future applications, just as wireless networks are a useful addition to wired networks.

Compared to traditional communication technologies, quantum communication has the advantages of strong anti-interference, transmission capability, high transmission efficiency, large capacity and high speed, and can theoretically transmit an unlimited number of messages. A team led by Prof. Harald Weinfurter of the University of Munich and Prof. Christoph Becher of the University of Saarland, Germany, has achieved entanglement distribution between two remote quantum nodes over a 33-kilometre-long telecommunication fibre. This result shows that entanglement distribution is feasible in communication fibre links[49]. The team at the University of Science and Technology of China achieved inter-memory entanglement at a distance of 12.5 kilometres, outperforming the above work in terms of link efficiency and other aspects[50]. In 2020, the US government proposed a plan to build a quantum internet; China is also accelerating the construction of a quantum communication system. In January 2021, the University of Science and Technology of China announced the successful construction of a 4,600-kilometre quantum communication network. China's quantum secure communication industry is at the forefront of the world in the planning and construction of quantum secure communication networks and satellite quantum communication [51]. The use of voice-controlled technology to transmit information in the network has been realised in computer networks, communication networks, the Internet of Things and even quantum networks. However, human beings have never communicated directly with other life bodies and non-life bodies over long distances using sound. The main feature of this type of communication is that, due to the properties of quantum entanglement, there is no need for relay transmission through intermediate devices in networks, no matter how far apart the two communicating parties are. Communication takes place directly in the form of a wireless network, using the quantum induction wave as the transmission medium. And there is no need to worry about the information being intercepted, tampered with or anything else. This is of great practical importance and value. Of course, this research still faces many technical and theoretical challenges, which will have to be solved step by step through continuous technological innovation and experimental verification. If this kind of communication method is feasible, it will be possible to realise the interconnectedness of man and everything through the consciousness of thinking.

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