Quantum Teleportation Using Quantum Dot System

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Abstract—**Quantum Teleportation (QT) is a secure communi-
cation technology that uses quantum entanglement concepts to
create an system that be used to send messages in binary form to
any part of the universe without using any medium . This system
can change the mode of the communication or provide the way
to communicate between light year distances . We present our
work here, which is based on a Quantum Entanglement concept
.**

Index Terms—**QT , Entanglement , ASCII**

I. INTRODUCTION

Quantum Teleportation (QT) is the main idea around which
this paper revolves.Quantum teleportation is an entanglement-
assisted teleportation. It is a technique used to transfer in-
formation on a quantum level, usually from one particle (or
series of particles) to another particle (or series of particles) in
another location via quantum entanglement. Its distinguishing
feature is that it can transmit the information in binary
form in quantum superposition, which is useful for quantum
communication and computation. More precisely, quantum
teleportation is a quantum protocol by which the information
on a qubit A (quantum bit, a two-level quantum system) is
transmitted exactly (in principle) to another qubit B. It involves
the generation of a secure data transfer which will be unique
to any two users at a time or cross the every limits of the data
transfer. The only requirement for the QT is the two entangled
electron. Quantum Teleportation share data in terms of binary
form to the any part of the universe without using any medium
.

II. HARDWARE AND SOFTWARE DESCRIPTION

We didn't need any hardware requirements because we
simulated the entire protocol, although we did use Qiskit and
Python for the simulation. Qiskit is an open source software
development kit (SDK) for simulating and running algorithms
and applications on IBM Quantum computers.

A. Abbreviations and Acronyms

QT - Quantum Teleportation

SDK - Software Development Kit

B. Equations

$$|\psi>1 = \alpha| \leftrightarrow >1 + \beta| \updownarrow > \qquad (1)$$

$$|\phi + >AB = 1/\sqrt{2}(|00>AB + |11>AB) \qquad (2)$$

$$|\psi E> = 1/\sqrt{2}(| \uparrow >\otimes| \downarrow >-| \downarrow >\otimes| \uparrow >) Entangled state \qquad (3)$$

$$|\psi N> = 1/\sqrt{2}(| \uparrow >\otimes| \uparrow >+| \uparrow >\otimes| \downarrow >) Non Entangled state \qquad (4)$$

$$|\psi>A = \alpha|0> + \beta|1>. \qquad (5)$$

$$|\psi CB> = 1/\sqrt{2}(c\dagger C \uparrow +c\dagger B \uparrow)1/\sqrt{2}(c\dagger C \downarrow +c\dagger B \downarrow)|0> \qquad (6)$$

C. Entangled Electron Protocol

Entangled electron protocol Alice and Bob are two users
with Alice being the sender and Bob being the reciever. Alice
has the one entangled electron in quantum state 1 (moving in
clockwise direction) and Bob has the another entangled elec-
tron in quantum state 0 (moving in anti clockwise direction).
As the electrons is entangled when we change the state 1 from
0 then the state of another electron change from quantum state
0 to quantum state 1 . Alice convert the text data into a binary
code of the data transferd using ASCII Code . Alice choose the
state of the electron to data transfer and Bob receive the state
of the electron in opposite state . As Alice have quantum state
1 in the electron and Bob has quantum state 0 state when Alice
change the quantum state 1 to quantum state 0 then there is
change in the bob electron from quantum state 0 to quantum
state 1 with in fraction of time .Where there is no medium
between these electron and the electrons may be present in
the any part of the universe . Alice has the data "Ankush"
which convert into binary using ASCII value [01000001
01101110 01101011 01110101 01110011 01101000] .Alice
has to make the quantum state of the electron[10111110
10010001 10010100 10001010 10001010 10010111] with 1
second interval . Alice has to transfer data to Bob . When Alice
change the quantum state of the electron data is transfered in

the form of the quantum state of the electron to Bob . Bob get the binary number [01000001 01101110 01101011 01110101 01110011 01101000] which can further converted into text using ASCII code which is "Ankush" . There is no possibility of the destroying the entangled electron because the states of the electrons are not same as both have 0.5 percent possibility . Both of the electrons are placed in the system where the state of the electrons are captured and recorded in the system .

D. Implementation

[1] Split a 0 state electron into two so that both having opposite spin (0 and 1') so that total spin in 0 .
[2] We can have only two user with one host and another one is receiver .
[3] Data can be transferred to the any part of the universe where entangled electron is present .
[4] Hence other users won't be able to eavesdrop or read the messages transmitted between any user and host.
[5] Required System to manage entangled electrons and detect the state of the electrons .

E. Code Output

Fig. 1. Enter text for conversion into binary.

Fig. 2. Binary code for input text.

III. DRAWBACKS OF TELEPORTATION USING ENTANGLED ELECTRON METHOD

[1] Binary code of the input is long with each character having 8 numbers .
[2] Time of the Input of the data is high as large number of the binary number is teleport to share data .
[3] Image or video type of data can't be shared using Quantum Entangled Electron Method .
[4] Need of a machine to automatically detect the state of the electron and capture it as it change with time .

IV. PROBLEM SOLVED USING ENTANGLED ELECTRON METHOD

[1] Data can be transfered to the any part of the universe .
[2] Data can't be accessed by third person .
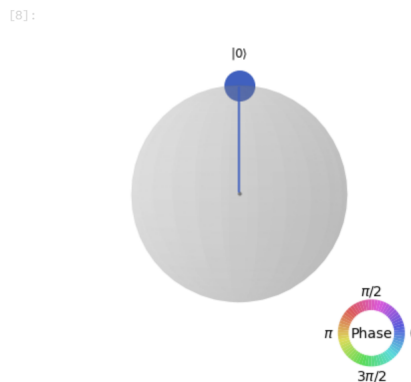[3] Data Transfering time is negligible as electron change the state when entangled electron change state .

Fig. 3. Sender and Receiver data.

Fig. 4. Data received by Bob.

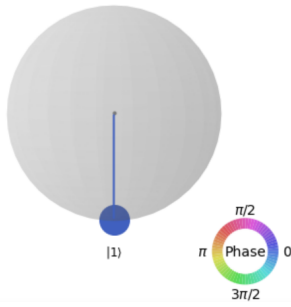Fig. 5. Qubit with quantum state 0 .

[11]:

Fig. 6. Qubit with quantum state 1.

V. RESULTS AND DISCUSSION

Through this project we successfully demonstrated how the data is transfered using the principles of Quantum mechanics and Quantum information sciences. The work is still in progress as we try to achieve still better efficiency using entanglement and superposition principles. The message should also be transformed by implementing quantum teleportation in three-electron system . Fig.7 shows that the probability of each state 1 and 0 is 0.5 . So there is no chance of destroying the entanglement as the state of both of the electron does't become same .
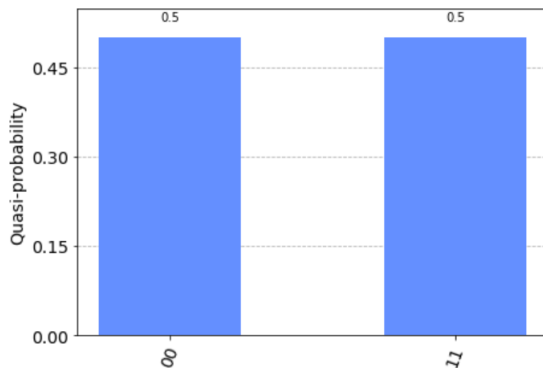
[6]:

Fig. 7. Probability of Quantum state 0 and 1.

VI. CONCLUSIONS

We have explored an unhackable and no limit system through which military applications or space exploration can be benefited largely in communication and data transfering . This project was on using Quantum Entanglement to Send and Receive the data in the binary number form . We are currently in progress to explore other QT protocols as well. We conclude that data is transferd from one electron to the another entangled electron in binary form .

VII. ACKNOWLEDGMENT

VIII. REFERENCES

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[2] https://www.chem.purdue.edu/kais/paper/Kais-Chapter.pdf

[3] https://github.com/isfonzar/quantum-teleportation

[4] https://www.nature.com/articles/37539