МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
СУМСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ
КАФЕДРА ІНОЗЕМНИХ МОВ
ЛІНГВІСТИЧНИЙ НАВЧАЛЬНО-МЕТОДИЧНИЙ ЦЕНТР

МАТЕРІАЛИ
VIII МІЖВУЗІВСЬКОЇ НАУКОВО-ПРАКТИЧНОЇ
КОНФЕРЕНЦІЇ
ЛІНГВІСТИЧНОГО НАВЧАЛЬНО-МЕТОДИЧНОГО ЦЕНТРУ
КАФЕДРИ ІНОЗЕМНИХ МОВ

“TO LIVE IN A SAFER WORLD”

(Суми, 28 березня 2014 року)

The eighth scientific practical student`s, postgraduate’s and teacher’s
LSNC conference

QUANTUMCOMPUTING

K.R. Zimokos– Sumy State University, group IN-21
I. A. Bashlak – EL Adviser

Computers built on the principles of quantum physics promise a revolution on the order of the invention of the microprocessor or the splitting of the atom. The vast increase in power could revolutionize fields as disparate as medicine, space exploration, and artificial intelligence.

First proposed in the 1970s, quantum computing relies on quantum physics by taking advantage of certain quantum physics properties of atoms or nuclei that allow them to work together as quantum bits, or qubits, to be the computer's processor and memory. By interacting with each other while being isolated from the external environment, qubits can perform certain calculations exponentially faster than conventional computers.

Quantum computing was first theorized less than 30 years ago, by a physicist at the Argonne National Laboratory. Paul Benioff is credited with first applying quantum theory to computers in 1981. Benioff theorized about creating a quantum Turing machine. Most digital computers are based on the Turing Theory. While a normal Turing machine can only perform one calculation at a time, a quantum Turing machine can perform many calculations at once.

Today's computers, like a Turing machine, work by manipulating bits that exist in one of two states: a 0 or a 1. Quantum computers aren't limited to two states; they encode information as quantum bits, or qubits, which can exist in superposition. Quantum computer has the potential to be millions of times more powerful than today's most powerful supercomputers.

This superposition of qubits is what gives quantum computers their inherent parallelism. According to physicist David Deutsch, this parallelism allows a quantum computer to work on a million computations at once, while your desktop PC works on one.

Quantum computers also utilize another aspect of quantum mechanics known as entanglement. To make a practical quantum computer, scientists have to devise ways of making measurements indirectly to preserve the system's integrity. Entanglement provides a potential answer. This allows scientists to know the value of the qubits without actually looking at them.

So, what's the biggest challenge? You need a very good control over individual particles. You can't just shove all the particles together because they would interact with each other in an unpredictable way. You need to be able to trap and direct them, but when the particles interact with the trap itself it makes them lose their information, so you need to make sure that you design the trap well.

Quantum computers could one day replace silicon chips, just like the transistor once replaced the vacuum tube. But for now, the technology required to develop such a quantum computer is beyond our reach. Most research in quantum computing is still very theoretical. However, the potential remains that quantum computers one day could perform, quickly and easily, calculations that are incredibly time-consuming on conventional computers.

Quantum computing is not well suited for tasks such as word processing and email, but it is ideal for tasks such as cryptography and modeling and indexing very large databases.

Will quantum computers look like our desktops and laptops do now? The very first quantum computers will probably fill a room. It's going to take a while to get to desktops. Really, actually what is going to happen is you are going to have a hybrid laptop with a quantum chip and a classical chip.