Introduction to the Mu-bit

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Content

1. **Definition:**
   Mu-bit is defined here as 'multi-space bit'. It is different from standard meaning of bit in conventional computation, because in Smarandache's multi-space theory, the bit is created simultaneously at multi-spaces.
   This new 'bit' term is different from multi-valued-bit already known in computer technology, for example as MVLong [8][9].
   This new concept is also different from qu-bit from quantum computation terminology [10]. We know that using quantum mechanics logic we could introduce new way of computation with 'qubit' (quantum bit), but the logic remains Neumann. Now from the viewpoint of m-valued multi-space logic, we introduce a new term: 'mu-bit' (from ' multi-space bit').
2. **Conceptual foundation:**
   It is known that multi-valued logic is required to understand the general theory of process [6][7]. Multi-valued atomic variable is also known in theory [12].
   Similarly, multi-space concept could be viewed as an attempt to comprehend various phenomena altogether beyond multi-valuedness..
   In a (finite or infinite) multi-space M, which is a space formed by union of n (where n can be finite or infinitely large), spaces $S_1, S_2, ..., S_n$, we can consider these spaces $S_1, S_2, ..., S_n$ overlapping and a particle P can have a degree of truth t_1 and can be in position p_1 in space S_1, and (t_2, p_2) in space S_2, and so on. Hence the same particle is logically infinite-valued and in infinitely many positions in the same time.

3. **Reasoning:**
   The reason for submitting a different term for this multi-space-bit is as follows. We all know that computer scientists always look for computation beyond Turing machine, and we believe that multi-space-bit from multi-space theory could offer significant theoretical leap beyond Turing machine paradigm.

4. **Theoretical implications**
   The idea was to abandon the notion of 'quantum computation', i.e. to use Neumann logic. We know that scientists began to use Bose condensate to model “quantum bit” but how to extend it to large systems remains unknown. Therefore, the best way is to forgo this “quantum bit” term,

and start from scratch, i.e. using Cantor sets instead.[3] In this context, multi-space hypothesis includes 'infinity' position of bits, which corresponds to Cantor sets, albeit from entirely different viewpoint.
Using the multi-space theory, we could expect to explain wave-particle duality problem in Young interference experiment [4]. It is known that there is a paradox that light could resemble particle (photon) yet it could behave like wave (Fresnel). It becomes apparent that this paradox could be reconciled once we introduce multi-space-bit, that creation of 'bit' will multiply itself into multi-space, which triggers wave pattern in Young slit experiment.

5. Possible practical use

(a) parallel quantum computation [1][2]. We could also think about 'parallel quantum computing' [somehow similar to parallel computer programming]. Since we work in a multi-space $S = S_1 \vee S_2 \vee \ldots \vee S_n$, we may consider a quantum computing in the same time in each space $S_1, S_2, \ldots, S_n$, – connecting this to mu-bit. This is different from standard logic used in quantum computation [10].
(b) theoretical biology: going beyond DNA model;
(c) quantum electrodynamics of wireless communication: advance radio frequency etc.;
(d) advanced brain modeling & human-consciousness theory [5];
(e) new chapter on artificial intelligence, pattern recognition, robotics [7a];
(f) multi-space CMOS [9].
(g) advanced coding/decoding symbolic language beyond multi-valued coder [11].
(h) new logical database design beyond "mutivalued column" [13].
(i) linear model of circuit design with multi-space theory [14].
(j) theoretical economy modeling.

6. Our previous publication

- F. Smarandache, www.gallup.unm.edu/~smarandache/TRANSDIS.TXT (extract from book on multi-spaces)
- W. B. Vasantha Kandasamy & F. Smarandache, *N-Algebraic Structures*, Hexis, 2006.
- F. Smarandache & V. Christianto, *Multi-Valued Logic, Neutrosophy, and Schrodinger equation*, Hexis & Phoenix Publ. 2005. URL ref. http://www.gallup.unm.edu/~smarandache/Schrodinger-book.pdf
- F. Smarandache, www.gallup.unm.edu/~smarandache/physics.htm

7. Other related references

1. http://www.stanford.edu/~eboyden3/mengthesis/thesis1.htm
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3. http://www.earlham.edu/~peters/writing/infinity.htm
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8. Other information

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