Design on a Network on the Lands : With Super Capacitance Sensors on Carbon Fibers Paper

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Abstract:- The authors describe the development and application of A Network on the Lands: By super capacitance sensors on carbon fibers paper. The network was constructed to support the internet of things, above on the 70,000,000 km highway surface adhere to super capacitance sensors on carbon fibers paper, to come true the internet of things, so it can be said A world wild web about the internet of things.

***Keywords**:- A network, super capacitance sensors, carbon fibers paper.*

I. INTRODUCTION

Bosom friend around the World,
The ends of the Earth are near.
Friend without near-far,
Ten thousand miles is still a neighbor!

Above on is a Chinese proverb, original intention is to speak, even across mountains and rivers , through friendship. The World Wide Web is technically implemented, thousands of miles away, and it's more than refrain.

The Internet is the global system of interconnected computer networks that use the Internet protocol suite (TCP/IP) to link devices worldwide. It is a *network of networks* that consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies. The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), electronic mail, telephony, and file sharing.[1]

Research into packet switching, one of the fundamental Internet technologies started in the early 1960s in the work of Paul Baran, [2] and packet switched networks such as the NPL network by Donald Davies,[3] ARPANET, Tymnet, the Merit Network,[4] Telenet, and CYCLADES,[5][6] were developed in the late 1960s and 1970s using a variety of protocols.[7] The ARPANET project led to the development of protocols for internetworking, by which multiple separate networks could be joined into a network of networks.[8] ARPANET development began with two network nodes which were interconnected between the Network Measurement Center at the University of California, Los Angeles (UCLA) Henry Samueli School of Engineering and Applied Science directed by Leonard Kleinrock, and the NLS system at SRI International (SRI) by Douglas Engelbart in Menlo Park, California, on 29 October 1969.[9] The third site was the Culler-Fried Interactive Mathematics Center at the University of California, Santa Barbara, followed by the University of Utah Graphics Department. In an early sign of future growth, fifteen sites were connected to the young ARPANET by the end of 1971.[10][11] These early years were documented in the 1972 film *Computer Networks: The Heralds of Resource Sharing*.

A research article mentioning the Internet of Things was submitted to the conference for Nordic Researchers in Logistics, Norway, in June 2002,[12] which was preceded by an article published in Finnish in January 2002.[13] The implementation described there was developed by Kary Främling and his team at Helsinki University of Technology and more closely matches the modern one, i.e. an information system infrastructure for implementing smart, connected objects.[14]

The Internet of Things connects the physical world to the Internet so that you can use data from devices to increase productivity and efficiency. Connecting things to the Internet is possible because different connectivity options are widely available, the cost of connecting is declining, and more devices are capturing data. All kinds of things are being used in IoT applications including consumer products such as refrigerators, security cameras, and cable set-top boxes; industrial systems such as conveyor belts and manufacturing equipment; and commercial devices such as traffic signals and smart meters. Any device that can be powered on could be part of an IoT application. [15]

ISSN No:-2456-2165

The Internet of things (IoT) is widely used in the integration of networks through intelligent perception, identification technology and pervasive computing and other communication perception technologies. It is therefore called the third wave of the development of the world's information industry after the computer and the Internet. According to the definition of the international telecommunication union (ITU), the Internet of things mainly solves the interconnection between Thing to Thing (T2T), Human to Thing (H2T), Human to Human (H2H).

The concept of the Internet of things was proposed by Kevin Ashton in 1999.Ashton believes that computers will eventually be able to generate and collect data on their own, without human intervention, and thus drive the creation of the Internet of things. In short, the idea of the Internet of things is to communicate between objects and interact with each other online. It's a technological advance that's hard to imagine, but it's coming out in front of us.[16]

The Internet of Things (IoT) is a "Internet of Things" that covers everything in the world on the basis of the computer Internet and USES RFID, wireless data communication and other technologies. In this network, goods can "communicate" with each other without human intervention. Its essence is to use the RFID technology, through the computer Internet to realize the automatic identification of goods and goods and the interconnection and sharing of information.

Main objectives of the study are to develop a technology, above on a highway surface , to adhere some carbon fibers paper and give it radio-frequency signal, it can form a super capacitance sensor. About 70,000,000 Km highway around the World compose a huge Web, to come to the internet of things all the World!

II. THE SOURCE OF A WORLD WIDE WEB ON THE LANDS

A. Radio-frequency Character of carbon fibers paper

Select to one paper is capacitance to give it F > 300kHz signal, C = 2.38nF, lx – x = lY – Y = 140mm. capacitance changing with asymptotic capacitance be changed see the Table 1 Simulation on Approximate switch.

Frequency (MHz)	Initial Capacitance (nF)	Distances (mm)				
		50	100	150	200	250
300 (kHz)	1.740	2.42	2.37	2.33	2.23	1.882
	C Changed (nF)	0.68	0.63	0.59	0.49	0.142
1.00	1.811	2.03	1.995	1.979	1.895	1.778
	C Changed (nF)	0.219	0.184	0.168	0.084	-0.033
5,00	2.22	2.37	2.30	2.28	2.28	2.19
	C Changed (nF)	0.15	0.08	0.03	0.06	-0.03
10.00	2.31	2.52	2.49	2.45	2.33	2.29
	C Changed (nF)	0.21	0.18	0.14	0.02	-0.02
15.00	3.83	4.20	4.17	2.75	2.68	2.63
	C Changed (nF)	0.37	0.34	-1.08	-1/15	-1.2
20.00	4.35	4.28	4.26	4.23	3.95	3.83
	C Changed (nF)	-0.07	-0.09	-0.12	-0.4	-0.52

Table 1. Capacitance changing with asymptotic capacitance be changed

B. The resistance is selective of carbon fibers paper

Block Resistance (BR) is an important characterization of two-dimensional conductive materials, to make capacitance sensors with carbon fiber paper, have made four Block Resistance forms of carbon fibers paper. In the study select sized 180x180mm, and given two signal F_1 = 100kHz, F_2 = 300kHz. The Data of tested those paper as capacitance sensor, shown in the table 2.

No.	R_X=R_Y (Ω)	BR (Ω/cm^2)	F1 100kHz		F2 300kHz	
			C (nf)	AC (V)	C (nf)	AC (V)
CFP-1	1290	3.981	1.051	0.292	1.081	0.143
CFP-2	1070	3.302	0.410	0.095	1.194	0.075
CFP-3	60.6	0.187	0.492	0.083	1.516	0.118
CFP-4	9510	29.35	1.233	1.468	1.519	0.086

Table 2. Compare to different Block Resistance on Carbon Fiber Papers

C. Deployment forms of carbon fibers paper above on the highway surface

Deployment forms of carbon fibers paper above on the highway surface, example, such as a car on the highway, a carbon fibers paper adhere on the highway surface by the epoxy resin, a car adhere a carbon fibers paper on the bottom. When the car through the highway, the super capacitance sensors on carbon fibers paper can test the car information and can transform energy to the car. See the Fig. 2

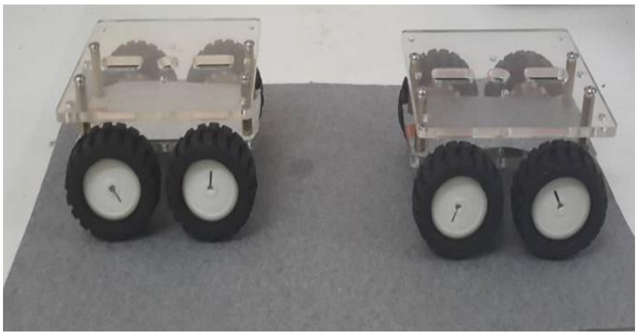

Fig 2:- Super capacitance sensors on carbon fibers paper above on the highway surface

III. RESULTS

The earth has changed dramatically under the influence of human activities, the earth's intricate road, rail, shipping and air transportation routes weave a vast and spectacular "spider web". Fig. 1

Fig 1:- Global transportation network

F (Hz)	100	200	300	400	500	600	700	800	900	1000
Capacitance (Nf)	13.66	21.20	13.67	9.89	7.62	6.11	5.04	4.23	3.60	3.10
Capacitance (Nf/cm^2)	0.028	0.035	0.0227	0.0165	0.0127	0.0102	0.0083	0.00705	0.006	0.005
Capacitance (Nf/m^2)	280.00	350.00	227.00	165.00	127.00	102.00	83.00	70.50	60.00	50.00
Capacitance (F/km^2)	0.28	0.35	0.227	0.165	0.127	0.102	0.083	0.0705	0.06	0.005

Table 3. The data of capacitance

Highway all the world are 70,000,000km, the road width is 16 meters,

$$70,000,000 * 1000 * 16 = 1.12 * 10^{12}\ m^2$$

According to table 3, C = 350.00nf/m^2

The Super capacitance sensors on carbon fibers paper all the World is

$$C = 350 * 1.12 * 10^{12} = 3.92 * 10^{14} nf = 3.92 * 10^5\ F$$

A super capacitance sensors = 3.92 * 10^5 F all the World, what A super capacitance sensors huge!

IV. DISCUSSION

Limited by technological bottlenecks, the development of the Internet of things has not exploded as quickly as the Internet did. The technology of the Internet of things has broad prospects. In recent years, some air purifiers, wearable devices and home environment monitoring devices that were not available in the past are serving the public in the current consumption context. There will be more new devices in the future. These are the inevitable results of the development of the Internet of things technology.

There is a lot of room for sensors and sensor inputs. The reason why people are smart is that they have a lot to do with their hands, eyes, mouth, nose and ears. Since it is difficult for individuals to accumulate knowledge in chip technology, they can only do algorithms. There is great potential for visual recognition technology and various fields to study and accumulate knowledge.

V. CONCLUSIONS

Sensor technology: as far as it is concerned, a lot of sensors are digital. They just throw out the values. A single chip computer can be used by connecting it. But the problem is that there's a lot of volume. Let's measure the temperature. Measure the light, there's a light sensor; Measure the air. Air quality sensors. There are accelerometers, heart rate sensors, color sensors, decibels sensors.

Used the carbon fibers paper as new materials made capacitance sensor, The carbon fibers paper easy to industrialized production, easy to spend large area, and, through Block resistive, easy to set up performance indicators. Especially for economic applicability, the cost can be controlled at \$100 /m^2

So the technology of super capacitance sensors on carbon fibers paper is achievable technology, must be able to be widely used, expect to be able to spread quickly.

VI. ACKNOWLEDGMENTS

This work would not have been possible without the SEGi University and the IGS given me the opportunities for learning and research.

I am especially indebted to Dr Gibert Thio Tze Hwai and Chris Chong Hock Siong, who have been supportive of my career goals and who worked actively to provide me with the protected academic time to pursue those goals.

Nobody has been more important to me in the pursuit of this project than the my son, Dr. WANG XIAOFEI, who make the carbon fiber paper and help me finished the experiments. So, I would like to thank him, he is the ultimate role models.

Most importantly, I wish to thank my loving and supportive wife, Dr. LUI HONG, who has provided unending inspiration and unending supported.

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