To write computer software in an easy way in words and minimum number of electronic/electrical elements required for proper functioning of computer.

Syed Mahboob[1] and Rizwana[2]

[1]Department of Physics, Osmania University, Hyderabad-500007, Telangana, India
[2]Institute of Aeronautical Engineering, Dundigal, Hyderabad 500043, Telangana, India
(Corresponding author e-mail:- mahboob1978@yahoo.com)

Abstract: *In this paper, the procedure of writing computer software is written in simple words. The software can be written by using binary codes for each alphabet, numbers, symbols, scientific symbols and function keys in a meaningful way in word document. Similarly one can do the scientific program to perform calculations and plotting of data and simulation. Same procedure can be adopted to write program for calculator, paint, equation editor. There is no need of operating system software as the above programs can be written directly on the primary storage device with set of instructions to do this by using binary code. To run the computer keyword, primary storage device, monitor or display device of laptop and secondary storage device is need along with the counter to count the binary code. One needs to check whether these 4 to 5 hardware will be sufficient to run the computer with minimum number of electrical elements. The procedure of storing the output data on the secondary storage device is shown in this paper.*

I.   Result and discussion:

The computer works on four functions i.e. (1) input of data, (2) processing of data (CPU: central processing unit), (3) output data and (4) storing of output data on secondary storage device. The keyboard is the primary input device by which the information is typed and is transferred to CPU. CPU collects the input data sent by keyboard by typing information on it. CPU is the basic primary memory device on which set of instructions are written and performed to process the input data from the keyboard. The instruction are written and performed based on the writing or counting of binary data. The binary data is counted using logic gates which in turn are made by diodes. The logic gates available are OR gate, AND gate, NOR gate, XOR gate, NAND gate etc. After processing and storing data the CPU displays output on the monitor or display device. This output is again stored on secondary storage devices like CD, DVD, memory stick, hard disk memory disc etc.

The parts required for the proper functioning of computer are keyword, primary storage device, monitor or display device and secondary storage device like hard disk. To store and read the data a counter is needed which read the binary data. The counting can be done through logic gates. The input given through keyboard is written on primary storage device in binary code with set of instructions to do this. With set of instructions the primary storage device stores the data in a meaningful way using binary code on the selected drives (C, D, E, F) and the folders and subfolders on these drives. The primary storage device sends the data to the output device like monitor or display device of laptops with the set of instructions to do this. Then the output data is stores in hard disk of computer. The different ways to store the data is given in subsequent paragraphs.

The data is written on the CD, DVD which contains bluish photo-sensitive organic liquid and reflective coating of gold film, the material of bluish photo-sensitive organic liquid is not known as its not written in papers and books. The laser beam is used to deform the bluish photo-sensitive organic liquid and also by reflection of beam from the gold coated side. This operation stores the output information to the CD's and DVD's.

The other form of storage devices are optical and electronic storage. Optical storage, electronic storage medium uses low power laser beams to record and retrieve digital (binary) data. In optical storage technology, a laser beam encodes digital data onto an optical, or laser, disk in the form of tiny pits arranged in concentric tracks on the disk's surface. A low power laser scanner is used to read these pits, with variation in the intensity of reflective light from the pits being converted into electric signals.

Then the data is written by using above two methods by using laser beams in CD's and DVD's.

To write the data on memory device, first the address locations needs to select for example drives C, D, E, F and the folders contained on these disks. There one needs to save, copy and paste the output information files.

To read or retrieve the data on memory device, first the address locations needs to select for example drives C, D, E, F and the folders contained on these drives. Then double click to open and read the information saved as files and folders.

When you save or write a document, it gets written somewhere "non-volatile" on a tiny spot that keeps its state on even when the power is off.

The question is How does that work for a hard drive?

The hard drive contains a spinning platter with a thin magnetic coating.

A "head" moves over the platter, writing 0's and 1's as tiny areas of magnetic North or South on the platter

To read the data back, the head goes to the same spot, notices the North and South spots flying by, and so deduces the stored 0's and 1's.

A Modern hard drive can store well over a trillion 0/1 bits per platter, so the individual North/South spots are quite small.

Programming software with set of instructions is needed to perform the all kind of operations as stated above on the computer.

One needs to think how to make the computer hardware in a simpler way with appropriate electronic components and programming software in a simpler fashion with minimum instruction to perform the all the computer operation from keyboard to output storage.

To make computers in a simpler fashion, the counting of binary, ternary, quadruple and higher order data is required. For this a binary, ternary and quadruple and higher order counting a counter is required. The binary counting is performed in electronic calculators and one need to check whether instruction written in calculators can be used as counting device to read and write binary data.

Fast processing of data and larger capacity of storage device is required for better performance of computer. For the fast processing of data the processor should be operated at higher frequencies. For storage of large capacity of data compressors of data is required example WINZIP and WINRAR software. These software compress the data many times less and can store larger data many times higher than in normal condition. One needs to check whether operation of WINZIP and WINRAR to compress the data can be done many times to occupy less space in storage device and can be read or extract in one go.

The data can be written and read in faster fashion using faster pulses of laser beam in on and off state to write and read the binary data 1 and 0. The instruction written in software can also be performed in a faster way by using faster pulses of laser beam in on and off state.

The important is to write software to run the computer hardware effectively. The software can be written using C language which is simple and effective software. Firstly we need to do partition of memory hard drive (drive C, D, E and F) using the C software. In the C drive one need to install the software or set of instructions to run the instruction typed using keyboard and is send to memory device which recognize the binary code of alphabets, numbers and symbols. These instructions are written and are used as the operating system software. There is no need of operating software. The software needed should be related to the word, paint, software for calculations plotting and simulation, calculator, date and time, software for PDF and software for writing mathematical equations. These different type of software are written directly on the primary storage device, there is no need of operating system.

We need to firstly store the binary code of alphabets, numbers and symbols firstly in the primary memory device and are send to output device like monitor or display of laptops when typed on keyword. We need to create the folders and files on to the drives C, D, E & F. On these files the alphabets, numbers and symbols are written to form words in a meaningful way and are displayed by using the output device like monitor or display of laptop. I think that these instructions are written in MICROSOFT word 2007 software. In the primary storage device the instructions shall also be written to show the time and date of different countries. On the primary storage device there is a need to write the program to process the paint diagrams using the binary code for each diagram. There is also a need to create the programming instructions to create the icons for the various type of software installed on the C drive. There is also a need to creation of search engine to search and read the contents on the website. One needs to write the set of instructions to do addition, subtraction, multiplication and division using the binary codes of individual number (this is a calculator).

The binary code used to write the words in a meaningful way using alphabets and writing numbers and symbols and function keys are shown in tables. .

In the word document software the meaning of each word should be written in a soft copy of word document and are linked to it so that it can read when needed, the necessary operation should also be written to know the meaning of each word. One need to write program to check the spelling error from the data base of words with meanings (soft copy of words) which is linked to word document. The names of function keys and

their binary code are given in tables below. These should also be written in the word document to process each function keys. The variation of size should also be considered.

Uppercase letter codes:
- A: 01000001
- B: 01000010
- C: 01000011
- D: 01000100
- E: 01000101
- F: 01000110
- G: 01000111
- H: 01001000
- I: 01001001
- J: 01001010
- K: 01001011
- L: 01001100
- M: 01001101
- N: 01001110
- O: 01001111
- P: 01010000
- Q: 01010001
- R: 01010010
- S: 01010010
- T: 01010010
- U: 01010101
- V: 01010110
- W: 01010111
- X: 01011000
- Y: 01011001
- Z: 01011010

Lowercase letter codes:
- a: 01100001
- b: 01100010
- c: 01100011
- d: 01100100
- e: 01100101
- f: 01100110
- g: 01100111
- h: 01101000
- i: 01101001
- j: 01101010
- k: 01101011
- l: 01101100
- m: 01101101
- n: 01101110
- o: 01101111
- p: 01110000
- q: 01110001
- r: 01110010
- s: 01110011
- t: 01110100
- u: 01110101
- v: 01110110
- w: 01110111
- x: 01111000
- y: 01111001

- z: 01111010

Number codes:

- 0: 00110000
- 1: 00110001
- 2: 00110010
- 3: 00110011
- 4: 00110100
- 5: 00110101
- 6: 00110110
- 7: 00110111
- 8: 00111000
- 9: 00111001

Symbol codes

- !: 00100001
- ": 00100010
- #: 00100011
- $: 00100100
- %: 00100101
- &: 00100110
- ': 00100111
- (: 00101000
-): 00101001
- *: 00101010
- +: 00101011
- ,: 00101100
- -: 00101101
- .: 00101110
- /: 00101111
- : : 00111010
- ; : 00111011
- <: 00111100
- =: 00111101
- >: 00111110
- ?: 00111111
- @: 01000000
- [: 01011011
- \: 01011100
-]: 01011101
- ^: 01011110
- `: 01100000
- _: 01011111
- {: 01111011
- |: 01111100
- }: 01111101
- ~: 01111110

Character Name	Char	Code	Decimal	Binary	Hex
Null	NUL	Ctrl @	0	00000000	00
Start of Heading	SOH	Ctrl A	1	00000001	01
Start of Text	STX	Ctrl B	2	00000010	02
End of Text	ETX	Ctrl C	3	00000011	03
End of Transmit	EOT	Ctrl D	4	00000100	04
Enquiry	ENQ	Ctrl E	5	00000101	05
Acknowledge	ACK	Ctrl F	6	00000110	06
Bell	BEL	Ctrl G	7	00000111	07
Back Space	BS	Ctrl H	8	00001000	08
Horizontal Tab	TAB	Ctrl I	9	00001001	09
Line Feed	LF	Ctrl J	10	00001010	0A
Vertical Tab	VT	Ctrl K	11	00001011	0B
Form Feed	FF	Ctrl L	12	00001100	0C
Carriage Return	CR	Ctrl M	13	00001101	0D
Shift Out	SO	Ctrl N	14	00001110	0E
Shift In	SI	Ctrl O	15	00001111	0F
Data Line Escape	DLE	Ctrl P	16	00010000	10
Device Control 1	DC1	Ctrl Q	17	00010001	11
Device Control 2	DC2	Ctrl R	18	00010010	12
Device Control 3	DC3	Ctrl S	19	00010011	13
Device Control 4	DC4	Ctrl T	20	00010100	14
Negative Acknowledge	NAK	Ctrl U	21	00010101	15

Synchronous Idle	SYN	Ctrl V	22	00010110	16
End of Transmit Block	ETB	Ctrl W	23	00010111	17
Cancel	CAN	Ctrl X	24	00011000	18
End of Medium	EM	Ctrl Y	25	00011001	19
Substitute	SUB	Ctrl Z	26	00011010	1A
Escape	ESC	Ctrl [	27	00011011	1B
File Separator	FS	Ctrl \	28	00011100	1C
Group Separator	GS	Ctrl]	29	00011101	1D
Record Separator	RS	Ctrl ^	30	00011110	1E
Unit Separator	US	Ctrl _	31	00011111	1F
Space			32	00100000	20
Exclamation Point	!	Shift 1	33	00100001	21
Double Quote	"	Shift '	34	00100010	22
Pound/Number Sign	#	Shift 3	35	00100011	23
Dollar Sign	$	Shift 4	36	00100100	24
Percent Sign	%	Shift 5	37	00100101	25
Ampersand	&	Shift 7	38	00100110	26
Single Quote	'	'	39	00100111	27
Left Parenthesis	(	Shift 9	40	00101000	28
Right Parenthesis	)	Shift 0	41	00101001	29
Asterisk	*	Shift 8	42	00101010	2A
Plus Sign	+	Shift =	43	00101011	2B
Comma	,	,	44	00101100	2C
Hyphen / Minus Sign	-	-	45	00101101	2D
Period	.	.	46	00101110	2E
Forward Slash	/	/	47	00101111	2F

Zero Digit	0	0	48	00110000	30
One Digit	1	1	49	00110001	31
Two Digit	2	2	50	00110010	32
Three Digit	3	3	51	00110011	33
Four Digit	4	4	52	00110100	34
Five Digit	5	5	53	00110101	35
Six Digit	6	6	54	00110110	36
Seven Digit	7	7	55	00110111	37
Eight Digit	8	8	56	00111000	38
Nine Digit	9	9	57	00111001	39
Colon	:	Shift ;	58	00111010	3A
Semicolon	;	;	59	00111011	3B
Less-Than Sign	<	Shift ,	60	00111100	3C
Equals Sign	=	=	61	00111101	3D
Greater-Than Sign	>	Shift .	62	00111110	3E
Question Mark	?	Shift /	63	00111111	3F
At Sign	@	Shift 2	64	01000000	40
Capital A	A	Shift A	65	01000001	41
Capital B	B	Shift B	66	01000010	42
Capital C	C	Shift C	67	01000011	43
Capital D	D	Shift D	68	01000100	44
Capital E	E	Shift E	69	01000101	45
Capital F	F	Shift F	70	01000110	46
Capital G	G	Shift G	71	01000111	47
Capital H	H	Shift H	72	01001000	48
Capital I	I	Shift I	73	01001001	49

Capital J	J	Shift J	74	01001010	4A
Capital K	K	Shift K	75	01001011	4B
Capital L	L	Shift L	76	01001100	4C
Capital M	M	Shift M	77	01001101	4D
Capital N	N	Shift N	78	01001110	4E
Capital O	O	Shift O	79	01001111	4F
Capital P	P	Shift P	80	01010000	50
Capital Q	Q	Shift Q	81	01010001	51
Capital R	R	Shift R	82	01010010	52
Capital S	S	Shift S	83	01010011	53
Capital T	T	Shift T	84	01010100	54
Capital U	U	Shift U	85	01010101	55
Capital V	V	Shift V	86	01010110	56
Capital W	W	Shift W	87	01010111	57
Capital X	X	Shift X	88	01011000	58
Capital Y	Y	Shift Y	89	01011001	59
Capital Z	Z	Shift Z	90	01011010	5A
Left Bracket	[	[	91	01011011	5B
Backward Slash	\	\	92	01011100	5C
Right Bracket	]	]	93	01011101	5D
Caret	^	Shift 6	94	01011110	5E
Underscore	_	Shift -	95	01011111	5F
Back Quote	`	`	96	01100000	60
Lower-case A	a	A	97	01100001	61
Lower-case B	b	B	98	01100010	62
Lower-case C	c	C	99	01100011	63

Lower-case D	d	D	100	01100100	64
Lower-case E	e	E	101	01100101	65
Lower-case F	f	F	102	01100110	66
Lower-case G	g	G	103	01100111	67
Lower-case H	h	H	104	01101000	68
Lower-case I	I	I	105	01101001	69
Lower-case J	j	J	106	01101010	6A
Lower-case K	k	K	107	01101011	6B
Lower-case L	l	L	108	01101100	6C
Lower-case M	m	M	109	01101101	6D
Lower-case N	n	N	110	01101110	6E
Lower-case O	o	O	111	01101111	6F
Lower-case P	p	P	112	01110000	70
Lower-case Q	q	Q	113	01110001	71
Lower-case R	r	R	114	01110010	72
Lower-case S	s	S	115	01110011	73
Lower-case T	t	T	116	01110100	74
Lower-case U	u	U	117	01110101	75
Lower-case V	v	V	118	01110110	76
Lower-case W	w	W	119	01110111	77
Lower-case X	x	X	120	01111000	78
Lower-case Y	y	Y	121	01111001	79
Lower-case Z	z	Z	122	01111010	7A
Left Brace	{	Shift [	123	01111011	7B
Vertical Bar	|	Shift \	124	01111100	7C
Right Brace	}	Shift]	125	01111101	7D
Tilde	~	Shift `	126	01111110	7E
Delta	Δ		127	01111111	7F

α	10000000
β	10000001
γ	10000010
δ	10000011
ε	10000100
ζ	10000101
η	10000110
θ	10000111
ι	10001000
κ	10001001

λ	10001010
ν	10001011
ξ	10001100
o	10001110
π	10001111
ρ	10010000
ς	10010001
σ	10010010
τ	10010011
υ	10010100
φ	10010101
χ	10010110
ψ	10010111
ω	10011000

In the calculator the addition can be performed by counting forward, if double digit the left side number should be carried back ward and should be added.

The subtraction can be done by counting backward from smaller number to bigger number and the balance is written as the answer. If first digit is smaller one should carry number 1 from the first left side number and should be counted backward from smaller number to bigger number the balance should be written as the answer. In the case of multiplication addition of numbers should be carried out and for division subtraction of numbers should be carried out. One need to think how effectively it can be done.

For addition using binary code of numbers can done by considering 1+0=1, 0+1=1, 1+1=0

For subtraction using binary code of numbers can be done by considering 1-0=0, 1-0=1, 0-1=1, 1-1=0

For division using binary code of numbers can be done by considering 1/1=1, 0/1=0, 1/0=meaningless and 0/0 is meaningless.

For multiplication using binary code of numbers can done by considering 1*0=0, 0*1=0, 1*1=1

The trigonometric function should also be included and their operation and their values should also be feed in to the software.

To make excel type of software one need to follow the above procedure of addition, subtraction, multiplication and division of number and use of trigonometric functions. How plotting of data can be done should be known.

Firstly to plot work sheet is needed on which the data points are shown in X and Y axis. In the work sheet all the operations like addition, subtraction, multiplication and division and combination of these should also be performed and the instruction to do this should also be written on the software. The instructions should be written to draw the X (bottom and upward) and Y axis (left and right) with breaks (major and minor) by considering the minimum and maximum values for both the axis. The values should be displayed on major and minor breaks or tick labels. For each data point the symbol should be shown. One need to include various types of symbols and line with different range of color for different column values. In the plotter software all the alphabets, numbers, symbols and scientific symbols and trigonometric function should also be included. The option for bold and underline and color should also be considered. The size and font should also be considered.

For simulation of data, one need to write the data on the worksheet and the data is plotted. After plotting the data it requires equation editor to write the equation and a bar to write the unknown parameters. These unknown parameters can be obtained by fitting/simulation of the data with different equations according to ones need. The constraints and number of iterations should also be written in the software.

The Portable document file (PDF) is a file, the contents of which is cannot be changed or write except for reading and copying. The size of the document should also be compressed like WINZIP and WINRAR. Proper software should be written to do this.

To make mathtype software for equation, one need to consider all alphabets, numbers, symbols, scientific symbols and trigonometric functions. For division of numbers one should consider one number above and below the dash line. Proper functions to write superscript and subscript should be considered. This much will be sufficient for making equation editor software.

For clock, counter of seconds, minutes and hours should be used and display the time. The dates and year should also be feed and shown. For every year the day 30 and 31 in the months are common. The time of different countries should also be feed and shown.

Search engine is the html webpage with address bar by which the contents on the net are searched by typing the words, sentences or URL's on the address bar. This can be written in a simple way as a normal html file.

For painting the binary code for each figure should written. The binary code for pencil, eraser and coloring and brushing should also be written. All the function options should also be shown below the address bar operated with binary coding. The size and font variation should also be considered.

Memory devices

Pend drives are memory devices and are produced in wide range of capacity. These pen drives may be fabricated in metal Insulator (oxide) metal structure (MOM or MIM) or other structure using materials which are not disclosed by computer companies. Ferroelectric materials have less remnant polarization and large coercive field in bulk form and these are also used in memory devices. This makes them to be operated with difficulty in bulk form due to large coercive field and less remnant polarization. But ferroelectric material can be used in thin film form. One needs to study the memory devices in back gate thin film transistor structure (BGTFT) using ferroelectric thin films. Thin ferroelectric films have larger remnant polarization and less coercive field. This makes them best candidates for larger memory capacity and easy to read, write and delete. The BGTFT structure using ferroelectric materials is as follows Al/n-Fe/i-Fe/n-Si/Al. The BGTFT using ferroelectric thin films can be used in longitudinally and laterally. If there is cumulative output of longitudinally and laterally side then the capacity of the memory device can be improved by many times keeping the size constant. The polarization can be modulated or enhanced by applying the back (bottom) gate voltage. This is the advantage of BGTFT utilizing the ferroelectric single crystal thin film. There are many types of ferroelectric materials and any of these ferroelectric materials be used for making memory pen drives keeping size constant. The examples of ferroelectric materials are doped and un-doped $BaTiO_3$, $Na_{0.5}Bi_{0.5}TiO_3$, $BaZrO_3$, $CaTiO_3$, $SrTiO_3$, $BiFeO_3$ etc. and their solid solutions. Single crystal thin films of above materials can also be formed by depositing the thin film by spin coater and heating the thin film until melting point and cooling. This result in single crystal in thin film form and may shows larger (improved) remnant polarization and appropriate coercive field due to no defects. Research in this direction is needed to cross check it.

According to researchers the ferroelectric material shows polarization vs. Electric filed hysteresis loops on the application of electric field Figure 1 (top left). The ferroelectric materials show positive and negative remnant polarization up on reversal of electric field cyclically. It also has zero polarization at zero electric field. The researchers consider positive remnant polarization as +1 state, zero polarization 0 state and negative remnant polarization as -1 state. Using these three state as one-one byte the memory device is operated. The ferroelectric materials have three states at zero electric field and it is difficult to optimize the three states at zero electric field.

The correct procedure of operating the memory devices is to consider positive saturation polarization (as +1 state) at positive electric field and negative saturation polarization (as -1 state) at negative electric field and zero polarization (as 0 state) at zero electric field (Figure 1 (top Right). The best way is to consider the para-electric material for memory devices instead of ferroelectric materials as the para-electric materials shows the three states at the respective electric field and will be easy and fast to read, write, copy and deletion of data.

The ferroelectric materials can be used as memory device with two states +1 (positive saturation polarization) at positive electric field and -1s state (negative saturation polarization) at negative electric field whereas the para-electric materials shows three states (+1, 0, -1) at respective electric field. This means that the para-electric materials exhibit higher capacity keeping size constant due to three states when compared to ferroelectric materials which have two states.
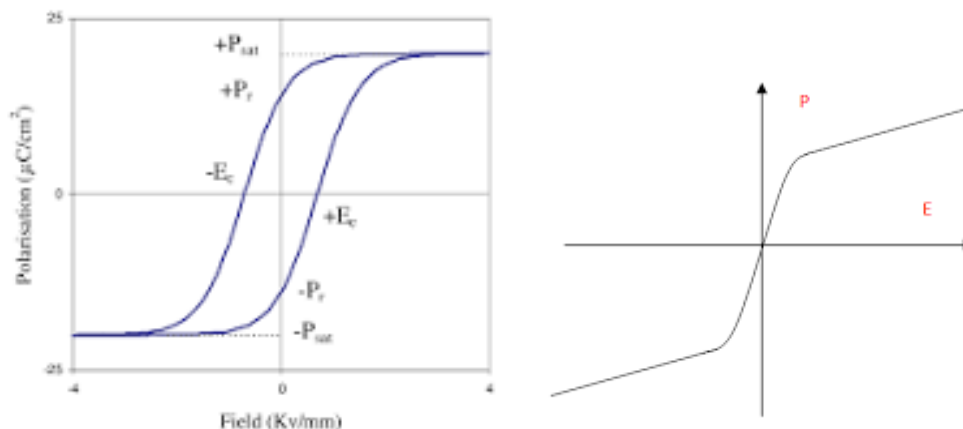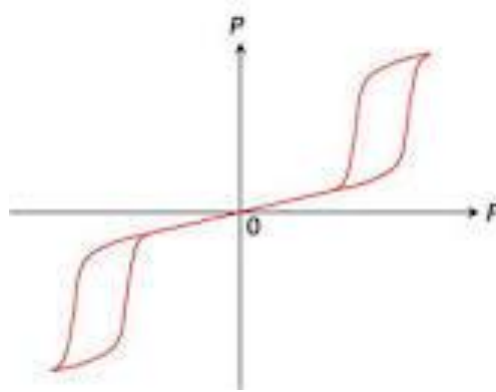
Figure 1 PE loop for ferroelectric materials (top left), para-electric (top Right) and anti-ferroelectric (bottom middle)

Using anti-ferroelectric materials which shows double PE hysteresis loop one can have five to seven states as shown in Figure1 (bottom middle) and this increase the memory capacity many order of magnitude keeping size constant. One need to check whether fast read, write, copy, paste and deletion can be done. One also need to study whether stacking of ferroelectric, para-electric and anti-ferroelectric films result in cumulative states for better performance in terms of higher memory capacity and fast and easy read, write, copy, paste and deletion.

There is a need to check the possible polarization states in the ferri-electric materials depending up on the shape of PE loop. Ferri-electric materials have opposite dipoles with non balanced dipole moment magnitude.

Some researchers are carrying out research on quantum dots based memory devices and these are operated based on single electron injection and extraction into quantum dots. The memory devices based on single electron injection and extraction is far from reality use. In the case of memory devices utilizing the quantum dots, the charge injection and extraction can be measured by using costly equipment like Kelvin Probe Force Microscopy (KPFM) and there is no simple method to measure or study the charge injection and extraction in to quantum dots.

The use of quantum dots is limited by few electron injection and extraction due to small size of quantum dots and this limits the use of quantum dots as memory devices.

Use of super capacitors as charge storage and utilization device when there is power cut.

When there is power cut these appliances are needd to run as given below.

9 watt bulb for one hour (four numbers)	9*4=	36W
75Watts of ceiling fan for one hour (four numbers)=	75*4=	300W
Mixer grinder of 750 W for half an hour	750/2=	375W
Electric iron 1100W for one hour	=	1100W
Water heater of 1200 W for two hours	1200*2=	2400W
	Total	= 4211W

Total power approximately needed is=5 KWh

The number of lithium battery with 385W needed to produce 5KWh is around 12 numbers and cost of each battery is 12,000 rupees and this amounts to 1.6 lakh of rupees. This amount is very high.

It is known that capacitors are charge storage devices which stores charge/current and can also be extracted to run appliances when needed. Capacitors are devices which store electrical energy in the form of electrical charge accumulated on their plates [1]. When a capacitor is connected to a power source, it accumulates energy which can be released when the capacitor is disconnected from the charging source, and in this respect they are similar to batteries. The difference is that a battery uses electrochemical processes to store energy, while a capacitor simply stores charge. As such, capacitors are able to release the stored energy at a much higher rate than batteries, since chemical processes need more time to take place.

For dielectric, ferroelectric and piezoelectric materials, higher is the dielectric constant, higher is the Current storage density and higher is the power that can be stored and extracted. The dielectric constant of Pr doped barium titanate prepared by us at room temperature is around 43,000 [2]. The following calculation gives information about the current storage density and also the power that can be stored and extracted from the capacitor.

ϵ=43,000

$I=q/t$ (1)

q=C*V   (2)
Substituting equation (2) in equation (1) gives equation (3)
I=C*V/t   (3)
The equations for ϵ and C0 are ϵ=C/C0 and C0 is =ϵ0*A/d substituting these equation in (3) gives equation (4)
I=(ϵ*Co*V)/(t)
I=(ϵ*ϵ0*A*V)/(d*t)   (4)
For measuring the capacitance and electrical current in HP4192A instrument it is actually done at V=1 Volt, approximately t=1s for bulk
I=(43,000*8.854*e-12*0.64*1)/(0.2*1)
I=1.2183e-6 Amps

The equation for current stored in capacitor is given by equation (4) i.e.
I=ϵ*ϵ0*A*V/(d*t)
I=43000*8.854*e-12*0.64*240/(10e-9*1) For 240 V applied volts and with film thickness of 10e-9 m (for thin film)
I= around 5847 A
From the above the power that can be stored and extracted is around
P=I*V=5847 A*240 V
P=1.4032e6 W

This means that the power that can be stored and extracted from the capacitor with dielectric constant 43,000 is 1.4032e6 W which is many times higher than the required power to run the above appliances when there is power cut (power needed is 5KWh).

If the dielectric constant is higher, operating voltage is higher and the film thickness is lower then the current density stored in a capacitor is higher, if the current density is higher the power that can be stored and extracted is higher. There are many dielectric materials using copper based dielectric materials in O_{12} form exhibiting giant dielectric constant with dielectric constant of the order of 10^4 to 10^6 [3-5]. The copper based nanowire also exhibit giant dielectric constant of the order of 10^{10} [6]. The above materials can be used as capacitors to store the charge or current and needed to extract when needed to run home appliances when there is power cut. The super capacitors (with dielectric constant of the order of 10^4 to 10^6) are best devices which can be used to store and extract charge/current/power/ instead of lithium batteries. The cost of each lithium battery is 12,000 rupees and the number of battered required are 12 numbers to store and extract 5KWh of power, where as the cost of each super capacitor is around 8,000 rupees. Only one capacitor (with dielectric constant around 43,000, P=1.4032e6 W) is needed to power more than that is required to power the home appliances (5KWh) when there is power cut.

The energy stored and extracted from the capacitor with other equations (equations 5 & 6) with the use of dielectric material with dielectric constant 43,000 is 7.0174e5 Wh & 5.2728e-40 Wh respectively. These calculations indicate that the equations 5 & 6 are wrong as these equations give different values. The correct equations to calculate the power/energy stored and extracted by using super capacitor are given by equations (1-4).

$$E = \frac{CV^2}{2} \qquad\qquad (5)$$

$$\varepsilon = \frac{C}{C_0}$$

$$E = \frac{\varepsilon * C_0 * V^2}{2}$$

$$C_0 = \frac{\varepsilon_0 * A}{d}$$

$$E = \frac{\varepsilon * \varepsilon_0 * A * V^2}{2d}$$

$$E = \frac{43000 * 8.854e^{-12} * 0.64 * 240 * 240}{2 * 10e^{-9}} = 7.0174e5$$

$$E = \frac{q^2}{2C} \tag{6}$$

$$\varepsilon = \frac{C}{C_0}$$

$$C = \varepsilon * C_0$$

$$E = \frac{q2}{2 * \varepsilon * C_0}$$

$$C_0 = \frac{\varepsilon_0 * A}{d}$$

$$E = \frac{q^2 * d}{2 * \varepsilon * \varepsilon_0 * A}$$

$$E = \frac{1.603e-19 * 1.603e-19 * 10e-9}{2 * 43000 * 8.854e-12 * 0.64} = 5.2728e^{-40}$$

Operation conditions for capacitor without break down

The capacitors should be operated at temperatures showing para-electric state as at this condition the dielectric constant will be frequency independent. Normal ferroelectric and para-electric materials have dielectric constant which is independent of frequency. If dielectric constant is dependent on frequency, the dielectric loss will be higher at higher frequencies which in turn results in breakdown if operated at higher frequencies. The nominal operation frequency should be at 60 Hz.

The temperature coefficient of dielectric constant should be positive or independent of temperature and should be minimum with temperature keeping the change of dielectric loss minimum.

The resistance with temperature and with voltage should be positive temperature of coefficient (PTCR), otherwise negative temperature coefficient of resistance (NTCR) results in breakdown of dielectric material. The operation voltage should be at 240V and the resistance should be of the order of 10^9 Ω.

The materials which do not show PE hysteresis loop should be used for effective working of capacitor otherwise break down occurs and the materials which do not show PE hysteresis are para-electric materials.

The tolerance factor should be maximum without breakdown with regards to the change of dielectric constant, dielectric loss, resistance and polarization with applied operating temperature, frequency and voltage.

The materials which show giant dielectric constant exhibit higher charge/current storage and extraction capacity.

Materials in thin film and single crystal thin film form shows higher charge/current storage and extraction capacity. The single crystal thin films can be grown using spin coating of material in study and heating until melting point and cooling. This result in single crystal thin film and these materials shows higher storage and extraction capacity.

The area of the dielectric material should be higher and the thickness should be lower for better performance of capacitor regarding the current/charge storage and extraction capacity.

The faster storage and extraction of charge/current can be done if the dielectric material has higher dielectric constant and are easily polarizable at optimum values of temperature (below transition temperature (Tc)) and at above Tc, frequency (at 60 Hz) and voltage (at which saturation polarization is exhibited).

It is required to easily modulation of dielectric constant i.e. storage and extraction of charge/current by modulating the temperature keeping frequency (60Hz) and Applied Voltage (240V) constant.

Capacitors connected in parallel circuit have larger or cumulative capacitance. To increase the charge/current storage and extraction the capacitors should be connected in parallel.

To optimize the capacity of capacitor (either increased or decreased capacity) according to required capacity, then this can be done by considering parallel (increased) or series (decreased) connection of individual capacitors with appropriate capacity.

The bottom gate thin film transistor (BGTFT) in MOS (metal oxide semiconductor) form can also be used as capacitors to store the charge/current. The capacity of TFT capacitor can be adjusted by modulating the gate voltage.

MOS (metal oxide semiconductor) (i.e. Al/SiO₂/n-Si/Al) capacitors can also be used as memory devices if the characteristic of capacitor exhibit stair case (Capacitance-Voltage) CV loop. The SiO₂ film is grown using remote plasma enhanced chemical vapour deposition (RPCVD) technique. The flat curves indicates the number of states i.e. bytes
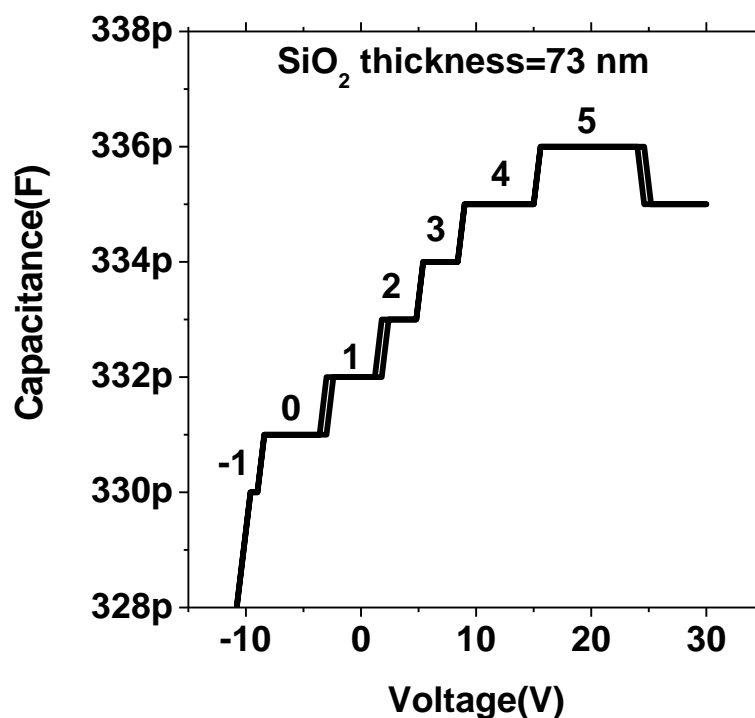

Figure 2. Capacitance Vs. Voltage stair case loop at 1kHz frequency.

II.   Conclusions:

In simple words the procedure of writing computer software is written in this paper using binary codes for alphabet, numbers, symbols, scientific symbols in meaningful way. The software for plotting and simulation of data, calculations, paint etc. are given in simple words. To run the computer keyword, primary storage device, monitor or display device of laptop and secondary storage device is need along with the counter to count the binary code. For proper functioning of these hardware one need check whether with minimum number of electronic/electrical elements are sufficient on the motherboard.

References:
[1].   https://eepower.com/capacitor-guide/applications/energy-storage/#
[2].   Syed Mahboob, A. B. Dutta, Chandra Prakash, G. Swaminathan, S.V. Suryanarayana, G. Prasad, G. S. Kumar, Materials Science and Engineering: B, Volume 134, Issue 1, 2006, Pages 36-40
[3].   Pariwat Saengvong, Jakkree Boonlakhorn, Jutapol Jumpatam, Narong Chanlek, Jariyanee Prasongkit, Bundit Putasaeng, Pairot Moontragoon, Pornjuk Srepusharawoot, Prasit Thongbai, Heliyon, Volume 9, Issue 1, 2023, e12946
[4].   Yong Guo, Junlang Tan, Jingchang Zhao, Inorganic Chemistry Communications, Volume 149, 2023, 110358
[5].   Yanyan He, Ting Liu, Yebin Xu, Jingyuan Zhao, Zeming Du, Materials Research Bulletin, Volume 47, Issue 5, 2012, Pages 1181-1184,
[6].   Anupam Maity, Subha Samanta, Shubham Roy, Debasish Biswas, and Dipankar Chakravorty, *ACS Omega* 2020 *5* (21), 12421-12430