GREEN COMPUTING: A STUDY FOR GREENER ENVIRONMENT

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ABSTRACT: Green computing is an effective way of studying about disposing, recycling and manufacturing of servers, computer and electronic devices. The main goal of green computing is to reduce hazardous materials and the most important use is to reduce energy efficiency, industrial waste, chemical waste, expired products. It promotes recyclability and biodegradability. Nowadays many organizations are moving towards green computing to decrease power consumption. Green computing has become main aspect for government, organizations and even individuals in our society. Green computing is increasing importance in IT fields and reducing impacts on environment and human health. Green computing is a technology, which is beneficial to the environment.

KEYWORDS: Green computing, hazardous material, recyclability, biodegradability.

I. INTRODUCTION:

WHAT IS GREEN COMPUTING?

Green computing is the environmentally responsible and eco-friendly use of computers and their resources. Nowadays green computing is the most important issues in the present IT. Green computing is the term used to denote the efficient use of resources in computing. It is also known as Green IT. It is mainly used to reduce the impacts on environmental and human health. The biggest challenge facing the environment is global warming. Global warming is caused by carbon emissions. Saving energy and reduction of carbon footprints is one of the main aspects of Green computing. It is primarily concerned about efficient use of power management, minimum discharge of CO_2 and to recycle electronic waste to make environment sustainable.In Fig.1 it represent- reduce, reuse and recyclingthe electronic waste. Reducing the e-waste as much as possible helps to minimize energy by consumers on efficient ways to keep power usage low.

Fig.1 The Three R's of Sustainability in Green computing.

II. HISTORY OF GREEN COMPUTING:

Green computing movement was the launch of Energy Star program in 1992. Energy Star is a label which is awarded to products that minimizing the use of energy and to reduce power consumption [9]. Energy Star is given to the products like compute monitors, televisions, printers, refrigerators, air conditioner and similar items like temperature control devices. The Green computing technique basically increase the "Sleep mode" function of computer monitors and "Standby mode" when it is on but, user is not being used. After the concept is Developed later, it began to encompass energy cost accounting, electronic waste etc.

Purchasing hardware that has been Electronic Product Environment Accessment Tool (EPEAT approved so that maintenance is reduced but thehardware life is extended, and so that it makes recycling the computer easy. EPEAT currently includes product rating for PC's, displays, tablets, imaging equipment (printer, copies, scanners and multifunction devices) and television. By the Green Electronics Council, EPEAT currently tracks more than 4,400 products from more than 60 manufactures across 43 countries.

III. WHY GO GREEN? HOW TO GO GREEN:

Going green is most important nowadays. From plastic bags to chemical products all are trying to come up with new and impactful ways that they can go green. It creates cleaner and brighter future for next generations. When going green, that effectively reduce the carbon footprint, pollution and reducing the amount of energy that is being used and creating a greener and cleaner environment. Here are some tips for how to go green.

3.1. GREEN HOMES:

Green homes are eco-friendly and are creating more durable. It has better indoor air quality as paints and cleaners are low in volatile organic compounds, which make it comfortable to breathe.

3.2. GOVERNMENTS GO GREEN: ENERGY STAR.

Energy star launched by U.S Environmental protection agency(EPA) in 1992. Purchasing energy star appliances help to reduce power management. Reduce the electricity cost. Energy star is found on more than 75 different products categories saving energy efficiency. Energy star appliances improve your home's comfort and efficiency. In Fig.2 the logo which is displayed is used in the products are manufactured on the idea of less power consumption.

Fig.2 for Energy Star Logo.

3.3. GREEN MODE OF TRANSPORTATION:

Purchasing an eco-friendly vehicle is important, so that it decreases the amount of pollution in air. This makes the environment to breathe fresh cleaner air. Going green can help to be less reliable on fuels and other harmful toxins. Breathing polluted air, actually inhaling toxic chemicals present in the atmosphere that affect the body, immune system and infections.

3.4. ORGANIC FARMING (OR) ECOLOGICAL FARMING:

Eating organic green foods have global consequences and make us healthy. It does not contain harmful chemicals, pesticides, preservatives, and added hormones. Organic farming is the method cultivating the land and raising crops in organic way. It maintains the fertility of the soil. It effectively utilizes the natural resources. It helps us to provide quality foodstuffs.

3.5. ECOFRIENDLY PRODUCTS:

An Eco-friendly product that is defined as, they do not harm the environment in their manufacture, use or disposal. Using natural productsmakeshealthy. The less chemical products have fewer toxins. Every material from household products to cosmetic products that are purchased by people can be as an eco-friendly product. Buying eco-friendly products helps us from chemicals that harm human health.Stainless steel drinking bottles: Instead of using plastic bottles can use stainless steel drink bottle, this is 100% BPA- free. This makes it a safe, sustainable way to consume less plastic.Ballpoint pens made from recycled water bottles: Bottle to Pen is the world's first family of pens made from recycled bottles. Water bottles are recycled to ballpoint pen so that it reduces plastic. By purchasing Pilot ballpoint pens, it removes some of these plastic bottles from landfills Fig-3.Biodegradable Garden Pots: It helps to keep garden from plastic pots and pollution, these Biodegradable Garden Pots are made from recycled materials and decompose in a year so that it won't affect landfills. Biodegradable pots are made from coir, wood fibre or biodegradable plastic. It is long lasting and easy to handle.

Clothing, Reusable coffee cups, Green toys, Recycled paper, Compostable Party Plates and Bowls, Drinking bottles (eg: stainless steel bottles), Home/ restaurant items, Home items, Home/ camping/ travel, jewellery and accessories, Shopping bags, Solar power are some Environmental friendly products.

These are some of the effective ideas to go green.

Fig-3 Pilot B2P- Bottle to Pen – Retractable Ball Point Pens Made from Recycled Bottles.

Buying an Eco Computer Accessories and Eco Laptop, it reduces carbon foot print by 70% lower than the other personal computer. The product Iameco D4R laptop is launched recently to reduce the emission of Greenhouse gas and the laptop has been built with high performance laptop that is designed for Recycling, Repair, Refurbishment and Reuse. Buying Iameco an Eco laptop [Fig-6] it reduces Greenhouse gas (GHG) by 30%.

Computer Accessories is the first environment friendly accessories, it is invented in order to reduce energy consumption, encourage reuse and eliminate waste. It is made from sustainable materials and responsibly manufactured Fig-4.

Eco-friendly Touch Screen Computer decrease of at least 30% in Greenhouse gas emission and at least 70% of overall reuse and recycling of waste and a reduction of at least 75% of fresh water utilization. It helps in the reduction in the use of strategic and hazardous materials Fig-5.

Fig-4 Eco Friendly Computer Accessories.

Fig-5 Environmental Friendly Touch Screen Computer

Fig-6 Eco Laptop

IV. THE THREE R'S SUSTAINABILITY:

The three R's REDUCE, REUSE and RECYCLE helps to cut down the amount of waste throwing away. It is the order of priority of actions to be taken to reduce the amount of waste generated and to improve overall waste management.

The goal of the three R's is to prevent waste and conserve natural resources. Throwing the unwanted computer and other hardware in land will cause serious environmental problems. Instead we should refurbish and can reuse.

Three R's is the guidence suggested for creating a sustainable life and can contribute towards a healthier plant. The concept and promotion of three R's was created to help combat the drastic increase in solid waste production Figure-1.

4.1. THE FIRST R-REDUCE:

Reduing is the first and most effective of three R's. It means reducing energy, power consumption and buying less. Many organizations buy new computers every 2-3 years. Instead of buying new we can make use of old computers. Using hardware for the longer period of time can reduce the total environmental footprint caused by computer. Reduce is simply creating less waste. Its also the best way for keeping our earth clean [2].

4.2. THE SECOND R-REUSE:

Reuse means using a product more than once, either for the same purpose or for a different purpose. The hardware that can reuse again and again instead of throwing them away. It generally makes more environmental sense to update your computer rather than buying a new one. Reusing the hardware and second hand computers is the best way to keep environment from waste production.

4.3. THE THIRD R-RECYCLE:

Recycle is converting waste materials into new materials. The united nation environment program estimate that 20-50 million tons of electronic waste are generated world wide for every each year and also it is increasing. Computers, moniters, hardware devices consist of toxic materials like lead, chromium, cadmium and mercury. Toxic material can leach harmful chemical into environment. Recycling is the natural way of reducing environmental pollution and the emission of greenhouse gas. If e-waste is not recycled property, it can harm the environment.

4.4. THE FOURTH R-RECOVER:

Recover is the last "R" refers to environmentally friendly approach to minimizing and managing the waste materials. Recover, Repair, Refurbishing the electronic devices or products and convert into newer one and use once again. Computers, cell phones and electronics while recovering it can give them a new use again. The practice of putting waste material and products into another use is called as recovering.

V. ENERGY SAVING:

The advantage of green computing is to reduce the power consumption. There are different techniques that are used to save power consumption.

1. Activating "Hibernate" or "Deepsleep" mode can reduce the consumption by 96% [7].

2. Keeping the computer in "Standby mode"when it is not in use and therefore it can reduce.the energy consumption upto 70% to 80% [7].

3. Power sucking displays can be replaced with green light displays made of Organic light emitting diodes (OLED's).

4. Use a low power desktop or a laptop computer (40-90 watts) rather than higher power desktop (eg: 300 watts).

5. For desktops,buy a low power centarl processing unit (cpu). This reduces both power consumption and cooling requriments.

6.Energy use of PC's- If the computer is left on all time without proper power saver mode, this can lead to 1600 kwatts.

7. Cathode ray tube (CRT) monitor and high resolution models consume more energy than the small ones. Liquid crystal displays (LED) which is used in laptop computers it is more energy efficient and uses 10%-20% of power.

8. Replacing the Cathode ray tube (CRT) screen with an Liquid crytal display (LCD) screen keep the pc atleast 5 years. This reduce energy consumption by 40%.

9. Software programs like "local cooling" can calculate how much electricity the computer uses and it adjust.the settings of power consumption and minimize it [7].

10. Instead of using Google native version to search we can use the "Blackle". The implementation is in dark mode to search so that it can save screen energy.

VI. ADVANTAGES AND DISADVANTAGES OF GREEN COMOUTING:

ADVANTAGES:

- Reduces the amount of pollutant in the surroundings. Reduce the electricity consued and environmental waste generated when using a computer.
- It saves the power consumption and reduces the amount of heat produced from the electronics.
- Green computing techniques reduces the carbon dioxide emission and less impact pn environment.
- Promotes effective utilization of natural resources.
- Green computing encourages the use of renewable resources and reduces the amount of heat production from the electronic devices.

DISADVANTAGES:

- Rapid technology change
- Computers that are green may be considerably underpowered.
- Green computing could actually be quite costly.

VII. CONCLUSION:

Green computing is reducing the use of harmful materials, maximize energy efficiency and promote recyclability. It helps to save environment as well as power use of power management devices reduce the consumption of environment. Reduction in energy consumption gives chance to money saving.

Green computing can lead to a lot of energy savings reduction in emission of CO2 and Chlorofluorocarbon (CFC), which leads to environment production. It can bring a revolutionary change in method of using the computers and making it environment friendly and always it will be the key to reduce carbon footprint. We can create the better quality of life for the coming generation. By green computing we are trying to make the whole surrounding and the computers more friendly to the environment, economy, for us and for next generations.

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