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RECYCLING E-WASTE AND DEVELOPMENT OF BIOMEDICAL SEMICONDUCTOR

Ankita Choudhary¹, Jagandeep Kaur², Shruti Karkra³, Aman Jatain⁴

Student, Department of Biomedical Engineering, Amity University, Gurugram, India¹

Assistant Professor, Department of Electronics and communication Engineering, Amity University, Gurugram, India^{2,3,4}

ankita18496@gmail.com¹, jkaur@ggn.amity.edu², skarkra@ggn.amity.edu³, jatain@ggn.amity.edu⁴

Abstract: E-waste (Electronic waste) is an electronic material which has completed its life span and has no worth. Growth and innovations of Information and communication technology has been a major factor in deterioration of human health and environment. These waste releases toxic chemicals and heavy metals which damages the environment and causes pollution which results in irregular breathing pattern, inflammatory responses and oxidative stress level in humans. To reduce these effects, E-Parisaraa (in India) a government organization took the initiative of covering the area of Waste Electrical and Electronic Equipment in all the developing countries. These hazardous wastes can be recycled to develop biodegradable semiconductors to reduce oxidative stress level and is biocompatible as well as bio inert biomaterial so that if it is implanted in human it won't affect human health. Oxidative stress and exploited cells are the elementary level for the formation of cancer cells. In this paper we will represent the impacts of Electronic-waste on the well-being of human and environment and will use recycling technologies to develop biodegradable semiconductor for reduction of oxidative stress levels. Prototype is created using sensors, actuators and electrodes on Arduino platform.

Keywords – E-waste, WEEE, E-Parisaraa, Oxidative stress level.

I INTRODUCTION

E-waste or electronic wastes are referred to use equipment's of electronic devices. These are hazardous as it can affect environment as well as human health too. These devices can be recycled in proper manner to obtain better results such that it can be reused further with the same strength and it won't affect the environment. These wastes affect environment in disastrous manner as it releases toxic matter which is non-biodegradable as we don't have any option rather than dumping or burning which is difficult as it is non-biodegradable. We will solve this with the help of education. The expression "e-waste" is approximately connected to buyer and business electronic hardware that is close or toward the finish of its valuable life. Segments of some electronic items contain materials that render them unsafe, contingent upon their condition and thickness. For example, California law right now sees nonfunctioning CRTs (cathode beam tubes) from TVs and screens as unsafe. Nowadays PC has turned out to be most normal and broadly utilized contraption in a wide range of exercises going from schools,

living arrangements, and workplaces to assembling businesses. Parts of PC can be harmful as circuit sheets containing substantial metals like lead and cadmium; batteries containing cadmium; cathode beam tubes with lead oxide and barium; brominated flaring specialists utilized on printed circuit sheets, links and plastic packaging; poly vinyl chloride (PVC) covered copper links and plastic PC housings that discharge exceptionally lethal dioxins and furans when copied to recoup significant metals; mercury switches; mercury in level screens; poly chlorinated biphenyl's (PCB's) available in more seasoned capacitors; transformers; and so on. Basel Action Network (BAN) assesses that the 500 million PCs on the planet contain right around 65 percent of E poisonous squanders. The lead can saturate the ground water from landfills consequently polluting it. On the off chance that the tube is pounded and consumed, it radiates poisonous exhaust into the air. So that due to all this arose problems recycling techniques are being used to develop something eco-friendly devices which can be generated with the help of e wastes and further be used or we can also enhance the life span of that particular material which we

take as a waste. After that we will develop biomedical semiconductor using that which can be further used to detect the oxidative stress level of human. Stress simulation is necessary as it can also eliminate mechanical failures in the structural design. Thermal extension coefficients of films vary from each other, thermal stress happens amid the assembling procedure. This occasionally causes mechanical disappointments, for example, film de-lamination or splitting and disengagement development in the silicon substrate. Hence it can be further reused. So, in this paper we will briefly explain the effects, recycling techniques, methodology and its result [3].

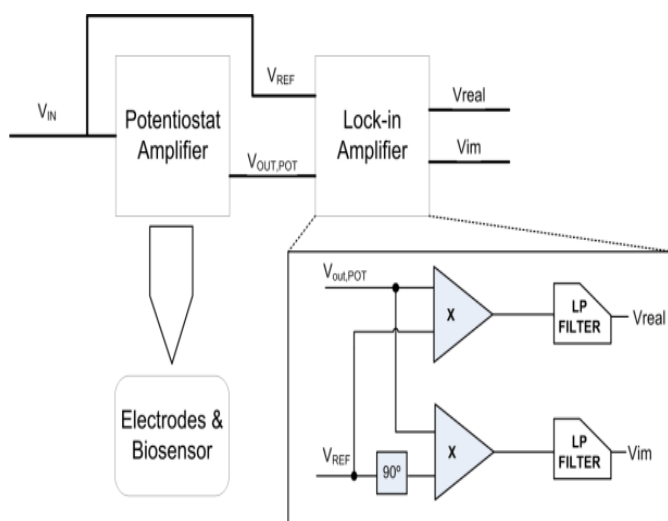


Figure 1 Schematic Diagram of Biosensor

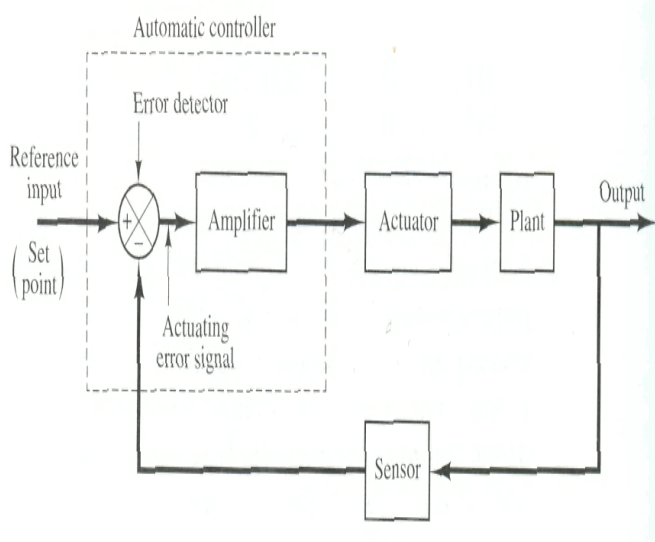


Figure 2 Linear Actuator

II EFFECTS OF E-WASTE ON HUMAN

As these waste releases e toxic elements such as cadmium it affects human because of that it has increased the oxidative stress level such that in the given table it is mentioned that what kind of e waste can cause different effects on human health.

Table 1 E – Waste and its Effect on Humans

E-wastes	Chemicals Constituents	Effects on Health
Hard Ware waste	Lead	Neural, excretory and circulatory damage. Brain development in children affected.
Biomedical semiconductors	Cadmium	Stress related problems and accumulation in abdominal region.
Relays and circuit boards	Mercury	Respiratory and skin disorders due to bioaccumulation in fishes.
Corrosion or rust	chromium (Cr) VI	Asthma, Bronchitis and DNA damage.
Cable wires	Plastics	Burning produces dioxin.
Plastics	(BFR)	Disrupts endocrine system functions
Motherboard	Beryllium (Be)	Carcinogenic (lung cancer), warts.

When not handled properly, many of the release toxins are absorbed by the body, affecting all those nearby, including children. The health effects of this have been noted to cause brain damage, kidney disease, cancer, handicapped mental development within children, and asthma. This affects not only those working with this toxic waste, but also surrounding community.

Basically, in this paper we will mention about the e wastes especially of biomedical semiconductors and biosensors which cannot be used again and considered as e waste. Generally, cadmium is the main toxic element released from this which disturbs the human health by disturbing the stress level of human. So, that it can detect the oxidative stress level in human with the help of sensing devices. And, will try to execute this for longer period of time and providing less damage to humans and even eco-friendly too.

III LITERATURE REVIEW

Researches depict that dumping and incineration of e-waste releases high amount of toxic gases which are not eco- friendly and have adverse effect on human health.

For us, if the computer is not working it is considered as waste but for those who cannot afford these things it is considered as some new equipment and they use it in some different manner what they know about it or whatever they can do with that particular device. From this thing an idea arises in our mind that if these slum people can think something innovative then why can't we. These small things create a lot of changes in our environment. If we are using a particular device then it's our duty to verify whether

the device is working properly or not. In some cases we usually throw our equipment's rather than this we can utilize the material which we need to rest we can use to design something creative [2] [3].

Some researchers also concluded that new equipment's and creative materials (such as acrylic jeweler) can be designed using the generated e-waste.

Customers approach various reusing openings, contingent on where they live. Thinking as far as the gadgets reusing pecking order, the best decision is to give PC hardware that can be revamped or reused as may be, gave that individual data is scoured from gadgets. Furthermore, different projects are accessible to help customers with the reusing of mobile phones and batteries, for example, through Call2Recycle. Regardless of whether you are permitted to toss EOL electronic gadgets into the junk, may rely upon gadget and area [1] [2] [3].

Allude to particular state enactment, however please reuse. Note that a few groups or urban areas will have approaches that boycott e-waste regardless of the possibility that there is no such boycott at the state level. Customarily the staying nonmetallic substrates are perilous (because of quality of brominated fire retardants and substantial metals like lead, cadmium, beryllium, and so on.), and have been dumped into landfills after legitimate treatment [4]. This has caused expansive soil lethality issues and pollution of ground water. Consequently, measures to make utilization of the non-metallic divisions have been sought after. As of late, there has been some accomplishment in better administration of non-metallic division. In the accompanying area couple of potential reusing strategies and reuses of non-metallic part is examined. The non-metallic portions recouped from squander PCB powder are lighter than concrete and sand, the granules are substantially better similarly, thus, more solid microstructure.

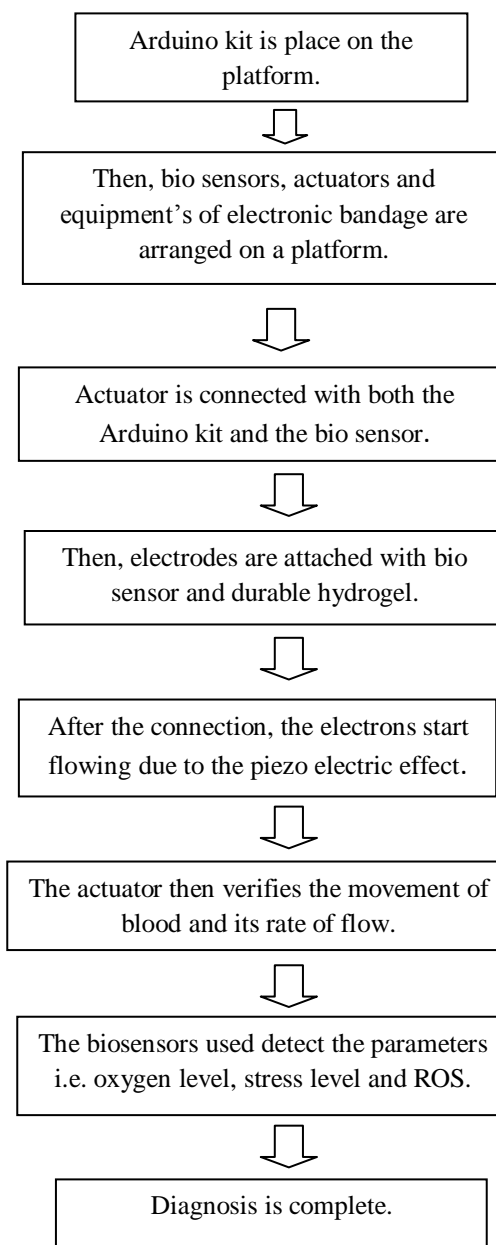
Mechanical quality of the material is enhanced by the nearness of coarse glass strands. Subsequently due to above expressed properties, non-metallic portion can be effectively utilized as filler material, concrete, for other surrounding applications, glues and enhancing specialists. NMP was utilized to deliver composite sheets. Composite sheets discover applications in many fields including vehicles, furniture, enlivening materials and delight gear. Nonmetallic portions from squander PCBs can likewise be utilized to make items which bring about more prominent twisting worry due to their excellent flexural quality [1] [2] [3].

Physiological signs will be measured by the biosensors that give alarms promptly when variations from the norm in a patient's physiological condition are recognized. The remote connection is used to satisfy the requirement for understanding portability in home human

services and to transmit constant medicinal data and cautioning inside a satisfactory time restrain for basic life cases, particularly when more than one sensor are interconnected. The biosensors are those devices which are planted over skin to detect the blood flow, oxygen flow, ph like basic requirements. Second main component for this is actuators which are basically designed for controlling and moving mechanisms.

IV METHODOLOGY

This part of this paper will actually define how the device is formed with the help of e waste and what will be its effect, advantages or disadvantages. We will design the prototype for this with the help of Arduino, actuator and biosensors. Now with this device we can verify various things like what will be the stress level.



The most important thing is that it will only cause the disease and with the help of the waste only we will develop a machine or a prototype which will help us to detect whether the oxidative stress level is normal or not or we should go for a serious health checkup.

In the platform the Arduino will be the only device which is not reused otherwise each and every devices are reused. The platform is made up of cardboard where all the devices are connected and will be attached to human body via electrodes. If it can stick properly then gel is not applied otherwise for rubber or plastic electrodes gel is applied on human skin such that it can detect the skin as smooth surface and get the result more accurately.

Now, the wires will be connected between biosensor, actuator and Arduino. Arduino will be connected to both with the help of wires and the biosensor will be connected with the skin too so that it can measure the generated bio potential of skin [1] [2].

V RESULT

As these connections are placed in the schematic manner such that the replaced or reused parts are connected with new elements to perform new functions and act like a new device. In this prototype only Arduino is the device which is not used. Now as it is a single board microcontroller it is used for prototypic work such that it can get better results and the other elements are used part of electronic bandages, actuators and biosensors. Wires and electrodes are also used but it can vary; if the used electrode is too damaged we cannot use it again for future reference as the electrode and biosensors are 2 important elements in detecting the particular phenomenon.

Connections are feasible and easily attached so that we can get whatever is being functioned. These devices can detect the oxidative stress level of human due to extra foliating cells because of E toxics. When the electrodes will be attached to human skin it will recognize the flow rate via which biosensor will calculate the stress level with the help of actuator which will measure the movement and flow rate of blood.

Table 2 Comparison of Parameters before and after Diagnosis

Parameters	Unit	Result	
		For Normal Human	For Diseased Human
Stress level	Pascal	<=3	>3
ROS	percentage	<40	>40
Oxygen level	percentage	100	<60

This will help us in future reference such that with the help of this we can detect the stress level which can help us to diagnose various health conditions but it won't be

helping in diagnosing what disease is the patient suffering from and in what context.

VI CONCLUSION

E waste or electronic wastes are referred to use equipment's of electronic devices. These are hazardous as it can affect environment as well as human health too. These devices can be recycled in proper manner to obtain better results such that it can be reused further with the same strength and it won't affect the environment. These wastes affect environment in disastrous manner as it releases toxic matter which is non-biodegradable as we don't have any option rather than dumping or burning which is difficult as it is non-biodegradable. The health effects of this have been noted to cause brain damage, kidney disease, cancer, handicapped mental development within children, and asthma. This affects not only those working with this toxic waste, but also surrounding community. Thinking as far as the hardware reusing order, the best decision is to give PC gear that can be repaired or reused, gave that individual data is scoured from gadgets. Composite sheets discover applications in many fields including cars, furniture, delight gear and cosmetics. Nonmetallic portions from squander PCBs can likewise be utilized to make items which brings about more noteworthy twisting worry due to their magnificent flexural quality. The remote connection is used to satisfy the requirement for understanding portability in home social insurance and to transmit ongoing restorative data and cautioning inside a satisfactory time constrain for basic life cases, particularly when more than one sensor are interconnected. At the point when the terminals will be joined to human skin it will perceive the stream rate through which biosensor will compute the feeling of anxiety with the assistance of actuator which will gauge the development and stream rate of blood. And hence with the help of the prototype we will be explaining the detection of Oxidative stress level of humans.

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