Bioelectronix—with an x
by Helmi Hardian

The term Bioelectronix (with the last letter 'x') grabbed my attention after an email discussion with Marc Dusseiler, a friend of Lifepatch, about plans for Tourdigrade in Surabaya. One of the programs was a workshop on bioelectronix, and I immediately turned to the internet to find out what that was. Then Google suggested I try the keyword bioelectronics; I thought, same thing, perhaps bioelectronix is just the modification of the final letter or syllable.

Predictably, the first result was Wikipedia, where it was written that bioelectronics is a new term created for research fields that aim to build synergy between electronics and biology. Sweet! It also made reference to a journal which defined the scope of bioelectronics, describing the key aspects as the interface between biological material and micro or nano electronics.

The last sentence automatically brought up new questions in my mind. Does it have to be micro? Does it have to be nano? I decided to continue my search and nearly all the writing centred on the micro or nano scales, both with regards to the biology and the electronics. Well, it seemed too far and too difficult; I felt I would need to ask for more details when the Hackteria team came to Surabaya.

While I waited for their arrival, I wondered whether the practice of bringing together biology and electronics was already happening or was even already necessary around where I live. Even though the term bioelectronics is still unfamiliar to the ears of people here, we're quite relaxed with the description of the term; in fact the practice of bringing together biology and electronics happens quite often and is usually related to necessities, some examples of which I'll describe:

Famers have created an innovative tool for drying grain, with the assistance of a kind of solar-powered circuit, made by local residents and farmers. Wow, I think that is such a useful application.

Another example is the emergence of a concept which fulfils everyday needs, such as the college students from Muhammadiyah 2 Sidoarjo School who, I read in the local paper, made a tool to assist the elderly to stand up, called the Postwec (power stand-up wheel chair). A project fulfilling more specific needs was conducted by two students from the electronics faculty at ITS, where they designed a tool that functions to stimulate the muscles of stroke sufferers. Meanwhile their colleagues built a machine, called the Electrolarynx, which assists people with no vocal chords to speak.

Do these count as bioelectronics? Perhaps there are those that will agree that it is, and others who will not. However, in the end, my opinion was reinforced when I became aware of the significance of the 'x' at the end of the word bioelectronix, which I had originally thought was insignificant. This explanation emerged spontaneously after I attended the whole series of activities in the HackteriaLab 2014, which

began with the Tourdigrade program.

Tourdigrade-Pre-HackteriaLab 2014, in Surabaya, was a pre-event activity for HackteriaLab 2014 in Jogjakarta in mid-April, which was a series of touring presentations and workshops initially held in Jakarta, Bandung and Jatiwangi. In the Surabaya iteration, Tourdigrades Pre-HackteriaLab held two sessions, the first a presentation at the Tenth November Institute (ITS), in the Biology Department Seminar Room, Mathematics and Natural Sciences Faculty, on Tuesday 1 April 2014, from 13:00-15:30. The second session was a workshop in the multi-purpose building at the Bank Indonesia Library, on Wednesday 2 April, 2014, at 13:00-16:30.

In the presentation session at ITS, the Hackteria team introduced one of the works that they had been developing, a DIY Microscope-Webcam that is cheap but has magnifying power up to 1000x. Students were given the opportunity to try and to understand the working process and the method for making the microscope.

The speakers also related the advantages of this cheap microscope, such as that an image of the magnification appears immediately on the screen of a laptop or projector, and can immediately be captured, easing documentation. At the end of the session students stayed on to ask questions and interact, the Hackteria team also showed examples of other instruments such as the DIY Distillatory, the DIY Turbidity Meter, and other DIY laboratory equipment. The students' enthusiasm was certainly high; from these simple instruments great expectations emerged, such as the dream of having a personal lab in your bedroom. This could overcome many classic problems, such as long queues for lab use, urgent needs for microscopes and most importantly, it spreads the DIY spirit, and means you don't have to give up if you can't afford to buy expensive lab equipment.

Hmm. I began to understand the superiority of bioelectronix with the 'x' at the end.

On the second day the Hackteria team held a workshop that was divided into two classes, and participants could choose which of two they wanted to attend. In the fermentation class, wine-making was explained and implemented using rising agents from the essence of soursop. However, the fruit used in this fermentation process was not grapes, as is commonly used in wine, but rather local fruit like mangosteen and manggo. The speaker explained several important points that are often forgotten, such as cleanliness and sterilisation of all the equipment. Participants were able to take home their produce from the workshop and wait for 2 to 4 weeks for the fermentation process to complete.

Meanwhile, the bioelectronix class was learning about the making of 'sonify life,' a sonification instrument that was created by joining electronic equipment and nature to create synthetic sounds. Visitors were given explanations about components that were

used in the structure, and then they were immediately able to solder and assemble their instrument. Participants were also allowed to develop the structure. Several participants tried to change and add to the components so that a different sound could be produced.

Before the two workshop sessions, the Hackteria team introduced them with a short presentation, explaining several primary matters, such as bioart, biohacking and bioelectronix (ah, this is what I was waiting for). They also explained how it has developed across the world, and the activities and collaborative works that have resulted from the collaboration between Hackteria and Lifepatch, as well as other creative organisations. Here, Marc Dusseiller was the speaker who explained that, in contrast to bioelectronics, bioelectronix is a concept that is more, he used the term 'rock and roll' – in the sense that rock and roll is not just about the music but also the attitude.

Rock and roll music is not just influential on music styles, but also on life, fashion, behaviour and language, and belongs to everybody. The rock and roll analogy is in relation to the principles, concepts and frameworks for bioelectronix, which are not merely innovative, but also relate to attitude, mentality and spirit. Not just in terms of how it is developed, but also how others without scientific backgrounds can become involved and apply it in their broader, everyday lives, where the process and the results can be equally appreciated. So, with that explanation I began to understand what bioelectronix is and how it works. But then a new question arose. How is it actually implemented in the field? That is what made me sure I should join HackteriaLab 2014.

HackteriaLab 2014 was held in Yogyakarta on April 2014. It was a joint project with research, experimentation and discussions amongst scientists, hackers, designers, artists and musicians, both local and international, which was implemented in three sites with different themes, such as bioremediation of volcanic soil on Mt Merapi, observation of the environment around Code River in Yogyakarta, and conservation of biodiversity in the Wonosadi Forest.

HackteriaLab 2014 began with a presentation from each participant, in which I did not feel very confident, given that I don't have even the slightest background in science. On top of this, I was the first speaker; such bad luck. However once the session was underway, the diversity of backgrounds, interests, projects, expressive methods and content of the presentations became obvious. In fact it was this diversity that indirectly meant I could be part of HackteriaLab; an opening capable of breaking down the barriers between disciplines.

Another quite interesting aspect was that no matter what program was taking place, it always began and ended in a kind of temporary lab, and this had the biggest role in interpreting the concept of the Hackteria network, how people gather, ask questions, discuss, experiment and

create without thinking about being right or wrong, successful or not. Here everyone was free to pour out their creativity without limiting segmentations. These are the conditions that made be feel I had a right to be part of the world of science. Unavoidably, science usually feels quite superior, but there we could sense science all around us, even the concept of experimentation would often emerge suddenly, and happen right then, with whoever wanted to be involved.

Program after program took place over two weeks or more, beginning with a symposium, workshop, and an exhibition and so on. I remember that what had brought me into this series of programs was that initial word, bioelectronix with an 'x' on the end. And after joining all the programs, I felt there was even more meaning in the letter 'x'. Not just as an experiment or something we don't know yet, but it reminded me of when I was in school, and the variable 'x' was something always used in tests, as in 'find x', 'determine x', 'what is the value of x?' And we mark an 'x' on the correct box, if our answer is incorrect; we also get an 'x'. So does 'x' mean right or wrong? That isn't the point, what is far more important is that we have tried and found the best answer, at least for ourselves.