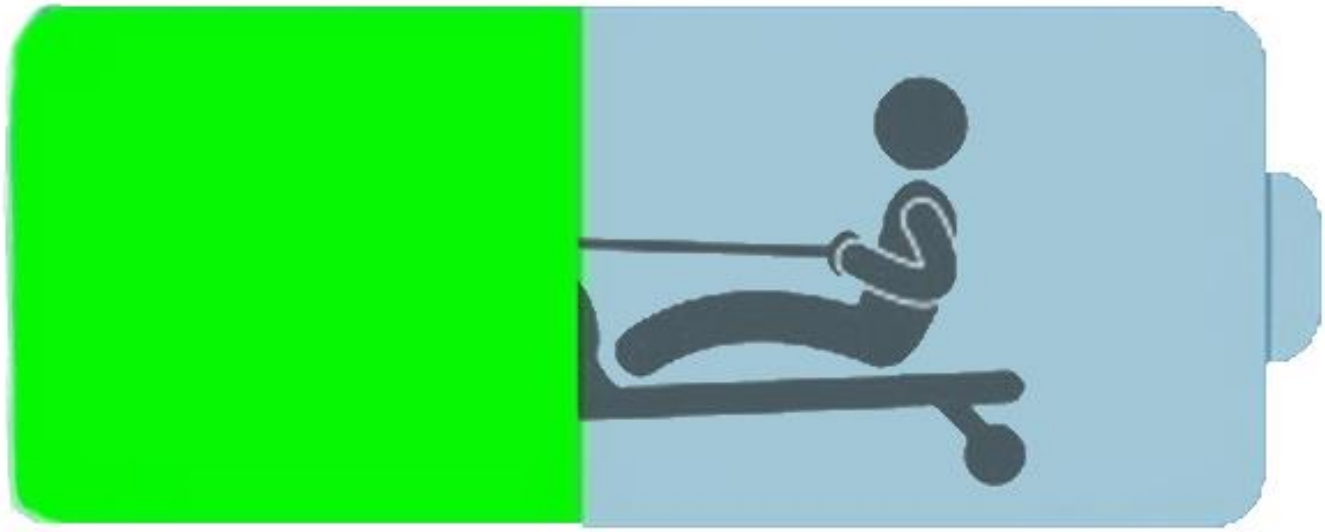
FROM BURNING CALORIES TO BURNING LIGHTS

GENERATING ENERGY WHILE WORKING OUT



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SUMMARY

In order to apply physics in design problems I aimed to combine sports and technology, which both interests me. Because people want to prevent obese but still want to use digital devices, I thought recharging devices with own generated energy could be very useful. I am motivated to sport and use electrical devices really often. This is why it is also applicable for me as well and that strives me to think about solutions.
So I would like to get a fully charged device through moving energy. I think the mobile device is the most used device, so that is the reason I chose it. I think that combining sport and technology there becomes a reason to even go outside and sport. There could be produced energy while running or while pushing weights. All that energy is now lost into almost nothing, but when there is a technology applied, it is possible to generate that energy to, for example, recharge a mobile phone. So in this report I looked for motions which provide the needed energy to recharge a mobile device. By doing this research I want to become more aware of the applications of the basic course 'Applied Physics'. This report includes my hypotheses, a short introduction, the methods and results and the discussion. After this all, you can find a conclusion and the bibliography.

HYPOTHESES

I thought that charging a smartphone did not need a lot of energy. I knew that smartphones take a lot of time to recharge and that is unfortunate for my research, but I think there are a lot of methods of generating the needed energy.

INTRODUCTION

I looked for the energy which could be generated from motion. This motion means the motion of the human body. Running with shoes which generates energy, the machines with which strength can be trained and the cardio machines, which needs a lot of energy itself as well. As a little expansion I looked for generated energy from the hydroelectric energy.

RESEARCH

In this part of the report I want to show some different methods of generating energy to fully recharge a smartphone. To compare the needed energy to the maximal generated energy I searched and calculated the value of energy to recharge a smartphone. To fully recharge my own mobile device you need 2100 mAh in perfect conditions. I use this value of an iPhone 5, because it is easy to use one value and it is for myself really interesting.

RUNNING

While running there could be a sort of spring in your sole, which generates energy. On internet I find a link to a project of this. It seems to work. With gears and which will spin when the vertical movement is beginning will rotate the motor and this will generates the energy. In my bibliography I put a link to the project of Angelo Casimiro. 'Angelo discovered that he could fully charge a 400 mAH Li-ion battery by jogging eight hours or charge a powerbank by playing two hours of basketball.'

STRENGHTEN MACHINES

Fitness strength machines could be used in my opinion as well. The pulley makes a circular motion and thus could be transferred to a motor and then to a generator. This motion is just not enough I think. Maybe it is possible to use hydroelectric energy by pushing water instead of weights. This water will go through a wheel, which thus makes a circular movement. This movement could be transferred to a motor and generator as well. Unfortunately I did not have time to experiment with this and in order to that have values to calculate. I could not find any other research in this area.

CARDIO

Fitness cardio machines, the persons using it, supply a lot of energy.

Reasoning: If you run 30 minutes on a cross-trainer, then the machine gives me a value of approximately 180 Kcal, which stands for ca. 750 KJ. A normal AAA battery has a capacity of 1200 mAh and that is equal to roughly 5.3 KJ(this stands on the battery itself). That means that such a 30-minutes' walk generates enough energy to fully recharge 141 AAA batteries in theory. Unfortunately in practice a lot of energy is lost to friction, air resistance and even more other factors. With a efficiency of 10% there are still roughly 14 batteries fully charged in half an hour running. This is energy which could be used to recharge your phone as well. 14 AAA batteries are equal to eight smartphones fully charged. By the way, you need some electronica to stabilize the correct voltage before it is possible to recharge a mobile device

This could be realized by generating the resistance in such fitness machines with a dynamo. Such a dynamo generates energy to a charging cradle or another sort of battery which stores the energy. With a cable this energy could be sent to the mobile device which is connected. This is comparable to a dynamo of a bicycle.

Expansion

When showering I find that we use a lot of water. This water have to be heated and this costs a lot of energy. Maybe with this average 51 liter of water in an average shower of nine minutes there is an opportunity of generating energy for your mobile device(this values are on the link in the bibliography)

Reasoning: To shower nine minutes you reach a Q(electric charge) of approximately 6.5 MJ. This could be calculated with the formula: $Q=c*m*\Delta T$. In this formula I used for c the value 4187 of water and 51 for mass and 30 for the change in temperature. The volume of water is the same as the mass of water and for the change in temperature I assumed the initial temperature of 10 degrees and the desired temperature of my showering water, 40 degrees. This 6.5 MJ is equal to roughly 1471 Ah. This is really much and actually equal to fully recharge 700 smartphones!! A lot of energy we use to shower, which we could also use to recharge a smartphone. The 9 minutes showering is obviously not equal to the time recharging 700 smartphones but it is equal to the energy it costs.

To generate hydroelectric energy while showering you could use the stream of the liters of water. Unfortunately that is really too small-scale. There is often no space for this technic. Maybe putting a wheel under the douche drain to generate some energy but it will not be enough to recharge a smartphone. The only solution is to shower less, but I don't know how the saved energy can be transferred to a smartphone.

CONCLUSION

I think it is possible to generate the energy needed for your mobile devices in many ways. The problem is that mobile devices needs a lot of time to recharge. This recharging time is going to be smaller in the future and then it will be possible to actually recharge your mobile device in the sporting time. That is a lot more motivated than sporting to supply a battery and it still takes hours to have that fully recharged phone.

BIBLIOGRAPHY

In the link below I found the needed mAh to recharge a iPhone 5.

http://www.beslist.nl/products/accessoires/r/Accu_Case_iPhone_5_Batterij_Hoesje_Zwart_2800_mAh_/

In the link below I found the project of Angelo.

http://conspiracy-watch.org/15-year-old-invents-energy-generating-shoes/

In the link below I found the values of average showering.

http://nos.nl/artikel/694426-stop-eerder-met-douchen.html