Civil and Criminal Liability In the Era of Subconsciously Controlled Prosthetics

Roy Meirom, Zvi Meitar Institute for Emerging Technologies- May 24th, 2016

HI-TECH BIO-TECH GREEN TECH PEOPLE TECH

IDC HERZLIYA | Zvi Meitar Institute for Legal Implications of Emerging Technologies

Hello everyone, My name is Roy Meirom and I am a researcher at the ZMI for emerging technologies.

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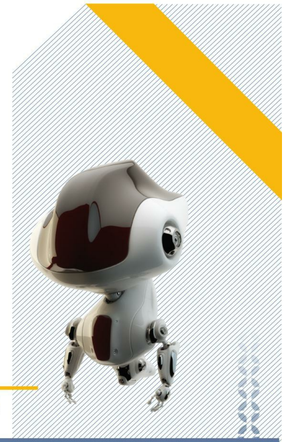
For example my team and I are working a very big project in the autonomous vehicles and others are working in the field of artificial lawyers and blockchain which you will get to hear later today.

Civil and Criminal Liability In the Era of Subconsciously Controlled Prosthetics



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Before I start to jump in to the heart of things id like to tell you a story: **about two years ago a good friend of mine, Ari, lost his hand in a car accident.**

-**somtimes find it hard to talk** about it
-y**ou dont always feel comfortable to ask. So like all good things, it started with humor.**
-He gave me the two most common questions people ask him.

- **for children - Does it go numb if you sleep on it**
- **for adults - (and this is my favorite one), if that's your right arm how do you ahhh…**

Now, one time we finally got to a more serious conversation and I asked him, **what he wished he could do but cant**

-Most daily actions that everyone do are things that he can do now

Problem: **the thought** and **the effort** that he has to go through with each of these actions.

catch something or wash the dishes

A few months after that he sign up for en experiment held in the sheba medical center in Israel and I went with him there and found out about nuro prosthetics,

- led me here, where I would love to talk to you a little bit about this subject from a legal perspective.

B. During this short lecture id like to talk to you about three things.
1. **Introduce the technology**
2. **Discuss about some of the problems**
3. **Liability issues of this technology**

a three-part wood and lea
artifact dating from betwe
710 B.C., was found attach
right toe of a mummy.

It is considered the earlies
prosthetic ever made.

Prosthetics isn’t anything new - earliest prosthetic found in egypt.

-with the purpose of completing a lost function of the body.

100 Years of Prosthetics

Whenever you lose something, you must replace it with something

Although the history is interesting - **I want to take you a little bit further to these past 100 years where prosthetic devices have been revolutionized.**

If you were a disabled person 100 years ago, the experience you had during your lifetime would have been quite different in terms comfort and functionality.

question: **How many of you stumbled upon a person with this kind of prosthetic?**

Their integration with everyday actions is unbelievably smooth.

and..its acutally pretty cool. Most kids these days **arnt being teased for having a prosthetic** - to other children - they are just plain awesome.

this is not only a change in technology. its also a change in perception.

100 years from now, there will be if there would be someone like me standing in front of people like you he would say **this current decade was where it all changed.**

The prosthetic that you are seeing now demonstrates the cahnge in technology.

ths is somewhat **of a robotic hand that is being triggered by very light bodily actions of the person who has it – through a connection to the nerves.**

It also works with **the help of sensors** so **if I throw a ball at it,** it could actually catch it.

for people who have lost a limb - this is lifechanging.

But - and this is a big but - the feeling of using it is **still not the same as having your own hand**, and again, y**ou would have to put effort in order to operate it.**

This leads us to subconciously controlled nuroprosthetics

neuroprosthetics - a technology that combines the biomedical engineering and neuroscience.

It is concerned with developing better integrated prostheses

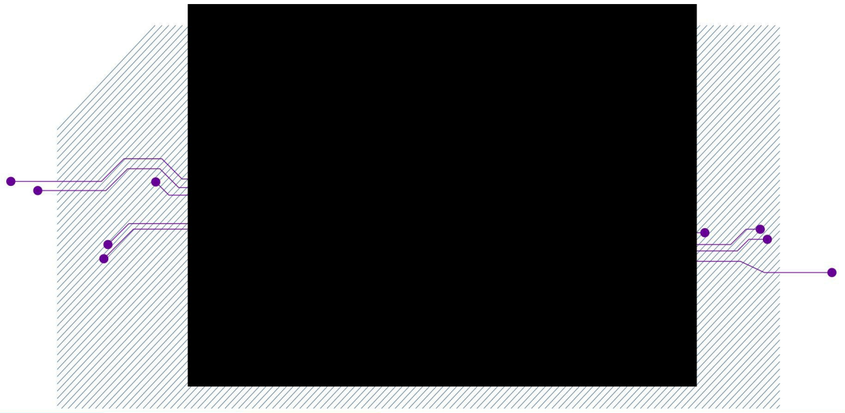
They are designed to sophisticatedly replace missing biological functionality, in contrast to a simple mechanical devices

These use brain-computer interfaces which directly connect the brain to a computer

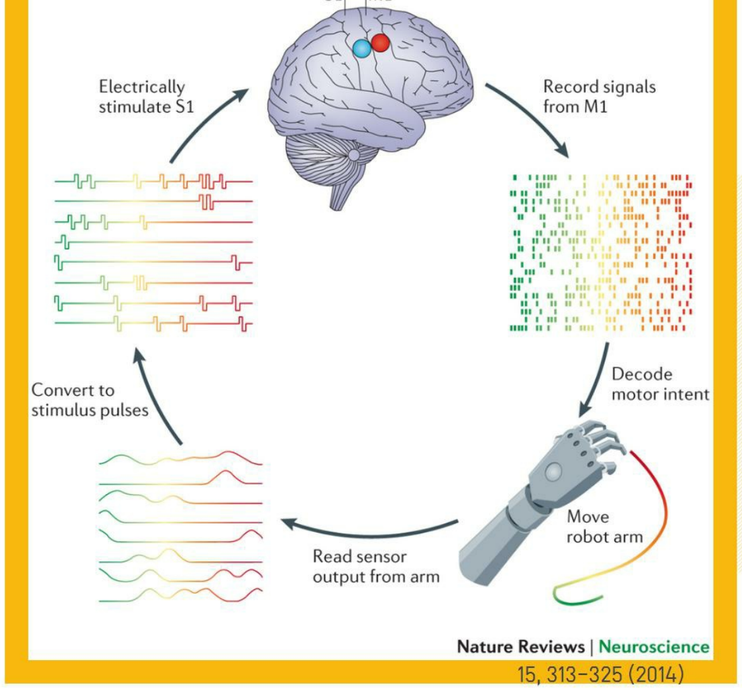
a technology that combines the biomedical engineering and neuroscience.

It is a different way to bring back biological functionality – the same biological functionality my friend Ari was talking about when I asked him that question.

Id like to show you a short video about this technology



Research shows that Brain Machine Interfaces (BMI's), interfacing via the brain's Posterior Parietal Cortex (PPC) can result in a more effective operation of a prosthetic.



Thomson, Helen. "I think, therefore I can." New Scientist 226.3023 (2015): 8-9.

<u>Ill try to make things simple</u>

Every action that we take, is being considered subcounsiously (blue dot)

and then it is being transfered to our countious part of the brain (red dot)> and then taht action is performed

What this technology does is basically the same thing **only with the use of electro-stimulant waves.**

<u>The space between the blue dot and the red dot</u> - or the space between our unconcious part of the brain and the contious part - **is where we decide if we want to perform an action or not.**

The good thing is that

This technology has the ability to predict or trigger actions based on subconscious planning

Which is HUGE for people like Ari

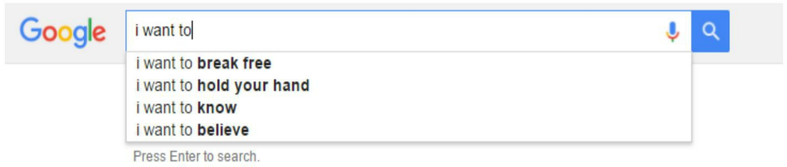
who doesnt want to think about every single action he does

This concludes the part about why this technology is amazing because there are quite a few legal issues with it

The bad thing is that

BMIs are effectively relieving the prosthetic user of not only their free will to control their prosthetic based on a conscious decision, but also their ability to make conscious voluntary decisions to stop their prosthetic device

Greenbaum, D., & Weinberger, S. (2015). Are BMI Prosthetics Uncontrollable Frankensteinian Monsters? Zvi Meitar Institute, 5.



I want you to return to the image we saw before with the blue and red dot.

Its pretty much like **googles autocomplete.**

the system is **constantly trying to help you based on its learning algorithem.**

you might be doing this movement a lot, reaching to your cup of coffee and back. and then one time..

This is a simple example for a complex problem

Once this technology kick in it wont just be coffee - it would be everyday things - it would be work things.

You might end up killing or injuring someone.

now if that really happens..

We all know that

"Blameworthy in mind"
an action cannot make a person guilty unless that person also posses a criminal mind

In this case we have to consider the existing defences

World-wide jurisdictions consider defenses that limit blameworthiness.

Typically these defenses speak to the individual capacity to have the requisite intent, including legal insanity, being underage, being unconscious, or extenuating circumstances such as duress.

But non of these defences fit the situation we have to consider something else

Anyone familiar with this term? (if so, can you give any examples?)

Non-Insane Automatism

- Sneezing
- Sleep walking (R v. Parks)
- Bee Attacks (Kay V. Butterworth)
- External Cause
- Hypnostism
- Drug Effects
- Head Blow

Sleep walking (R v. Kenneth Parks) – this is interesting. May 1987, Kenneth Parks **drove to the house of his wife's parents and killed them with a kinfe.** He attacked both of them with a kitchen knife, killing the mother and leaving the father seriously injured.

he was suffering from a disorder of sleep rather than neurological, psychiatric or other illness and the he did not so anything <u>VOLUNTARY.</u>
He was acquitted.

I want to focus on the tem voluntary

Define: Voluntary

The classical usage is as defined by the eminent Supreme Court jurist, Oliver Wendell Holmes as a willed contraction of the muscle

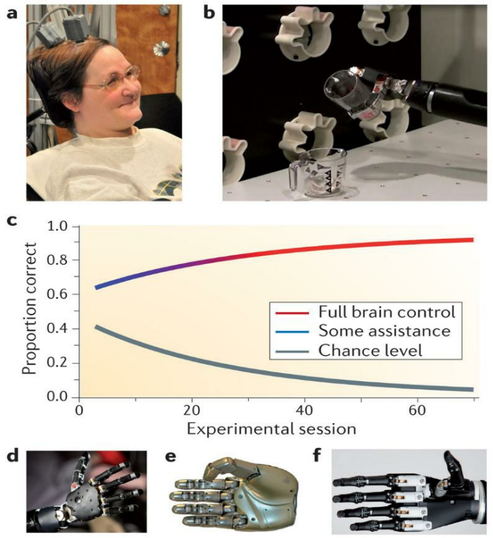
[1] Holmes, Oliver Wendell. The common law. I Harvard University Press, 2009.

The classical usage is as defined by Supreme Court jurist, **Oliver Wendell Holmes** as **a willed contraction of the muscle.**

This is not the case with neuroprosthetics.

But - unlike sleepwalking- neuroprosthetics also dont go in the category of non-insane autotimsem.

i want to show you why



The patient's performance on grasping tasks improved over time, even as the task complexity increased and the degree of computer assistance decreased. The grey trace shows chance level given the level of assistance.

Nature Reviews | Neuroscience

So - the harder the task got, the easier it was for the patient to control the prosthetic, because the learning curve is fast and natural .

but also not linear. and later on, the computer will intervene again.

the blue line that represents AI and the red line that represents the the actual person are intertwined.

this makes it impossible to determine who made the action.

we might even have to develop a human compatible black box for these things.

Not just criminal

"The law of torts does not recognize a distinction between voluntary and involuntary acts".

Denno, D. W. (n.d.). Crime and Consciousness: Science and Involuntary Acts. SSRN Electronic Journal SSRN Journal. doi:10.2139/ssrn.267589

Id like to take a pause

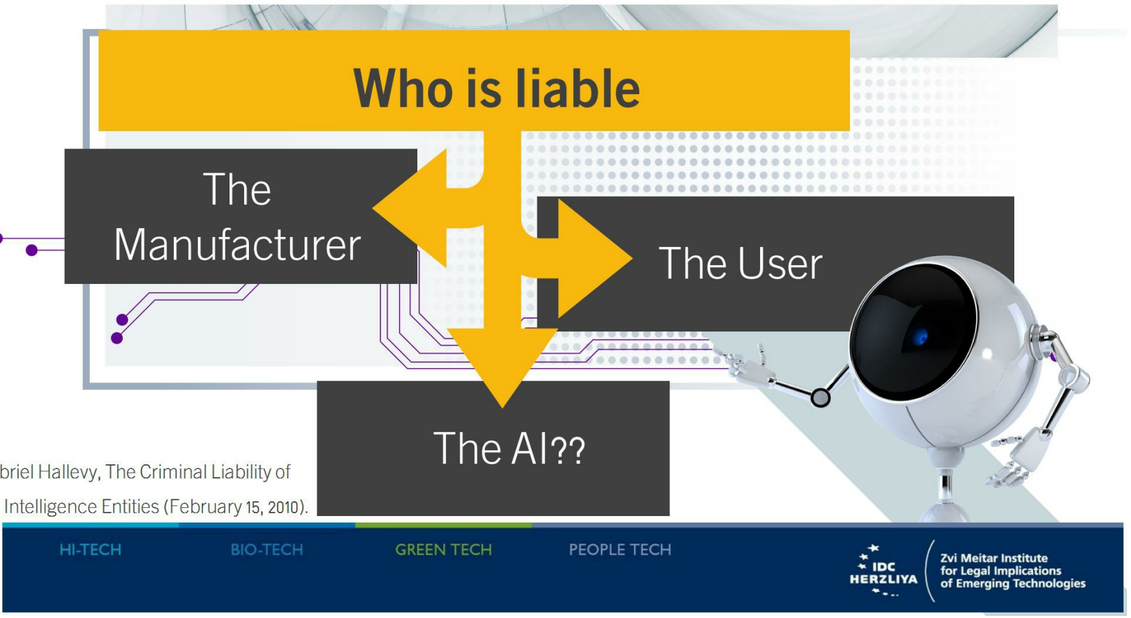
and mention that the discussion is not just criminal but also civil.

This technology will probably be used by fully functional and healthy humans too

build cars
Lift things

or - just generally be stronger with augmented hands.

maybe people will voluntary give up thier limbs in order to get a superstrong augmentation.



we talked about why this technology is amazing.

we talked about the problem.

but whats the solution here?

who is liable?

Israeli researcher Gabriel Hallevy - offers three alternetives.

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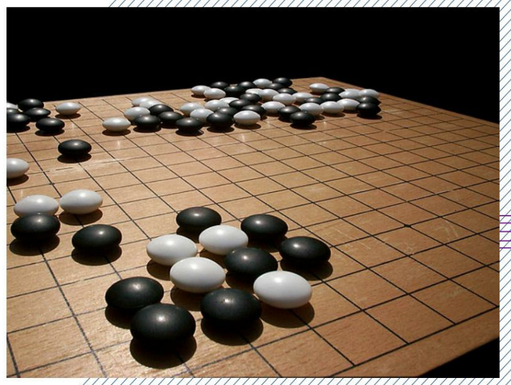
I started with a story and I want to end with a story - so For those of you who are sceptical about the last one I want you to consider th

AlphaGo's "Move 37" and AV's



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Alphago was developed by google as an **AI player for a game of go** - and playing against the best player in the world it amazed everyone as it did something that has been coined as "move 37".

No one predicted the move
No one prorgrammed the move
its was absolutluy- 100% the computer that was able to learn this move by itself.

For that reason with self learning machines- The NHTSA said that it would classify Google's artificial intelligence system as the driver of its cars.

But back to our issue - I find this problematic

because unlike an autonomous vehicle and unlike Alphago - neuroprosthetic involve a human being –

and the issue of liability remains, unsolved.

SO - I hope that you learned something new- and that together we can all come up with a legal solution so that we can see this technology safely operated and properly regulated in the next years.

Thank You

Roy Meirom

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