Western Science

## WESTERN SCIENCE SPEAKS PODCAST
## SEASON 3, EPISODE 11

**EPISODE TITLE**

Left in the Dark: Why are Power Outages Still so Disruptive?

**PODCAST SUMMARY**

Power outages disrupt modern life, making the speed of repairs to electrical wires absolutely crucial. Unfortunately, the technology behind power outages is dated, leaving families and businesses in the dark longer than they should be. Western Science Speaks is joined by Dr. Hanan Lutfiyya, Chair of the Computer Science Department at Western University, to discuss the flaws in our current method of power repair, and her proposed solutions to the issue.

## INTERVIEW

You're listening to the Western science speaks podcast. Presented by Henry Standage.

Look, I don't need to convince you how important electricity is to our day to day lives. To live without electricity is to live in a world without an economy, entertainment, or just plain old comfort in your at home life. That's why it might come as a surprise that the technology we use to detect and fix power outages has barely progressed since electricity first came into our homes. Dr. Hannan Lutfiyya, from the Department of Computer Science, researches how power outages are repaired, and where she believes the technology needs to go. She joins this episode of Western Science Speaks, here's the interview.

**Henry**: How is our power distributed?

**Lutfiyya**: Power is distributed, it starts with the power plants. So a power plant actually generates the electricity, whether it's from coal, hydro, nuclear, or whatever, then what it does is it has to transmit that power to the consumers. So it does that through transmission lines. And those are the things she's you often see these long transmission lines, you know, the electric poles. But the thing is, so when it does that transmission, what it does, it has to increase the voltage a lot, so that it can be transmitted over a long distance. Then when it gets closer to the consumers, what happens is you actually have to decrease that voltage, because the high transmission voltages are dangerous. So what they do is they go to a distribution grid, where it starts to decrease the voltage before making the final delivery to the consumers.

**Henry**: Right. So it comes out extremely high voltage when it leaves the plant.

**Lutfiyya**: That's right. And then when it gets to closer to the consumers, they have to start decreasing that voltage before they can actually power your home.

**Henry**: What happens when we have an outage?

**Lutfiyya**: What happens when we have an outage, well, you every you no longer uncle have electricity, right? And usually, what happens is that it's very difficult to detect. So what they [providers] have to do right now, is they send crews to the area that's been affected by the outage, trying to find out what's the cause? You know, is it something that one of the substations that's reducing the voltage, did a tree fall in a branch or whatever? So they actually have to send crews out to sort of manually search for the outage.

**Henry**: There's no automatic sensor or anything?

**Lutfiyya**: No, nothing. It's very manual right now.

**Henry**: And so I imagine that when there's severe wreckage in some sort of community, such as a hurricane, or tornado, locating the pivotal spot must be extremely gruelling.

**Lutfiyya**: It is, there could be actually multiple causes, right? If you have two trees falling on the line, right? But yeah, it can be very difficult to find out.

**Henry**: Is that a universal method? Or do different cultures have more modern advanced technologies for this?

**Lutfiyya**: No, everyone is pretty much doing it the same way.

**Henry**: What are you proposing as a solution?

**Lutfiyya**: The solution we're looking at is we're saying, "can we pinpoint what's causing the outage?" And it turns out that there are techniques on the transmission network that people do use for that. The reason it doesn't carry over to the part of the grid distribution network, which is closer to our homes, is because they're much more complicated. Because every time if you are the neighbourhood, you may have a line. And then you have to have a bunch more lines, they have to branch out like a tree, or radio network, just so that they can actually deliver it to different homes. So the approach we're taking is that whenever there is an outage, it will emit some sort of signal. And our centres are going to detect that signal. And then based on that, they will be able to figure out based on that signal also get the reflection. Because when a pop happens, it will send out signals throughout the distribution network and they start to bounce. So the sensors, they'll get the initial fault and they'll get off the bounces or the reflections. And so you can use those signals - you can use the time between them - to sort of help you figure out what were the actual location is.

**Henry**: Is that what you call the x-fault?

**Lutfiyya**: Yes, you're trying to pinpoint. So that's what's actually causing that outage. What makes that actually very hard, is that the way this works, is if you have a fault somewhere, it's going to take out everything, right? It's going to cause an outage everywhere, within a certain area, the reason is they are trying to protect the equipment. So I can have two faults in one area, and they cost the same outage, right? And that's making it very challenging.

**Henry**: I think this will surprise a lot of people because we're talking about a billion-dollar industry, where when there's a fault, more money can be made in other industries because in a certain community, everyone's relying on this power. Yet, what we have now is an extremely dated method very much 20th-century.

**Lutfiyya**: That's absolutely true. And it's not even 20th century, I mean, the electric grids are really based on a concept from almost the first days of the grid. Now we're talking more than 100 years, sure the equipment gets upgraded and they will, you know, buy new stuff and it's more modern and faster and all that stuff. But, the basic structure is the same. What's changed, I think now, looking at the possibilities of using cheap sensors, analytics. And they're looking at trying to take advantage of it and in this environment. But you're right, it's an old infrastructure, and yeah, we still have it and we're still using old technologies.

When a power outage strikes, it takes down the entire community and won't be fixed until the exact sweet-spot is manually found by workers. Power outages are inevitable. But prioritizing the technology behind repairing them faster, so that hundreds of families aren't left in the dark is more crucial than ensuring top-speed WiFi. The world has primarily shifted to automatic detection methods for industries as lucrative as electricity. And considering the impact outages have on a wide range of people and businesses. A modern shift and how we fix them is imperative. I'm Henry Standage asking you do a warm up and chill out. Thanks for listening.