

Rachid (00:01):

Hey there, and welcome back to the Made By Google Podcast. I'm your host, Rachid Finge. And if there's ever a topic that I love, but that I'm not good at, it's this one. Whatever we do, whatever we want, whatever we love, everything gets better with high quality sleep, we know that much, but it's easier said than done, right? So many people have trouble sleeping, and I can confidently include myself in that group. So let's talk about sleep today and how both Pixel Watch and Fitbit can help you to do it better. It's so cool to have a whole group of scientists and engineers at Google who work on our sleep products, and we're meeting two of them today. So please welcome to the Made by Google podcast, Megan Jones Bell and Connor Hennigan. Megan and Connor, welcome to the Made by Google Podcast. Megan, let's start with you. What do you work on at Google and how did you end up here?

Megan (01:02):

Well, thank you so much for having me today. I work on health and wellness devices, products and services across the Google portfolio. I have the really great privilege of getting to improve health for billions of people.

Rachid (01:16):

Amazing. And Connor, how about you? And what's the work you do?

Connor (01:20):

Hi. So I work in the consumer health research team at Google, and we basically use consumer technologies like the Pixel watch, the Pixel phone, the Fitbit devices to help people achieve better health outcomes.

Rachid (01:34):

Excellent. Now maybe just ask the first question because I'm sure many people are wondering this. Why does Google care about the health of its users? Like, you know, why are we working on this? Maybe Megan, can you shed some light on that?

Megan (01:45):

Health is a really important goal for Google. It goes back really to our founders letter, where we talk about the health as one of the key ways that Google supports the lives of billions of people around the world. And particularly in our devices business. We know that we have a critical role to play in helping people manage their basic health and wellbeing and understand and be empowered with the information and knowledge to be at their healthiest.

Rachid (02:18):

Today's guests are dedicated to improved the health of millions and millions of Google customers. Megan Jones Bell is a clinical director of consumer and mental health who worked at Stanford and companies like Headspace. Before joining Google two years ago, Megan's goal is to make healthcare more effective, affordable, and accessible. And Connor Hannigan is a research scientist who joined Google through Fitbit originally from Ireland. Connor knows everything about sensors and algorithms, which is exactly what is needed to make Fitbit and Pixel watch track and understand your sleep. Together, Megan and Connor can help us understand how Fitbit and Pixel Watch could help us improve

our sleep. I hope you'll enjoy our talk. Let's start with the basics, Megan. Why is getting enough sleep important in general for wellbeing?

Megan (03:12):

Healthy sleep is a critical component of our wellbeing, and unfortunately, one in three people don't get the sleep that they need. Sleep is a vital human function, just like eating. It's a basic drive and it has a critical role to play in healing our bodies from injury, promoting better brain functioning around alertness, helping you make good decisions, be focused as a key role in learning and memory also helps us be more creative and productive, improves our mood, helps you build muscle, have quicker reflexes stronger immune system. The list goes on and on. And when we think about mental wellbeing specifically, there's a really unique role between sleep and mental wellbeing that's bidirectional and that we all experience every day depending on the amount and quality of our sleep,

Rachid (04:07):

Definitely that's a long list and a lot of benefits just to get your sleep right. So are there any signs I, I can think about like mood changes that may indicate poor sleep?

Megan (04:17):

Absolutely. I think we've all had the experience of waking up on the wrong side of the bed as the expression goes of feeling those, that grouchiness or irritability that comes from not getting high quality sleep. And there's actually a vice versa to this statement, that there's this bidirectional relationship. If you are stressed during the day, if you've had challenges and your mood is impacted, your sleep may be too because your body's overall alertness and that fight or flight response has been activated. So that can both contribute to poor sleep as well as be a result of poor sleep. And for many people, you can feel pretty trapped in that cycle.

Rachid (05:00):

Definitely. Now, Connor, let's turn to you. How does sleep tracking work on Pixel Watch and Fitbit? I know there is a squirrel check mine right now it is 65. I don't think that is a great score, is it?

Connor (05:12):

You can always improve, don't worry. Don't give up. So basically what we do in the wearable devices is we use what are called machine learning algorithms. And I'm sure many of your listeners have heard this term. Machine learning sounds very fancy and very ominous. Sometimes all it means is basically we train computers to recognize patterns. In most cases, humans could probably do too. But the great thing about a computers, you could do it over and over at low cost and you can automate it. So in this particular case, when a person sleeps, the types of things that happen are they move less, their heart rate changes. it often becomes lower more regular, their breathing changes. So what we've done in our algorithms is we've taken features from the movement, which is measured with what's called an accelerometer inside your wristwatch. And we have taken measurements of your heart rate, which we collect with an optical sensor. So some of you might see that little green light of flashes inside of smartwatch and that heart rate changes depending on your stage of sleep, whether you're asleep or not. And similarly, when you move less, it's an indicator that you are likely to be either asleep and in a particular stage of sleep. So we combine all that together into an algorithm that looks at about 60 different combinations of heart rate and movements to go up on an estimate of what stage of sleep you're

Rachid (06:38):

In, that's a lot. And then how do you train that machine learning model? Because you have those signals and the watch, I guess, needs to understand what they mean, how do you make sure it understands all those signals?

Connor (06:50):

Yeah, so the way we approach this is we're kind of building on the work of all the great sleep scientists that came before. So they had developed these systems for scoring sleep in laboratories. So what we did is we got a bunch of volunteers, which was mostly internal folks and we actually all went off to the lab over a few months duration. We were wearing devices on our wrists and we were also wired up with the electrodes in our brains and chest monitors and heart monitors. And we went through a full sleep at this lab and we used that to basically what's called label the data. So we knew the, the answer and we then trained our machine learning algorithm to get as close as possible the answer that the human exper had provided for us.

Rachid (07:35):

So you mentioned that green light which we see blinking all the time on our wrist, but how does that provide a heart rate measurement?

Connor (07:43):

Yeah, it's really fascinating that what actually happens is the green light reflects off the blood in your blood vessels, and every time your heart beats, there's just a tiny little pulse of arterial blood with more oxygen, and the color of the blood is slightly different. So with the optical sensor, you can actually see changes in the reflected light intensity back that's driven by the change in your color of your blood with every heartbeat. So effectively we get a little sinusoid wave and we can pick up the peaks and they tell us when sort of each individual heartbeat happens.

Rachid (08:14):

Wow. But you have that green light and then you also probably have a sensor that then picks up, you know, whatever it is reflecting, I guess?

Connor (08:21):

Correct. So we have what's, what's called an LED receiver. So effectively it's a sensor that monitors reflected light.

Rachid (08:29):

Excellent. And then a pixel watch, of course, a lot more convenient than having all those wires in your head.

Connor (08:35):

Exactly.

Rachid (08:35):

Great way to do it. Absolutely. Megan, I guess measuring sleep is only useful if you can also improve it. Have you ever struggled with sleep, by the way?

Megan (08:44):

I sure have. Sleep has never been easy for me, and apparently that started pretty early on and I'm experiencing some payback apparently at the moment. So I actually spent five years commuting every month between Europe and California. And then I had two kids, so that was a pretty dark period for my sleep because of the, you know, external context. And I've done a lot to try to improve it within what I can control.

Rachid (09:11):

Yeah. So what can you control about, you know, trying to sleep better, especially if apparently you've always had a challenge with it, even as a kid.

Megan (09:20):

So I think it comes down to a few key principles. It starts with understanding how your sleep works and those leverage points or influencers that create the conditions for you to have a better or a worse night's sleep. The second principle for me is around acceptance, and I'll unpack that in a moment, and then commitment. Okay. So when you think about that, getting the facts, getting, finding that leverage point, sleep tracking, whether it's with a journal or wearable device, can be incredibly revealing and both give you the information you need come up with ideas of, oh, I could, you know, skip that glass of wine with dinner. Maybe having the same wake time every morning would help. It also gives you hope because it shows you that there are a lot of different things that you can do throughout the day and at night to try to improve your sleep. We all need to look at data to make decisions, but also not be too evaluative with that data. And what I mean, there is not catastrophize that if my sleep score isn't what I need it to be, that the day is ruined or get too focused and kind of obsessive with it. That overachiever mentality of trying to optimize everything. That brings me to that second piece, which is about acceptance, when people are exhausted, when you're frustrated with not sleeping well, those are normal emotional reactions to something that is really important. But when we make bedtime or sleep more stressful, that brings us back to that vicious cycle where unlocking that cycle really comes down to accepting that there may be nights where sleep comes naturally. There may be nights when sleep doesn't and you're awake more than you'd like to be. You may be more tired than you'd like to be in the next morning. The best tool I've found to help you manage that acceptance piece is mindfulness, meditation during the day, even 10 minutes during the day, can really help you train that muscle of noticing those reactions in the moment, letting them go, just accepting the sleep that comes to you that night. The last piece I'll mention is commitment. Commitment to the small choices that you make each day that create better conditions or less favorable conditions. Because while you can't control what happens when your head hits the pillow, you can choose to have one cup of coffee instead of two, making space for taking a walk as an afternoon, pick me up instead of caffeine giving yourself those 10 minutes to meditate, passing on, you know, that glass of wine with dinner or parking, lotting all those devices and putting them on do not disturb so that you can really have a solid wind down. There are a lot of things we can do to improve sleep.

Rachid (12:09):

I think it's also revealing that a lot of, you know, improvement of sleep happens during the day and not, you know, at the time when you are going to bed, basically.

Megan (12:18):

Exactly.

Rachid (12:18):

That's good to know. I'm writing that down for myself. Connor, back to you. What is your philosophy on using technology to get better at? Because as Megan said, you know, it can create maybe some sort of fear that something's wrong.

Connor (12:31):

Yeah, so I think the fundamental philosophy is to provide useful information to people and I kind of think of that in two areas. I think we give useful information, which is one of experts learned about sleep over the years. So things like regularity of going to bedtime, avoiding caffeine after a certain point of time. Those are all things which are well established and applied to everyone, but there's still that need for education and letting people know what's actually known about sleep. The second part of the information that we can give to people is the individual feedback about their own sleep. So having objective information, oh yeah, I slept six and a half hours and the average person my age sleeps six hours and 45 minutes. It gives a lot of context to people. Mm-Hmm. <affirmative> some people worry too much. Maybe they feel, oh, I only got, you know, I only got an hour and a half of deep sleep is there's something wrong. And actually find, it turns out that's perfectly normal for their age and gender. So we try to give the personalized data about the individual's patterns and they can also see their own connections. So for example, for me, I will unfortunately notice a glass of wine will have a sort of, you know, slight impact on my quality of sleep. So now I have that information available to me. I can do the connection between my sleep that night and the choices I made the previous day. So it's all about information. We're never, we're not magicians. We don't know everything that's gone on a person's life, so you we're not able to provide magic solutions, but we do want to provide the most accurate information we can.

Rachid (13:59):

So it sounds like maybe you could use your sleep score as a way of experimenting with things like you mentioned a glass of wine. Does it affect me a lot or maybe not at all? You, you could use those cores and, and try things out for yourself.

Connor (14:12):

Correct. Yeah. So I mean, we actually call out an n of one experiment where you are the, the single experiment subject. And people have found that quite useful in terms of, we can also, we can automate some insights. So within our current products, it will notice patterns. For example, if, if over the last month you have slept slightly longer at the days you exercise, that will be surfaced as an insight. So you don't have to do all the work, but you can certainly do most of the work yourself, either through journaling or through just looking at the data as it's presented to you on the devices.

Rachid (14:46):

Now Connor, one thing that sleep trackers often do is tell you how long you slept, which I find like, but I can look at the clock and then sort of see how long I slept. Right. So what's the use of telling me that?

Connor (14:57):

Yeah, no, it's a great question is that one of the things that sleep scientists have discovered over the last 50 years is humans are very bad at assessing their own sleep. So you'll often find people who come to a sleep lab and say, doctor, I only sleep two hours a night. They go into the lab and they find out actually they're sleeping six and a half, seven hours. But they're just more sensitive to being woken up. They, they

misperceive their sleep. So sometimes the data we provide can really reassure people that in fact they're not that different to everyone else. So I think the ability to provide objective sleep information can be a very important feature for a user to understand.

Rachid (15:33):

So one thing we provide with Fitbit is a sleep profile that explains how you're sleeping. I'm a Paris, apparently. That's interesting. They have lively attention spans and a lot of energy. That's very kind of Connor, but what will those sleeping profiles tell me? What can I learn from them?

Connor (15:50):

Great. And I too am a Paris, so welcome to the club.

Rachid (15:53):

Thank you.

Connor (15:53):

Just to pick up on a point that Megan raised earlier, a single night is not the story of your sleep. So we all have good night's sleep and bad night's sleep. So what we wanted to do is you wanted to give a more holistic picture of your overall profile. So it's measured over at least 14 days, but typically a whole month. And what we're looking for is the things that are patterns. Like do you actually go to bed at a regular time? Do you have pretty much the same type of sleep every night? Do you experience a lot of need for naps, for example, do you have consistent awakening periods during the night? So we combine all of those attributes together to find out what your average sort of sleep is like. And what we found when we analyzed the data from users is it kind of broke into six clusters of different types of sleeper and to kind of make it a bit more fun, each of those clusters we label with an animal purely to kind of give a person something to connect with. But it basically shows you're a lot like other people. You're not the only person who finds it hard to fall asleep, or the only person who wakes up early. There are lots of other people like you.

Rachid (16:58):

Perfect. Now, Megan, Connor, we close every episode with a top tip for our listeners. Maybe you have a bunch of tips rather than just one. Megan, could you share a tip or two for how people can prioritize their sleep better?

Megan (17:15):

I think you start by having a goal. We know that people are more likely to be successful at changing their health outcomes and their health behaviors. When they have the intention to do so, they find it important and they actually set a specific goal. Next, I would do exactly what you, Rachid and Connor talked about in having a scientific mindset. And picking one thing to try and tracking the impact it has. Looking at that, does that 10 minutes of meditation actually move the needle on your sleep score? Does it move the needle on how you you feel in the morning regardless of how you sleep? And then layer in other practices and behavior changes and track those over time? That's an approach called scaffolding. It's basically trying to ease in and bring one new behavior or change in, add another and keep going until you've really found the right combination and new routine that you can focus on trying to maintain over time. The last thing I'll mention is that if you're really struggling with sleep and it's impacting your mood

in a serious way or your day-to-day functioning, it's always a good idea to talk to a healthcare professional about your sleep.

Rachid (18:26):

Connor, anything to add here?

Connor (18:27):

Yeah. for me personally, what I've discovered about my own sleep has been by looking at the deep sleep part of my night. I've found quite a strong correlation with kind of my mental performance and my overall feeling of wellbeing by looking at that particular number out of the all the numbers we, we could look at that might not apply for everyone, but just as a tip, it's interesting to look at your deep sleep and see how it correlates with your personal mood and how you do in life. The second thing, just come back a little bit of what Megan said. The wind down routine. Yeah. The hour before bed, really trying to turn the emails off, you know, turn your brain off as much as possible, whatever it is for you, whether it's music, reading a book, you know, sleep is not a on and off switch. You have to give your, your brain a chance to, to get into the right zone. So definitely the wind down routine is worth considering.

Rachid (19:19):

Excellent. Megan Connor, thank you so much. I learned a lot in these 15 minutes. So I'm going to start experimenting with sleep. Thank you so much.

Megan (19:26):

Thank You

Connor (19:27):

Thank you very much.

Rachid (19:30):

Well, if there's one takeaway from today, then it's this Experimenting with sleep is a good idea. And a sleep tracker, like on your Fitbit or Pixel Watch can help you measure what works and what doesn't. So a big thank you to Megan and Connor for joining our Made by Google podcast. But are you a subscriber? And if you aren't, how about we change that right now? Just hit subscribe or follow or whatever it's called in your podcast app. And make sure you don't miss another episode of The Made by Google Podcast. Next week we're returning to the Pixel camera and talk about a very important topic, real tone. So thanks again for listening. Take care. Talk to you in the next one.