

[Transcript] Lex Fridman Podcast / #398 - Mark Zuckerberg: First Interview in the Metaverse

The following is a conversation with Mark Zuckerberg inside the Metaverse. Mark and I are hundreds of miles apart from each other in physical space, but it feels like we're in the same room because we appear to each other as photorealistic Kodak avatars in 3D with spatial audio.

This technology is incredible and I think it's the future of how human beings connect to each other in a deeply meaningful way on the internet.

These avatars can capture many of the nuances of facial expressions that we humans use to communicate emotion to each other. Now I just need to work on upgrading my emotion expressing capabilities of the underlying human.

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uh business management software. Choosewise and my friends. Also if you want to work with our team where I was hiring go to lexfreeman.com slash hiring and now on to the full ad reads. As always no ads in the middle.

I try to make this interesting but if you must skip them friends please do check out the sponsors. I enjoy their stuff.

Maybe you will too. You never know until you try.

This episode is brought to you by the thing I consume many times a day. The thing I'm consuming currently as I am speaking the words I'm speaking. Element electrolyte drink spelled L M N T.

I do a low carb diet sometimes a very low carb diet and I usually eat only once a day so that's fasting and low carbs and for that you have to get your electrolytes right.

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This show is also brought to you by Inside Tracker, a service I use to listen to my body through the power of data science.

So for my body comes signals through blood tests that give information about whatever's going on in my body and that data is used with machine learning algorithms to make suggestions about what you should do in your life.

Now in this conversation about the metaverse where Mark and I are incredibly in a whole other plane of existence we have teleported into this place

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while we're miles apart from each other in physical space in the virtual space we're right there together shrouded in darkness. I wonder if those entities that are driven by the content of our minds if they have biological like signals if they need to make lifestyle and diet decisions. I wonder one day we should be able to ask them. Actually that's one of the things that I'm about to announce which is really cool which are the AI personalities and I do think from just from a technical perspective is super exciting and difficult to encapsulate a particular personality like Snoop Dogg in an AI agent where it reflects all the quirks the weirdnesses but also the beauty of the character of that particular human being. I love conversation that task doing that thing technically super exciting but I think super difficult so I'm glad they're taking it on. Anyway get special savings for a limited time when you go to [insettracker.com slash lex](https://insettracker.com/slash/lex). This episode is also brought to you by 8Sleep and it's pod 3 mattress. It can cool down or heat up the two sides of the bed separately. This actually makes me think of that meme where the two kids are scared in the corner and they're looking at a bunny and I am those two scared kids in the corner thinking about the bunny where the bunny represents the people that want their bed heated up. I don't know who does this but I want to meet you. Maybe you have an 8Sleep like in the Antarctic or somewhere in northern Canada but you also don't have heat and maybe you're out camping. I can't possibly construct a situation which you would use heat. I'm only half kidding of course. Anyway I prefer to cool down the bed and it's an incredible experience. A cold bed with a warm blanket. It's another place I teleport to in my mind when I go to the nap. It's not a metaverse. It's a nappaverse and there I find a deep piece from the chaos of life and I return refreshed ready to take the chaos on once again. Anyway check it out and get special savings when you go to asleep.com. This show is also brought to you by AG1. Another delicious thing I consume every day. I just drink it like an hour ago. It's delicious. It's green and makes me feel like Popeye. I grew up I don't know how many years ago watching Popeye. There was a stretch of time where I wanted to be Popeye. I think I admired Popeye for being strong. Maybe because I wanted to be strong. I always thought a man is supposed to be strong and so if I just eat my spinach like Popeye did I'll be strong so hence the color green is forever associated with strength and I'm also playing Diablo now and that's one of the things

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you can increase is strength, dexterity, willpower, intelligence, all that kind of stuff but strength still has that sexy sound to it and so every time I play Diablo actually and I drink AG1 and it just makes me feel stronger and better and like I got my nutritional bases covered. Anyway they'll give you one month supply of fish oil when you sign up at drinkag1.com slash Lex.

This show is also brought to you by Netsuite an all-in-one cloud business management system. I still hold in me a little bit of a flame that turns hopefully into a fire which is a desire to contribute by building stuff whether it's working at a company or starting a company and I'm very cognizant of how difficult it is to run a company successfully whether you're looking at a huge company like Metta or a tiny startup all of it and actually yes all of it is a source of challenge and complexities and and fear and anxiety and uncertainty all of that but ultimately the camaraderie of the people working together that's a deeply fulfilling deeply meaningful pursuit especially when there's a big vision that you're reaching for so I love people at companies working at a thing chasing that big impossible vision actually the metaverse is one such thing just the technical complexity of everything involved it's just really incredible from the headset software and the hardware the cameras the scanning for the average all of it is just incredible anyway if you want to figure out how to run a business small or large successfully you should be using the best tools like Netsuite you can start now with no payment or interest for six months go to netsuite.com slash lex to access their one-of-a-kind financing program that's netsuite.com slash lex

this is the Lex Friedman podcast and now dear friends here's Mark Zuckerberg

this is so great

lighting change wow yeah we can put the light anywhere and it doesn't feel awkward to be really close to you no it does I actually moved you back a few feet before you got into the headset you were like right here I don't know if people can see this but this is incredible the realism here is just incredible where am I where are you Mark where where are we you're in Austin right no I mean this place we're shrouded by darkness with ultra realistic face and just feels like we're in the same room this is really the most incredible thing I've ever seen and sorry to be in your personal space I mean we have done jujitsu before

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yeah no I was commenting to the team before that even that I feel like we've choked each other from further distances than it feels like we are right now I mean this is just really incredible I don't know how to describe it with words it really feels like it feels like we're in the same room yeah feels like the future this is truly truly incredible I just wanted to take it in I'm still getting used to it's like it's you it's really you but you're not here with me right you're there wearing a headset not wearing a headset it's it's really really incredible so what can you describe what it takes currently for us to appear so photorealistic to each other yeah so I mean for background we both did these scans for this research project that that we have at meta called codec avatars and the idea is that instead of actually instead of our avatars being cartoony and instead of actually transmitting a video what it does is we've sort of scanned ourselves and a lot of different expressions and we've built a computer model of sort of each of our faces and bodies and the different expressions that we make and collapse that into a codec that then when you have the headset on your head it can it sees your face it sees your expression and it can basically send an encoded version of what you're supposed to look like over the wire so in addition to being photorealistic it's also actually much more bandwidth efficient than transmitting a full video or especially a 3d immersive video of a whole scene like this and it captures everything like the flaws like to me the subtleties of the human face like even the flaws that's like that's all amazing it makes you uh it makes it so much more immersive it makes you realize that like perfection isn't the thing that leads to immersion it's like the little subtle flaws like freckles and like variations in color and just yeah wrinkles all stuff about noses yeah asymmetry and just the different like the corners of the eyes like what your eyes do when you smile all that kind of stuff yeah eyes are a huge part of it yeah i mean there's all the studies that most of communication even when people are speaking is not actually the words that they're saying right it's kind of the expression and all that so and we try to capture that with the kind of classical expressive avatar system that we have that's the kind of more cartoon designed one you can you can kind of put those kind of expressions on those faces as well but there's obviously a certain realism that comes with delivering kind of this photorealistic experience that i don't know i just think it's really magical i mean this gets to

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kind of the core of what the vision around virtual and augmented reality is of like delivering a sense of presence as if you're there together no matter where you actually are in the world and i mean this this uh experience i think is a good embodiment of that where it's like i mean we're in two completely different states halfway across the country and it just like you know looks like you're just sitting right in front of me it's uh it's pretty wild yeah yeah i can't it's almost almost getting emotional it's like it feels like a totally it's a fundamentally new experience like for me to have this kind of conversations with loved ones it would just change everything maybe just to elaborate so the i went to pittsburgh and went through the whole scanning procedure which has so much incredible uh technology so software and hardware going on but it is a lengthy process so what's your vision for the future of this uh in terms of making this more accessible to people you know it starts off with a small number of people doing these um very detailed scans right which is this that's the version that you did and that i did and you know before there are a lot of people who who've done this kind of a scan for we probably need to kind of over collect expressions um when we're doing the scanning because we haven't figured out how much we can reduce that down to a really streamlined process um and extrapolate from the the the scans that have already been done but you know the goal and we have a project that's working on this already is just to do a very quick scan with your cell phone where you just take your phone kind of wave it in front of your face for a couple of minutes um you know say a few sentences make a bunch of expressions but overall have the whole process just be two to three minutes and then produce something that's of the quality of what we have right now so i think that that's one of the big challenges that remains and right now we have the ability to do the scans if you you know have hours to sit for one and with today's technology i mean you're using a meta headset that exists it's a product that's kind of for sale now you can drive these with that um but the production of of these scans in a very efficient way is one of the last pieces that we still need to really nail and then obviously there's all the experiences around it i mean right now we're kind of sitting in a dark room which um you know is is you know familiar for for your podcast but i think part of the vision for this over time is um is you know not just having this be like a video call i mean that's fine it's it's cool or it feels like it's immersive but um you know you can you can do a video call on your phone the thing that you can do in the metaverse

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that is different from what you can do on a phone is like doing stuff where you're physically there together and participating in things together and we could play games like this um we could have meetings uh like this in the future once you mix um once you get mixed reality and augmented reality we could have codec avatars like this and go into a meeting and have some people physically there and have some people show up in this photorealistic form uh super imposed on the on the physical environment i think that stuff like that is going to be super powerful so we got to still build out all those kind of applications and the use cases around it but i don't know i think it's going to be a pretty wild uh next few years around this i mean i just i i'm actually almost at a loss of words this is just so incredible this is truly incredible i i hope that people like watching this can get a glimpse of like how incredible it is it really feels like we're in the same room like there is that um i guess there's an uncanny valley that seems to have been crossed here like it looks like you yeah i mean i think there's still a bunch of tuning that i think we'll want to do where different people emote to different extents right so i think one of the big questions is you know like when you smile how wide is your smile and how wide do you want your smile to be um and i think getting that to be tuned on a per person basis is um is going to be one of the things that we that we're going to need to figure out um you know it's like to what extent do you want to give people control over that um you know some people might try to you know might prefer a version of themselves that's more emotive in their avatar than their actual faces you know so for example you know i i always get a lot of um critique and and shit for um for for having like a relatively stiff uh expression but you know i mean i might i might feel pretty happy but just make a pretty small smile so i mean maybe you know for me i would it's actually you know it's like i'd want to have my avatar really be able to better express um like how i'm feeling than than what than how i can do physically so i think that there's a question about how you want to tune that but uh but overall yeah i mean you we want to start from the baseline of capturing how people actually emote and express themselves and i mean i think the the initial version of this is has been pretty impressive and like you said um i do think we're we're kind of beyond the the uncanny valley here where it and it does feel like you it doesn't feel uh it doesn't feel weird or anything like that i mean that's going to be the meme that the two most monotone people are in a metaverse together but i think that actually makes it more difficult like the the the amazing thing here is that the subtleties of the expression of the eyes you know people say i'm

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monotone and emotionalist but i'm not it's just this maybe my expression of emotion is more subtle usually like with the eyes and that's one of the things i've noticed is just how expressive the subtle movement of the corners of the eyes are in terms of displaying happiness or boredom or all that kind of stuff i am curious to see just i've never done one of these before i've never done a podcast as is one of these kodak avatars um and i'm curious to see what what how what people think of it because you know one of the issues that we've had in some of the vr and and mixed reality work is it tends to feel a lot more profound when you're in it than the 2d videos capturing the experience so i think that this one because it's photorealistic um may look kind of as amazing in 2d for people watching it as it as it feels i think to be in it but we've certainly had this this um this issue where a lot of the other things just it's like you feel the sense of immersion when you're in it that that doesn't quite translate to a 2d screen but i don't care i'm curious to see to see what people think yeah i'm curious to see if people could see that um like my heart is actually beating fast now this is super interesting like the that such intimacy of conversation could be achieved remotely this been that you know i don't do remote podcast for this reason and this is like breaks all that this feels like just an incredible transition to something else to the different kind of communication breaks all barriers like geographic physical barriers uh what you mentioned do you have a sense of timeline in terms of how many difficult things have to be solved um make this more accessible to like scanning with a smartphone yeah i mean i think we'll probably roll this out progressively over time so it's not going to be like we rolled out one day everyone has a codec avatar um we want to get more people scanned and into the system and then we want to start uh integrating it into each one of our apps right making it so that you know i think that for a lot of the work style things productivity i think that this is going to make a ton of sense in a lot of game environments i mean this could be fine but games tend to have their own style right where you almost want to fit more with the aesthetic style of the of the game um but i think for doing meetings and one of the things that we get a lot of feedback on work rooms where you know people are pretty blown away by the experience and this feeling that you can like be remote but feel like you're physically there around a table with people but then you know we get some feedback that people have a hard time with the fact that the avatars are so expressive and and don't feel you know as as realistic in that environment so i think something like this um could make a very big difference for those remote meetings and especially with quest 3 coming out which is going to be the first mainstream

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mixed reality product right where you're really taking digital um you know expressions of either a person or or objects and overlaying them on the physical world um i think the ability to do kind of remote meetings and and things like that where you're like just remote hang sessions with friends i mean i i think that that's going to be very exciting so yeah rolling it out over the next over the next few years it's not ready to be like a kind of mainstream product yet but um we just want to we'll keep tuning in keep getting more scans in there and keep you know and kind of rolling it out into more of the features but yeah i mean definitely in the next in the next um few years it will you'll be seeing a bunch more experiences like this yeah i would love to see some celebrities scanned and some non-celebrities i just just more people to experience this i would love to see that this is something i mean on my mind is but i'm literally at a loss because it's very difficult to just convey how incredible this is how like how i feel the emotion how i feel the presence how i feel like the subtleties of the emotion in terms of like work meetings or any kind of in terms of podcasts this is like this is awesome i don't even need your arms or legs is that well we got we got we got to get that i mean that's that's its own challenge and part of the question is also so you have the scan then it takes a certain amount of compute to go drive that both for the sensors on the headset and and then rendering it so one of the things that we're working through is what is the level of fidelity that is optimal right you could do the full body in in kind of a codec and that can be quite intensive but but one of the things that we're we're thinking about is like all right maybe you can kind of stitch a somewhat lower fidelity version of your body but still still have the main kind of the major movements but but your face is really the thing that we have the most resolution on right in terms of being able to read and express emotions i mean like you said if you move your you know eyebrows like a millimeter i mean that really changes the expression what you're you're emoting whereas you know i mean moving your your arm like a an inch probably doesn't matter quite as much so so yeah so i think that will we do want to get all of that into here and and that'll be some of the work over the next period as well so you mentioned quest three that's coming out i've gotten a chance to try that too that's awesome so the how'd you pull off the mix so it's not just virtual reality it's mixed reality yeah i mean i think it's going to be it's going to be the first mainstream um mixed reality device i mean obviously we shipped quest pro um last year but it was \$1,500 um and well part of what i'm super proud of is you know we try to innovate not just on pushing the state of the art and

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delivering new capabilities but making it so it can be available to everyone and you know we have this and it's coming out it's \$500 and um in in some ways i think the mixed reality is actually better in quest three than it was um than than what we're using right now in quest pro so and i'm really proud of the team for being able to deliver that kind of an innovation and get it out but you know some of this is just um software you tune over time and get to be better part of it is you put together a product and you figure out what are the bottlenecks in terms of making it a good experience so we got the resolution for the mixed reality cameras and sensors to be multiple times better in quest three and we just figured that that that made a very big difference when we saw the experience that we were able to put together for quest pro um and part of it is also that you know qualcomm just came out with their next generation chipset for for vr and mr that we worked with them on a kind of custom version of it um but that was available this year for quest three and it wasn't available in quest pro so you know in a way i'm quest three even though it's not you know the pro product um actually has a stronger chipset in it than the pro line at a third of the cost so um so i'm i'm really excited to get this in people's hands it um it does all the vr stuff that that quest two and the others are done too it does it better because the display is better um and and the chip is is better so you'll get better graphics uh it's 40 thinner so it's um so just more comfortable uh as well but but the mr is really the big capability shift and i'm part of what's exciting about the whole space right now is you know this isn't like smartphones where you know companies put out a new smartphone every year and you can almost barely tell the difference between that and the the one year before it now for this each time we put out a new headset it has like a major new capability and and the big one now um is is mixed reality the ability to basically take digital representations of people um or objects and and superimpose them on the world and basically you know i mean there's a one version of this is you're gonna kind of have these augments or or holograms and and experiences that you can kind of bring into your living room or a meeting space or office um another thing that i just think is going to be a much kind of simpler innovation is that there are a lot of VR experiences today that don't need to be fully immersive and you know if you're playing a shooter game or you're doing a fitness experience and sometimes people get worried about swinging their arms around like am i going to hit a lamp or or something you know it's and and am i going to run into something so having that in mixed reality actually is just a lot more comfortable for people right you you kind of still get the immersion in the 3d experience um and you can you can have an experience that just wouldn't be possible in the

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physical world alone but by being anchored to and being able to see the physical world around you it's like it just feels so much safer and more secure and i think a lot of people are really going to enjoy that too so yeah i'm really excited to see how people use it but yeah quest three coming out um later this fall yeah and i got to experience it with other people sitting around and there's a lot of furniture and so you get to see that furniture you get to see those people and you get to see those people like enjoy the ridiculousness of you like swinging your arms i mean presumably they're friends of yours even if they make fun of you they uh there's a lot of love behind that and that you guys got to experience that so that's a really fundamentally different experience than just pure vr with like with zombies coming out of walls and yeah it's like someone shooting at you and you hide behind your real couch in order to duck the fire it's incredible how it's all integrated but also like subtle stuff like in a room with no windows you can add windows to it and you can look outside as the zombies run towards you but like it's still nice view outside you know yeah it's it's really and so that's pulled off by having cameras on the outside of the headset that do the pass through uh that technology is incredible to do that on a small headset yeah it's not just the cameras you basically need to you need multiple cameras to capture the different angles and and sort of the three-dimensional space and then it's a pretty complex compute problem an ai problem to map that to your perspective right because the cameras aren't exactly where your eyes are because no two people's eyes are you know going to be in exactly the same place you kind of need to to to get that to to to line up um and then do that basically in real time and then generate something that looks that kind of feels natural um and then superimpose whatever digital objects you want to put there so it's yeah it's a it's a very interesting technical challenge and um i think we'll continue tuning this for for the years to come as well but uh but i'm pretty excited to to get this out because i think quest three is going to be the first device like this with that millions of people are going to get that's a mixed reality and it's only when you have millions of people using something that you start getting the whole developer community really starting to experiment and build stuff because now there are going to be people who actually use it um so i think we'll get you know we got some of that flywheel going with quest pro but i think it'll really get accelerated once quest three gets out there so yeah i'm i'm pretty excited about this one plus there's hand tracking without so you don't need to have a control so this camera the cameras aren't just doing the pass through uh of the entire physical reality around you it's also tracking the details of your hands in order to use that for like gesture recognition this kind of stuff

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yeah we've been able to get way further on hand recognition in a shorter period of time than i expected so that's been pretty cool i don't know did you see the the demo um experience that we built around um piano like yeah the piano learning to play piano yeah it's incredible you're basically playing piano on a table and it's that's without any controller and like how well it matches physical reality with no latency and it's tracking your hands with no latency and it's tracking all the people around you with no latency integrating physical reality and digital reality obviously that connects exactly to this uh kodak avatar which is in parallel allows us to have ultra realistic copies of ourselves in this mixed reality it's uh so like it's all converging towards like an incredible digital experience in the metaverse to me obviously i love the intimacy of conversations so even this is awesome but do you have other ideas of what this unlocks of like something like kodak avatar unlocks in terms of applications in terms of uh things we're able to do well there's what you can do with avatars overall in terms of super imposing digital objects on the physical world um and then there's kind of psychologically what is having photo realistic do um you know so i i think we're moving towards a world where you know we're gonna have something that looks like normal glasses where you can just see you see the physical world be able to see holograms and in that world i think that they're gonna be you know not too far off you know maybe you know by the end of this decade we'll be living in a world where there are kind of as many holograms when you walk into a room as there are physical objects and it really raises this interesting question about what are um about you know a lot of people have this phrase where they they call the physical world the real world and you know i kind of think increasingly and the physical world is super important but i actually think the the real world is the combination of the physical world and the digital worlds coming together but until this technology they were sort of separate right it's like you access the digital world through a screen right and you know maybe it's a small screen that you carry around or it's a bigger screen when you sit down at your desk and you strap in for a long session but um but they're they're kind of fundamentally divorced and disconnected and i think part of what this technology is going to do is bring those together into a single coherent experience of what the modern real world is which is and it's got to be physical because that we're physical beings so the physical world is is always going to be super important but but increasingly i think a lot of the things that we kind of think of um can be digital holograms i mean any

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screen that you have can be a hologram um you know any media um in any book art um you know it can basically be just as effective as a hologram as a physical object any game um that you're playing a board game or um or any kind of physical game cards you know ping pong things like that they're they're often a lot better as holograms because you could just kind of snap your fingers and instantiate them and have them um show up you know it's like you have a ping pong table show up in your living room but then you can snap your fingers and have it be gone um so that's super powerful um so i think that it's actually an amazing thought experiment of like how many physical things we have today that could actually be better as interactive holograms but then beyond that i think the the most important thing obviously is people so the ability to you know have these mixed hangouts whether they're social or meetings where you show up to a conference room you're wearing glasses um or a headset in the very near term but you know hopefully by you know for the next five years glasses or so and um and you know you're there physically some people are there physically um but other people are just there as holograms and it feels like it's them um who are right there and also by the way another thing that i think is going to be fascinating about being able to blend together the digital and physical worlds in this way is we're also going to be able to embody um ai's as well so i think you'll also have meetings in the future where you're basically you know maybe you're sitting there physically and then you have you know a couple of other people who are there as holograms and then you have like bob the ai who's an engineer on your team who's helping with things and he can now be embodied as a you know as a realistic avatar as well and just join the meeting in that way so i think that that that's going to be pretty compelling as well so then okay so what can you do with photo realistic avatars compared to kind of the more expressive ones that we have today well i think a lot of this actually comes down to acceptance of the technology um and because all of the stuff that we're doing i mean the the motion of your eyebrows the motion of your eyes the cheeks and and all of that there's actually no reason why you couldn't do that on an expressive avatar too i mean it wouldn't look exactly like you but i mean you can make a cartoon version of yourself and still have it be um almost as expressive but i i do think that there's this bridge between the current state of most of our interactions in the physical world and where we're getting in the future with this kind of hybrid physical and digital world where i think it's going to be a lot easier for

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people to kind of take some of these experiences seriously with the photo realistic avatars to start and then i'm actually really curious to see where it goes longer term i could see a world where people stick to the photo realistic and maybe they modify them to make them a little bit more interesting but maybe fundamentally we like photo realistic things um but i can also see a world that once people get used to the photo the photo realistic avatars and they get used to these experiences that i i actually think that there could be a world where people actually prefer um being able to express themselves in kind of non you know ways that aren't so tied to their physical reality and so i that's one of the things that i'm really curious about and i don't know in a bunch of our internal experiments on this one of the things that has i thought was psychologically pretty interesting is people have no issues blending photo realistic stuff and not so you know we could have a you know for this specific scene that we're in now we we happen to sort of be in a dark room um i think part of that aesthetic decision i think was based on the way you like to do your podcast but we've we've done experiences like this um where you have like a cartoony background but photo realistic people who you're talking to and we seem to like people just seem to just think that that is completely normal right it doesn't bother you it doesn't feel like it's weird another thing that that we have experienced with is um is basically you have a photo realistic avatar that you're talking to and then right next to them you have an expressive kind of cartoon avatar and that actually is pretty normal too right it's it's like it's not that weird right to to basically being interacting with with different people in different modes like that so i'm not sure i think it'll be an interesting question to what extent these photo realistic avatars are like a key part of just transitioning from being comfortable in the physical world to this kind of new modern real world that that kind of includes both the digital and physical or if this is like the long term way that it stays um that's that's a i mean i think that they're going to be useless for both the expressive and the photo realistic over time i just don't know what the balance is going to be yeah it's a really good interesting philosophical question but to me in the short term the photo realistic is amazing to where i would prefer like you said the work room but like on a beach with a beer just to see a buddy of mine remotely on a chair next to me drinking a beer i mean that as realistic as possible is an incredible

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experience so i don't want any fake hats on him i don't want any just chilling with it with a friend drinking beer looking at the ocean while not being in the same place together i mean that yeah that experience is just it's a fundamentally uh it's just a high quality experience a friendship whatever we seek in friendship it seems to be present there in the same kind of realism i'm seeing right now this is this is totally a game changer so to me this is i can see myself sticking with this for a long time yeah and and i mean it's also its novel and it's also a technological feat right it's like being able to pull this off is like it's a it's like a pretty impressive and i think to some degree it's just this kind of like awesome experience yeah um but i'm already sorry to interrupt i'm already forgetting that you're not real like this really so i am novel it's it's just a an avatar version of me but it's a deep philosophical question yes but i mean but here's some of the so i put this on this morning and i was like all right like it's like okay so this my hair is a little shorter in this than my physical hair is right now i probably need to go get a haircut um and like and i actually i did happen to shave this morning but but if i hadn't you know i could still have this photorealistic avatar that is that is more cleanly shaven right even if i'm you know a few days in um physically so i do think that they're gonna start to be these subtle questions that seep in where the the avatar is realistic um in in the sense of this is kind of what you looked like at the time of capture but it's not necessarily temporarily accurate to exactly what you look like in this moment and i think that we're gonna end up being um a bunch of questions that come from that over time that i think are gonna be fascinating too you mean just like the nature of identity of who we are are we the people you know how people do like like summer beach body with people be for the scan they'll try to lose some weight and look their best and sexiest with the nice hair and everything like that i mean it does um it does raise the question of you know if a lot of people interacting with the digital version of ourselves who are we really are we the the entity driving the avatar or are we the avatar well i mean i think our physical bodies also fluctuate and change over time too so i think there's a similar question of like which version of that are we right there's there's like the i mean it's and it's interesting identity question because all right it's like i don't know it's like weight fluctuates or things like that it's like i i think most people don't tend to think of themselves as the uh well i don't know it's it's an interesting psychological question some maybe some people maybe a lot of people do think about themselves as the kind of worst version um but you know but i think a lot of people probably think about themselves

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the best version and and i and then it's like what you are on a day-to-day basis doesn't necessarily map to to um to either of those so i think that's yeah there will definitely be a bunch of a bunch of social scientists and and folks will have to you know and psychologists are really there's going to be a lot to understand about how our perception of ourselves and others um shifted from this well this might be a bit of a complicated and a dark question but one of the first feelings i had experience in this is i would love to talk to loved ones and the next question i have is i would love to talk to people who are not longer here that are loved ones so like if you look into the future is that something you think about who people pass away but they can still exist in the metaverse you can still have you know talk to your father talk to your grandfather and grandmother and a mother once they pass away the power of that experience is one of the first things my mind jumped to because it's like this is so real yeah i think that there are a lot of norms and things that people have to figure out around that there's probably some balance where you know if someone is has lost a loved one and is grieving there there may be ways in which you know being able to interact or relive certain memories could be helpful but then there's also probably an extent to which it could become unhealthy and i mean i'm not an expert in that so i think we'd have to study that and understand it in more detail we have you know a fair amount of experience with how to handle death and identity and people's digital content through social media already unfortunately right with her you know there's you know unfortunately you know people who use our services die every day and their families you know often want to have access to their profiles and we have whole protocols that we go through where you know there's certain parts of it that that we try to memorialize so that way the the family can get access to it so that way the account doesn't just go away immediately but then there are other things that are you know important kind of private things that that person has like we're not going to give the family access to someone's messages you know for example so so yeah i think that there's there's some best practices i think from the current digital world that will carry over but but yeah i think that this will enable some different things another version of this is is how this intersects with ai's right because and one of the the things that that we're really focused on is you know we we want there to we want the world to evolve in a way where there isn't like a single ai

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superintelligence but where you know a lot of people are empowered by having ai tools to to do their jobs and you know make their lives better and if you're a creator right and if you run a you know podcast like you do then you have a big community of people who are super interested to talk to you i know you'd love to you know cultivate that community and you interact with them online outside of the the podcast as well but i mean there's way more demand both to interact with you and i'm sure you'd love to interact with the community more but you just are limited by the number of hours in the day so and with some point i think making it so that you could build an ai version of yourself that could interact with people you know not after you die but but while you're here to help you know help help people kind of fulfill this desire to interact with you and your desire to build the community and there's a a lot of interesting questions around that and you know that's obviously it's not just in in the metaverse i think you know we we'd want to make that work you know across all the messaging platforms you know whatsapp and messenger and instagram direct but you know there's certainly you know a version of that where if you could have an avatar version of yourself in the metaverse that people can interact with and you could define that sort of an ai version where you know people know that they're interacting with an ai that it's not you know the the kind of physical version of you but maybe that ai even if they know it's an ai is the next best thing because they're probably not going to you know necessarily all get to interact with you directly i i think that that could be a really compelling experience there's a lot of things that we need to get right about it that you know it's we're not ready to release the the version that a creator can can kind of build a version of themselves yet but we're starting to experiment with it in terms of releasing a number of ai's that people can interact with in different ways and i i think that that is is also just going to be a very powerful you know set of capabilities that people have over time so you've made major strides in developing these early ai personalities um with the idea where you can talk to them across the meta apps and have like interesting unique kind of conversations what can you describe your vision there and these early strides and what are some technical challenges there yeah so i mean a lot of the vision comes from this idea that yeah i i don't i don't think we necessarily want there to be like one big superintelligence we want to empower everyone to both you know have more fun accomplish their business goals you know just everything that that they're

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trying to do and you know we don't tend to have you know one person that we work with on everything and i don't think in the future we're going to have you know one ai that we work with i think you're going to want a variety of these um so there are a bunch of different uses um if some will be kind of more assistant oriented there's a sort of the kind of plain and simple one that we that we're building is called just meta ai it's simple it you can chat with it in any of your threads it doesn't have a face right it's it's just it's it's just kind of more vanilla and and neutral and kind of factual but it can help you with a bunch of stuff then there are a bunch of cases that are more kind of business oriented so let's say you want to contact a small business um you know similarly you know that business probably doesn't want to have to staff someone to man the phones and you probably don't want to wait on the phone to talk to someone but you're having someone who you can just like talk to in a natural way who can you know help you if you're having an issue with a product or if you want to make a reservation or if you want to you want to buy something online um having the ability to to do that and have a natural conversation rather than navigate some website or have to call someone and wait on hold um things will be really good both for the businesses and for for normal people who want to interact with businesses so i think stuff like that makes sense um then there are going to be a bunch of use cases that i think are just fun right so i think people are going to i think that there will be ai's that i can tell jokes so you can put them into chat thread with friends i mean i think a lot of this because we're like a social company right i mean we're you know fundamentally around helping people connect in different ways and part of what i'm what i'm excited about is how do you enable these kind of ai's to facilitate connection between two people or more you know put them in a group chat you know make the group chat more interesting um around whatever your interests are sports fashion um trivia video games i love the idea of of playing i think you mentioned balder's gate an incredible game just having an ai that you played together with i mean that could that seems like a small thing but it could deeply enrich the like gaming experience i do think that ai's will be will make the npc is a lot better in games too so that's a a separate thing that i'm pretty excited about but um but yeah i mean one of the one of the ai's that we've built that just in our internal testing people have loved the most is like a like a adventure text-based um like a dungeon master yeah nice and and i i think um you know part of what what has been fun and we talked about this a bit but we've gotten some like real kind of

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cultural figures to play a bunch of these folks and be the embodiment and the avatar of them so um so snoop dog is the dungeon master which i think is just hilarious in terms of the next steps of you know if you mentioned you mentioned snoop to create a snoop ai so basically ai personality replica a copy or not a copy maybe um inspired by snoop what are the some of the technical challenges of that what does that experience look like for snoop to be able to yeah so that so starting off creating new personas is easier because it doesn't need to stick exactly to what you know that physical person would want how they'd want to be represented right it's like it's just a new character that we created so even though there's a snoop in that case is you know he's um you know he's basically an actor right he's playing the the dungeon master but it's not snoop dog right it's it's um you know whoever the the dungeon master is um if you want to actually make it so that you have an ai embodying a real creator there's a whole set of things that you need to do to make sure that that ai is not gonna say things that the creator doesn't want right and um and that the ai is gonna you know know things and be able to represent things in the way that the creator would want um the way that the creator would know um so i think that it's less of a it's less of a question around like having the avatar express them i mean that that i think we're you know it's like well we have our kind of v1 of that that will release soon um is after connect but you know that'll get better over time but a lot of this is really just about continuing to make the the models for these ai is it's that they're just more and more i don't know you could say like reliable or predictable in terms of what they'll communicate it's that way you know when you want to create the lex assistant ai that that your community can talk to you can you know it's you don't program them like normal computers you're training them their ai models not not not um kind of normal computer programs but um but you want to get it to be predictable enough so that way you can set some parameters for it and even if it isn't perfect all the time um you want to generally be able to stay within those bounds so that's a lot of um what what i think we need to nail for for the creators and that's why that one's actually a much harder problem i think than starting with with uh with new characters that you're creating from scratch so that one i think will probably um start releasing sometime next year not this year but experimenting with existing characters and the assistant and games and a bunch of different personalities and experimenting with some small businesses um i think that that stuff will be ready to do this year and we're rolling it out you know basically right after

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connect yeah i'm deeply entertained by the possibility of me sitting down with myself and saying hey man like you need to stop the dad jokes or whatever i think the idea of a podcast between you and ai assistant lex podcast i mean there is uh just even the experience of a kodak avatar being able to freeze yourself like basically first mimic yourself so everything you do you get to see yourself do it that's a surreal experience that feels like uh if i was like an ape looking in a mirror for the first time realizing like oh that's you but then freezing that and being able to look around like i'm looking at you it's uh i don't know how to put it into words but it just feels like a fundamentally new experience like i'm seeing maybe color for the first time seeing i'm experiencing a new way of seeing the world for the first time because it's physical reality but it's digital like and realizing that that's possible is just it's it's blowing my mind this is really exciting because i live most of my life you know before the internet and and and experiencing the internet experiencing voice communication video communication you think like well there's a ceiling to this but this is making me feel like there might not be there might be that blend of physical reality and digital reality it's actually what the future is yeah i think it's a weird experience it's a it feels like the early days of of like a totally new way of living and like there's a lot of people that kind of complain well you know the internet is not that's not reality you need to turn all that off and go you know in nature but this feels like this will make those people happy i feel like because it feels real the flaws and everything yeah well i mean a big part of how we're trying to design these these new computing products is that they should be physical right i think part that's a big part of the issue with computers and tv's and even phones is like yeah i mean maybe you can interact with them in different places but they're they're fundamentally like you're sitting you're you're still and i mean people are just not meant to be that way i mean i think you and i have this shared passion for sports and martial arts and doing stuff like that we were just moving around it's like so much of what makes us people is like you know you move around you're not we're not just like a brain in a tank right it's the where you know the human experience is a physical one and so it's it's not just about having the immersive expression of the digital world it's about being able to really natively bring that together and and i do really think that the the real world is this mix of the physical and the digital right the digital is there's too much digital at this point for it to just be solid to a

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small screen but the physical is too important so you don't want to just sit down all day long um at a desk so i i think that this is uh yeah i do think that this is the future this is i think the kind of philosophical way that i would want the world to work in the future is a much more coherently blended physical and digital world there may be some difficult philosophical and unethical questions we have to figure out as a society uh maybe you can comment on this so the the metaverse seems to enable sort of unlock a lot of experiences that we don't have in the physical world and the question is like what is and isn't allowed in the metaverse you know in video games we allow uh all kinds of crazy stuff and in physical reality you know a lot of that is illegal so where's that line where's that gray area between video game and physical reality do you have a sense of that well i think i mean there there are content policies and things like that right and in terms of what what people are allowed to create but i mean a lot of the rules around physical i think we try to have a society that is as free as possible meaning that people can do as much of what they want unless you're going to do damage to other people and and infringe on on their rights and the idea of damage is somewhat different in a in a digital environment i mean when i get into you know uh some world with my friends the the first thing we start doing is shooting each other which obviously we would not do in the physical world because you'd need to hurt each other but in in a game that's like just it's almost you know it's like just fun and um i'm even in like the lobby of a game right it's like it just it's not even bearing on the game it's just kind of like a funny um sort of humorous thing to do so it's like is that is that problematic i don't think so because it's it's fundamentally it's not you're not causing harm in that world so i think that the um part of the question that i think we need to figure out is what are the ways where things could have been harmful in the physical world that we will now be freed from that and therefore there should be fewer restrictions in the digital world um and then there might be new ways in which there could be harm in the digital world that there weren't the case before so there's more anonymity right it's um you know when you when you show up to a you know a restaurant or something it's like all the norms where you pay the bill at the end it's because you know you you you have one identity and you know the you know if you if you stiff them then like you know life is a repeat game and that's not going to work out well for you but you know in a digital world where you can be anonymous and show up in different ways um i think the incentive

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to act like a good citizen can be a lot less and that causes a lot of issues and toxic behavior so that that needs to get sorted out um so i think in terms of what is allowed i think you want to just look at what what what are the the damages but then there's also other things that are not related to kind of harm you know less about what should be allowed and more about what will be possible that are more about the laws of physics so right it's like if you wanted to travel uh to see me in person you'd have to get on a plane and and that would like you know take a few hours to get here whereas you know we could just jump in a conference room and you know put on these headsets and we're basically teleported into a space where we're you know it feels like we're together so that's a very novel experience that um that it breaks down some things that previously would have defied the laws of physics for what it would take to get together and i think that that will create a lot of new opportunities right so um and one of the things that i'm curious about is you know there are all these debates right now about you know remote work or people being together and you know i think this gets us a lot closer to being able to work physically in different places but actually have it feel like we're together so you know i think that the dream is that is that people will one day be able to just work wherever they want but we'll have all the same opportunities because you'll be able to feel like you're physically together i think we're not there today with with um with just video conferencing and the basic technologies that we have but i think part of the idea is that with something like this over time you can get closer to that and that would open up a lot of opportunities right because then people could live physically where they want while still being able to get the benefits of being physically or kind of feeling like you're together with people at work all the ways that that helps to build more culture and build better relationships and build trust which are the real issues that if you're not seeing people you know in person ever so yeah i don't know i think it's going to be it's very hard from first principles to think about all the implications of um of a technology like this and you know all the good and and and the things that you need to mitigate so you try to do your best to kind of envision what things are going to be like and accentuate the things that they're going to be awesome and hopefully mitigate some of the the downside things but i you know it's the reality is that we're going to be building this out one year at a time it's going to take a while um so we're going to just get to see how how how it evolves and and what developers and different folks do with it uh if you could comment this might be a a bit of a very specific technical question but llama 2 is incredible it's the you've released it recently um there's already been a lot of exciting developments around it is there what what's your sense about its release and

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is there a llama 3 uh in the future yeah i mean i think on the last podcast that we did together we were talking about the debate that we were having around open sourcing llama 2 and i'm i'm i'm glad that we did um you know i think at this point there's the the value of open sourcing a foundation model like llama 2 is significantly greater than um than the than the risks and in my view i mean we did we spent a lot of time took a very rigorous assessment of that and red teaming it um but i'm i'm very glad that we released llama 2 i think the reception has been um it's it's just been really exciting to see how excited people have have been uh about it and it's gotten way more you know downloads and usage than i than i i would have even expected and i was pretty optimistic about it um so that's that's been great um llama 3 uh i mean there's always another model that we're training so i mean it's you know for right now you know we built we trained llama 2 and we released it as an open source model and right now the priority is building that into a bunch of the consumer products all the different ai's and um and a bunch of different um products that that we're basically building as consumer products because llama 2 by itself it's not a consumer product right it's more of a piece of infrastructure that people could could build things with so that's been the big priority is kind of continuing to fine tune and um and kind of just get llama 2 and it's um and it's little the branches that we built off of it ready for consumer products that hopefully you know hundreds of millions of people will will um enjoy using those those products and billions one day but yeah i mean we're also working on on the future foundation models and um and i don't have anything new or news news on that i don't know and i don't know exactly when it's going to be ready um i think just like we had a debate around llama 2 and open sourcing it um i think we'll need to have a similar debate and process to red team this and make sure that this is safe but and my hope is that we'll be able to to open source this next version when it's ready to but um but that's not that we're not we're not you know close to doing that this month i mean this is um that's just it's a thing that we're we're still somewhat early in working on well in general thank you so much for open sourcing llama 2 and for being transparent about all the exciting developments around AI i feel like that's contributing to a really awesome conversation about where we go with AI and obviously it's really interesting to see all the same kind of technology integrated into these personalized AI systems with the AI personas which i think when you put in people's hands and they get to have conversations with these AI personas you get to see like

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interesting failure cases like where the things are dumb or they go into weird directions or and we get to learn as a society together what's what's too far what's interesting what's fun how much personalization is good how much generic is good and we get to learn all of this and you probably don't know this yourself like we have to all figure it out by using it right yeah i mean part of what we're trying to do with the initial AI's launch is um having a diversity of different use cases just so that people can try different things because i don't know what's going to work i mean are people going to like playing in the text-based adventure games are they going to you know like having a comedian who who can add jokes to threads or they can want to interact with historical figures you know we made we made one of Jane Austin and one of Marcus Aurelius and i'm curious to see how that goes i'm excited for both yeah because i'm a big fan i'm excited for both i have conversations with them i mean yeah that's yeah you know and and i'm also excited to see you know the internet i don't know if you heard can get kind of weird um and i applaud them for it so i get that yeah yeah so it'd be it'd be nice to see how weird they take it what kind of memes i generated from this and i think all of it is a especially in these early stages of development as we progress towards agi it's good to learn by playing with those systems and interacting with them at like a large scale like you said yeah totally i mean that's why well so we're starting out with a set and then um we're also working on this platform that we call AI studio that's going to make it so that you know over time anyone will be able to create if one of these ai is almost like they create any other UGC content across the platform so i'm excited about that i think that to some degree we're not going to see the full potential of this until then you just have the full creativity of the whole community being able to build stuff but there's a lot of a lot of stuff that we need to get right so um so i'm excited to take this in stages i don't i don't think anyone out there is really doing what we're doing here i think that there are there are people who are who are doing kind of like fictional or consumer oriented character type stuff but the extent to which we're building it out with the um you know avatars and expressiveness and and making it so that they can interact across um you know all the different apps and um they'll have profiles and you know we'll be able to engage people on instagram and facebook i i think it's it's just it's it's going to be really fun well i'm still so we're talking about ai but i'm still blowing away this entire time that i'm talking to mark zuckerberg and you're not here but you feel like you're here i've done

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quite a few intimate conversations with people alone in a room and this feels like that so i keep forgetting for long stretches of time that like we're not in the same room and for me to imagine a future where i can with a snap of a finger do that with anyone in my life the way we can just call right now and have this kind of shallow 2d experience uh to have this experience like we're sitting next to each other it's like i don't i don't think i can i don't think we can even imagine what how that changes things where you can immediately have intimate one-on-one conversations with anyone that's that might like in a way we might not even predict changed civilization well i mean this is a lot of the thesis behind the whole metaverse is giving people the ability to feel like you're present with someone i mean this is like the main thing i talk about all the time but i do think that there's a lot to process about it i mean from my perspective i mean i i'm definitely here we're just not we're we're not physically in the same place it's not like you're you know you're not talking to an ai right here you know this is um so i think the the thing that's novel is the ability to convey through technology a sense of almost physical presence um so the the thing that is not physically real is um is us being in the same physical place but uh but but kind of everything else is and i think that that gets to this somewhat philosophical question about what is the nature of kind of the modern real world and i i just think that that's it really is this combination of a physical world and the presence that we feel but also being able to combine that with this increasingly rich and powerful and capable digital world that we have and and all of the the innovation that's getting created there so i i think it's super exciting because i mean the the digital world is just is just increasing um in its capability and our ability to do awesome things but the physical world is so profound and that's a lot of what makes us human is is that we're we're physical beings so i don't think we want to run away from that and just spend all day on a screen and that's like you know it's one of the reasons why i care so much about about helping to shape and accelerate the these future computing platforms i just think this is so powerful and it's it's you know even though the current version of this is like you're wearing a headset um i just think this is going to be by far the most human and social computing platform that has ever existed and i know that that's what what makes me excited yeah i i i think just to linger on this kind of changing nature of reality like of what is real maybe shifting it towards the sort of consciousness so what is real is the subjective experience of a thing that makes it feel

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real versus necessarily being in the same physical space because it feels like we're in the same physical space yeah and that the conscious experience of it that's probably what is real not like that the space time like the physics of it like you're basically breaking physics and focusing on the consciousness that's what's real just whatever is going on inside my head but there were a lot of social and psychological things that go along with that experience that was previously only physical presence right i think that there's like an intimacy a trust you know there's a level of communication because so much of communication is non-verbal and is based on expressions that you're kind of you know you're you're sharing with with someone when you're in this kind of environment and before those things would have only been possible you know had you know i got on a plane and and flown to austin and sat you know physically with you in the same place so i think we're we're basically shortcutting those laws of physics and delivering the social and psychological benefits of being able to be present and and feel like you're there with another person which has good real benefits to anyone in the world and i think that that like you said i mean i think that is going to be a very profound thing and that a lot of that is you know that's the promise of of the metaverse and what you know why you know i i just why i think that that's the next frontier for for what we're working on you know i started working on social networks when they were primarily text or the first version of facebook your profile you know you had one photo and the rest of it was like lists of things that you were interested in and and then we kind of went through the period we were doing photos and you know now we're kind of in the period where most of the content is video but there's a clear trend where you know over time the way that we want to express ourselves and and kind of get insight and content about the world around us gets increasingly just richer and more vivid and i think the ability to be immersed and feel present with the people around you or the people who you care about is from my perspective clearly the next frontier it just so happens that it's incredibly technologically difficult right it requires building up these new computing platforms and completely new software stacks to deliver that but i mean i kind of feel like that's what we're here to do as a company well i really love the connection you have through the conversation and so for me this photo realism is really really exciting i'm really excited for this future

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and thank you for building it thanks to you and thanks to the amazing meta teams that i've met the engineers and just everybody i've met here thank you for helping to build this future and thank you mark for talking to me inside the metaverse this is blowing my mind i can't quite express i would love to measure my heart rate this whole time would be hilarious if you're actually like sitting on a beach right now i'm not i'm in a conference room okay well i'm at a beach and if i'm not wearing any pants i'm really sorry about that for anyone else who's watching me in physical space anyway thank you so much for talking today this is this this really blew my mind it's one of the most incredible experiences in my life so thank you for giving that to me awesome awesome glad you got to check it out and it's always fun to talk all right i'll catch you soon see you later this is so so amazing man this is so amazing