**Transcript**

17 June 2025, 01:57pm

**Roopika Ravikanna (18724409)** started transcription

**Roopika Ravikanna (18724409)** 0:05  
 Babe, if you don't want to introduce yourself, Jack, you don't. Then just fly on the wall.  
 OK, now it's only me. Listen to the translator.  
 OK.  
 It sounds real cool.  
 The home.  
 Make sure you don't welcome to the show tomorrow. Check.  
 Do you mind leading the group, then? Tomorrow. Daniash McKinley. I don't think I need to be carry.  
 ING Ally at least some solvents. Gary is Gary, you know, like.  
 I can just chill in.  
 Gary can work with me. We'll see if we can keep a live document going about interviews and at least you can see what's happening. Maybe you can also have suggestions for base camp so you look, maybe you can ask these questions. All we are not launching sash.

**Jack Grant** 1:32  
 Hello.

**Roopika Ravikanna (18724409)** 1:33  
 Hello, Jack, how are you?

**Jack Grant** 1:35  
 I'm good. Thank you. How are you?

**Roopika Ravikanna (18724409)** 1:36  
 But not too bad. Thank you. So it's I'll quickly introduce the team we have here. So and first of all, thank you for agreeing to.  
 Spend your time with us answering. You know the questions we have.  
 So we this activity is part of a summer school that Agri forwards is conducting this week, so.  
 We are majorly focusing on, you know, developing research on the shepherding project that we were doing a little bit ago in November. You might have seen the video.  
 That I shared with you. So this team here with me, we are exclusively focusing on the ethics and the economic aspect of the project and as a part of it is why we are scheduling these interviews. So you know me rupika and with me here is Catherine. Do you want to introduce herself? I'm a PhD student from Cambridge doing robotics.  
 I'm. I'm Andrew. Hi. Nice to meet you. I'm also a chief student doing robotics in agriculture. Yeah.

**Jack Grant** 2:40  
 Yes.

**Roopika Ravikanna (18724409)** 2:42  
 Amanda.

**Jack Grant** 2:44  
 So.

**Roopika Ravikanna (18724409)** 2:45  
 Hi, Josh. Oh, I'm a man. I'll see you. Pascal at PT. Student doing robotics.

**Jack Grant** 2:52  
 Lovely to meet you all. I'm Jack. I'm a postdoc at leap with background in psychology, but more recently, my research has been around kind of the barriers and neighbours to farmers adopting new technology, not necessarily just robotics, but new kind of software platforms as well. So quite a general focus, but yeah, nice to meet you.

**Roopika Ravikanna (18724409)** 3:15  
 Yeah. Thank you. Brilliant. Thank you so much Jack again for agreeing to do this for us. And I sent you a list of questions pretty much going to be the same questions unless we, one of us has any follow up to your answers and Catherine will be asking you the questions very informal. So we understand that you might not be an expert on all of the questions that we have, but we just be happy to get your opinions in perspective.  
 On this and this meeting, I I you've not sent us the consent form back with, but I'm assuming it'd be OK with us transcripting this interview. Is that OK? Like we the meeting? Yeah. Thank you so much. And I let Katherine stop. OK, so I think this will be good. So the first question is from a psychological behavioural perspective.

**Jack Grant** 3:41  
 So.  
 That's fine.

**Roopika Ravikanna (18724409)** 4:02  
 What are the important welfare considerations when introducing a robot to livestock?

**Jack Grant** 4:08  
 Yeah, good question. I think so. I've seen the video and I was actually surprised how the animals responded to the the dog. I expected them to be a bit more alarmed by it. So I think with research in this area, it's important to kind of embed studies that focus specifically on the stress responses that the animals might have to the introduction of the technology. So not just.  
 Focusing solely on optimising the technology and making it as useful as possible.  
 But also having that aspect within the project that focuses specifically on the stress responses.  
 And taking some kind of physiological measurements also kind of tracking behaviour and behavioural changes following the introduction of the new technology.  
 I think that's really important. So I mean, one of the things I guess is trying to make the technology move in a way that's as close to the real thing as possible.  
 So that the animals have got that consistency and predictability.  
 And that might reduce anxiety among the livestock.  
 I think yeah. So as well as like individual behaviour that might be affected, I think it's also important to track how social structures within the flock or the herd might change.  
 Depending on or following the instruction of the new technology.

**Roopika Ravikanna (18724409)** 5:41  
 Very interesting.  
 Another one would be how might farmers asked you towards red Boltxt influence the success or failure of such technologies.  
 So you know, how do farmers feel? And do you think that would really affect introducing robotics?

**Jack Grant** 6:01  
 I think so. I've actually conducted some research quite recently on farmers perceptions of robots and how they feel about robots being used in different scenarios. So one of the trends that emerged in that data set was that farmers are really open to robots helping with kind of practical hands on tasks, but they're less inclined to adopt robots that replace people completely or.  
 Have kind of a say on operational decisions. So they like to maintain that kind of agency in terms of making decisions on the farm, but they're more than happy to adopt robots that can help with practical hands on tasks.  
 And the other big thing is demonstrating the cost effectiveness and the profitability of the of the robots, especially in the current political climate. I think farmers are less inclined to invest in something that isn't proven in terms of what, what can I gain from this financially is there, is there a financial benefit to me actually adopting this technology?  
 So I think that would significantly affect adoption.  
 When it comes to, I think we're probably going to come on to this later on because I did have a look at the questions, but.  
 Also, that kind of tradition around the use of of dogs on the farm would be something that could lead to some kind of cultural resistance where individuals are less inclined to adopt robots to replace animals that have traditionally been used to do those jobs.  
 And then the other thing that came through in that line of research was the strong impact of like peer influence, so.  
 Diffusion of innovation theory. I'm not sure if you're familiar with it, but it essentially highlights kind of the typical the typical.  
 Adoption patterns for emerging technology.  
 And early adopters play a really key role. So if you can get some respected farmers within a community to become early adopters of the technology and then that kind of diffuses through them to the wider community and that could really accelerate acceptance.

**Roopika Ravikanna (18724409)** 8:15  
 Are there any known psychological barriers on the motivators to the adaption of New York cultivation technologies and farm communities?

**Jack Grant** 8:25  
 And I think these, yeah, I think these vary between groups. So one of the things is just the complexity and how easy it is kind of the ease of use of the technology, so.  
 Are the farmers going to have to go out their way to actually learn how to use the technology or is it going to integrate into the system quite seamlessly and that will be a big driver in terms of motivating?  
 Farmers to adopt the technology.  
 And then to be honest with.  
 The the patterns that I've been seeing, it is more around the costs and the increase in productivity, the increase in profitability, but also potentially.  
 Improving the resilience so.  
 You know, once you've got the robot there to do the job, essentially in some tasks you don't have to worry about getting Labour and Labour's increasingly hard to find in some in some kind of situation. So I think, yeah, that giving them that kind of reassurance that they've got this technology that can do the job even when they can't find the labour that's going to be another big motivator potentially.

**Roopika Ravikanna (18724409)** 9:38  
 How might the relationship between farmers and working dogs shape replacing dogs with?

**Jack Grant** 9:46  
 Yeah.  
 So yeah, the research I've done's not really looked at that in depth, but it's obviously looked at the relationship between kind of the farmers and their employees. And there's a real mixed bag. Some farmers are completely happy to replace the humans that work for them with robots because they think that they'll make their life easier, but others have that kind of strong emotional bond with with their employees. And I assume it's.  
 Probably more likely that it will be the latter with the dogs. I assume farms have quite a close bond with with the working dogs and that obviously might result in some scepticism around robotics actually replacing them.  
 So one thing that I've outlined in my research is the importance of how we frame the technology. So frame it as potentially complementing existing workers or in this case the dogs that work on the farm, complimenting them, making their life easier, making their their job easier.  
 Instead of replacing them completely and then potentially further down the line once the efficacy of the technology has been demonstrated, they may then be more inclined to replace the dogs completely.

**Roopika Ravikanna (18724409)** 11:00  
 So would you suggest like a robot dog that works with a normal sheep? Dog would be like a first step. Then you should do something.

**Jack Grant** 11:04  
 Mm hmm.  
 I think that would be, yeah, sensible first step to try to introduce the technology, but then I think that conflicts somewhat with the cost kind of benefit of it because if the cheap dogs still there doing the job anyway.  
 The farmer might think why do I need the robot dog? So it is quite a tricky. It's a tricky 1 to balance, but I think in an ideal world, introducing it alongside the sheepdog, so you're not completely replacing it out of the blue would work potentially.

**Roopika Ravikanna (18724409)** 11:35  
 And what kind of training or support do you think the farmers need to build trust in the remote systems?

**Jack Grant** 11:42  
 So on a separate survey that I've been running, we've actually been looking at kind of what formats of information farmers prefer when learning about new technology for farming. And the overwhelming majority say that they like hands on kind of workshops, demonstrations, that agricultural shows. So I think those in person events will be crucial to demonstrate the technologies that they can actually get.  
 Get to see it in action and potentially get to to interact with it as well.

**Roopika Ravikanna (18724409)** 12:16  
 What ethical concerns do you think of researching and developers should be most be aware of when designing the web.

**Jack Grant** 12:25  
 I think this obviously there's there's AI. Assume there's a lot of kind of work to be done around animal welfare, which we've touched on previously. So minimising kind of the stress and discomfort and anxiety that the animals might feel once the technology is introduced.  
 And also kind of in terms of the wider adoption of robotics, it's there's also questions around the responsibility and accountability. So if the robot.  
 Makes a mistake. Where does responsibility lie and it's it's it's a bit of a grey area at the moment, so I don't think that's always clear. So just considering those questions.  
 Is really important.  
 Yeah, we can't think of anything else at the moment, but I'll if anything comes to mind, then I'll drop repeat a message on that one.

**Roopika Ravikanna (18724409)** 13:19  
 Thank you. And then on sort of like a wider scale with human like robot animal interactions.  
 How do you think these new technologies impact human animal relationships? So sort of facing these with robots?

**Jack Grant** 13:37  
 I think the one thing that's emerged, a pattern that I've noticed as well and something that that's been pointed out is that by replacing some of the tasks that humans or animals would typically do with the livestock and replacing them with robots, you kind of distance them from their livestock a little bit.  
 And even though so for example.  
 You know mocking out for example.  
 They they have that kind of they get to see the animals more by doing those tasks. And it's often during those tasks that they'll realise something is wrong, like one of the animals isn't behaving quite as they'd expect. And by replacing them with a robot that won't have that same level of awareness so that it won't recognise issues during tasks even though the tasks are unrelated to those issues.  
 The person actually just being in the vicinity of the animals means that they can actually pick up on those things quite early.  
 So there'll be that kind of distance in between the the livestock and the farmer potentially. And then also.  
 In terms of the animal human relationship between the the working dog and the farmer, there's obviously, as we've touched on already, it's probably some emotional connection there.  
 And one of the things with farming is it can sometimes be quite a lonely job. So by removing that kind of emotional tie with the animal, they might actually become even lonelier. And this is an issue as well, with replacing human workers with robots.  
 A farmer who's already potentially quite lonely becomes lonely and wants the robot takes the place of the human.

**Roopika Ravikanna (18724409)** 15:28  
 And in your opinion would be new technologies coming out and sort of what we wanted in agriculture, who should be in charge of certainly sort of guidelines and policies.

**Jack Grant** 15:40  
 Question. I think the amount of stakeholders that need to be involved.  
 Is is very large.  
 So.  
 For example, I'm on a board for committee that's developing safety standards for autonomous mobile machinery, so kind of small platforms that are used in horticulture and broadacre crops as well. And we have individuals from kind of robotic companies, academics.  
 But also like wrap people from the Ramblers Association, because obviously with farming there's often kind of public spaces of public footpaths that run through the farmland. So that's something that often gets overlooked. But.  
 There's quite.  
 There's quite a lot of potential for these technologies to come into contact with individuals who aren't aware of them in within these spaces. So I think it's important to include a really wide range of stakeholders.  
 In those committees.  
 And also.  
 Within the research team.  
 In generally within research teams, I think there needs to be more emphasis on inclusive innovation and including the end users in the research process. So.  
 Having kind of an iterative process in place where every so often you kind of collect and formalise feedback from potential end users and then feed that back into the more technical side of of the project. And I think that's that's really important.

**Roopika Ravikanna (18724409)** 17:29  
 Areas of future research and psychology try or architect, do you think of most needed to support ethical robot interaction?

**Jack Grant** 17:39  
 So I think as I said previously, I think I'm, I'm no expert in terms of what's already been done in terms of like the robots that interact with the animals. But I think more of a focus on the animal wells, better side of things and how we actually measure these things. So rather than just observing.  
 Kind of the behaviour of the animals actually taking something physiological, measurements to quantify the stress response that they have to.  
 Some of these technologies I think that would be really important that may already being done, but I'm not. I'm not aware of it. I assume it is in some cluster.

**Roopika Ravikanna (18724409)** 18:21  
 And if you could give advice to a robotics team developing these sort of animal interacting systems, what would you suggest?

**Jack Grant** 18:31  
 I think.  
 A few things so that we've kind of already touched on. So one is the iterative user centred design, so making sure that you're actively involved farmers early on in the project and throughout the project's life cycle, so that their opinions and perspectives actually feed into the development of the tech.  
 Being transparent with those individuals and providing evidence based demonstrations in person. So as mentioned earlier, how they really like this kind of hands on.  
 In person exchange of information. So go into shows, show kind of demonstrating the efficacy of technology is really important.  
 And then the final thing would be to really pay attention to existing farm culture.  
 Looking closely at that bond that the farmer has with their animals and considering how introducing this technology.  
 Would potentially change that.

**Roopika Ravikanna (18724409)** 19:33  
 Yeah. Do we have any follow up questions? I I'm the one, Jack. I think you are so well placed to really provide a bit of a some insight into the types of technologies that are kind of robot technologies that you're interested in anyway. I mean, would you be able to sort of enlighten us into the kind of automated or robotic systems that you've encountered in your time?

**Jack Grant** 20:03  
 Yeah, sure. So the main main focus really of the, the tech that I've been working most closely with is.  
 Horticultural robots used to harvest soft fruit so tomatoes and strawberries.  
 And that's really.  
 Kind of seen an influx of funding since Brexit and COVID because there was a real labour shortage, a lot of soft fruit was actually going to waste. It was was being ruined because no one was there to harvest it.  
 So there's a real push to try and automate that picking process, but one of the challenges there is that the robots at the moment are just so much slower than the human pickers. So a horticultural robot picks around.  
 Well, between 5:00 and 8:00 berries per minute and a human can pick up to 60 berries per minute, so they're huge disparity in in how well they pick through.  
 So that's one area that I've been looking at. The other area is robots.  
 To assist rather than replace so those would be to replace human because another option is to have, as I'm sure some of you are aware, at Lincoln, there's kind of trade carrying robots, so the pickers will harvest the fruit into trees.  
 And then rather than having to go to the end of the row to get fresh trays, the robot comes along, takes the tray away, and they can carry on picking. They get a new tray from the robot. So.  
 Using the robot to complement the worker rather than replace them, and I think that's that's probably where.  
 The early kind of.  
 So what I'm looking for, I think that's where there's the most potential for the initial adoption of robotics in horticulture in particular.

**Roopika Ravikanna (18724409)** 21:58  
 What's about, you know, humans and robot work in?  
 All those thinking, sorry.

**Jack Grant** 22:09  
 I think actually that another important point is you've got. You've obviously got the safety of the robots like the actual how safe the robots are to use. But another important thing to consider is perceived safety. So.

**Roopika Ravikanna (18724409)** 22:10  
 OK.

**Jack Grant** 22:23  
 How can we improve that perceived safety through things like indicators like indicators, visual signals, audio signals on the robot so that the human operator knows what that robot's planning on doing as much as possible so they don't feel?  
 Kind of like they're guessing the robots next move, so that really clear communication between the robot and the user so they're always aware of of what the robot's doing is important.

**Roopika Ravikanna (18724409)** 22:51  
 Yeah. OK.  
 Thank you. Do we have any more?  
 Do you have any more questions, Missy? Hello.  
 Jack, thank you so much for answering our questions. I think I probably have one or two questions which is not directly you know related to this, but more of your general opinion because I think most of us here are not ethics or behaviour study people, but what we're trying to do is.  
 Collaborate our findings like we have also spoken to Helen Zulch earlier in the day today with a different set of I I don't know if you know her, Helen Sashi is in the animal behaviour. She's a clinical animal behaviour scientist with our university.

**Jack Grant** 23:41  
 I don't know that.

**Roopika Ravikanna (18724409)** 23:42  
 I think David Mills gave us this, her contact.  
 Think in in the Natural sciences department I'm I'm probably my and we are also we we spend this interview with you and we are talking to Matt Bagley, who is the farm manager. Probably not my the He's also the sheep dog trainer.

**Jack Grant** 23:50  
 So.  
 Yeah.

**Roopika Ravikanna (18724409)** 24:05  
 So we're basically trying to draught up a a report on like a paper, a potentially a conference or a journal paper on the ethics and the economic viability of shepherding robot robot shepherding. So would you suggest some like potential journals or venues you think would be suitable for this kind of work? It's just like because I think you might be more familiar with that area. Yeah.

**Jack Grant** 24:31  
 So one that comes to mind initially would be agricultural systems. So that looks it's quite interdisciplinary. So you could include like behavioural aspects and economic aspects and basically highlight how the adoption of that technology would impact the current system and that would be one that comes to mind. Journal of Rural Studies as well might be suitable.

**Roopika Ravikanna (18724409)** 24:37  
 OK.  
 OK.

**Jack Grant** 24:56  
 But I would note as well there's several. Well, there were at least several researchers in the School of Psychology.  
 That work with dogs quite a lot, so it might be worth reaching out to those. I'll try and get a list together for you because I think they'd be good. They'd be good to interview and potentially know some.

**Roopika Ravikanna (18724409)** 25:12  
 Alright, thank you so much. Yeah, that's been done. Yeah.

**Jack Grant** 25:18  
 Some journals as well that might be suitable.

**Roopika Ravikanna (18724409)** 25:21  
 If you can just send me like in the chat later, that would be very helpful. Thank you so much.

**Jack Grant** 25:26  
 Memories.

**Roopika Ravikanna (18724409)** 25:27  
 That's it from our end. I think I overbooked you.  
 You know, just for the interest of time. So we are really happy with what we got from you. So thank you once again, Adam start. Thanks if you can send us a like a short list of you know people you think might be suitable for similar interviews that'd be very helpful.

**Jack Grant** 25:40  
 Open.  
 Sure, I will do nice to meet you all.

**Roopika Ravikanna (18724409)** 25:50  
 Thank you so much. Thank you once again.

**Jack Grant** 25:52  
 Thanks, bye.

**Roopika Ravikanna (18724409)** stopped transcription