**Engineering the Green Transition 1% inspiration 99% perspiration**

**Back in nineteen-ninety-eight a slightly madcap engineering nut called Robert Llewellyn hit our UK television screens as the host of a new format show that had never been tried before. If you’re of a certain age you will, no doubt, remember it well. It was called Scrapheap Challenge, and each week it brought together two competing teams of engineers, scientists and general machine tinkering enthusiasts in a scrap yard and gave them ten hours to build a working machine or device to a specific brief using only the spare parts and materials they found around them. That brief could be anything from a medieval trebuchet to a car or a boat, or even a submarine or flying machine.**

**It was a brilliant format that taught a whole generation of budding engineers that mechanical creativity and problem solving could be a lot of fun, and the American spin off, Junkyard War seven got a couple of Emmy nominations. Some say it was largely responsible for spawning the maker movement –a repair and recycle culture that emphasizes creativity, hands-on building, and sharing knowledge in areas like woodworking, metalwork, electronics & robotics, 3D printing & digital fabrication, and even coding, engineering, and prototyping, always with a focus on upcycling & reusing materials with a blend of traditional craftsmanship and modern technology.**

**I would argue it was well ahead of its time and that without it we may not have other hit series like Mythbusters and American Pickers.**

**Anyway, why am I blithering on about it today? Well because upcycling and recycling is having a bit of a resurgence right now, isn’t it, as we grapple with the limited resources our planet has to offer and try and navigate towards a bit more of a circular economy where we don’t just buy cheap throw-away products with built in obsolescence but instead learn to look after stuff a bit more carefully, find out how it all works so we can fix it if it breaks, and ultimately keep it out of the dreaded landfill. And now, Robert Llewellyn and his amazing colleagues at the Fully Charged and Everything Electric YouTube channels are bringing the Scrapheap Challenge format back, but with a very specific 21st Century twist. So, I thought I’d catch up with Robert himself to find out all about it straight for the horse’s mouth - so to speak!**

**Hello and welcome to Just Have a Think.**

**Before we get stuck in, it’s time for a shameless plug on behalf of my good friends over at the Fully Charged and Everything Electric channels. I’m delighted to say that they’ve invited me back to be a moderator for several of the discussion panels at the Everything Electric LIVE show being held at Excel London from Wednesday the sixteenth to Friday the eighteenth of April. All the usual attractions will be there, from home energy generation and storage solutions right through to the latest EV models AND electric COMMERCIAL vehicles. Plus, there’s loads of fun stuff to keep the kids occupied. Ticket prices have been slashed this year as well, to make the event as accessible as possible to as many people as possible. AND if you use the Just Have a Think discount code at the bottom of the screen now, you’ll get an extra twenty percent off that already reduced price. Absolute bargain! So, follow the link in the description to the Everything Electric tickets sales page, pop the dates in your diary, and I look forward to seeing you there.**

**Right. Mr. Llewellyn, nice to see you. It looks like you're still down there in Australia. And of course, for those people listening and watching that don't know, you're down there predominantly because of the Everything Electric live show in Sydney. So I've heard rave reviews about that. How did it all go?**

**It was It was truly remarkable. So, every time, I'm still not there. Still can't be confident about the live shows. I still think no one's going to come to everyone we do.**

**And I, I mean, I think some of the sort of background stuff is that, you know, there were 35 car makers with cars on display and or test drives. We've never had that many anywhere. So I think we in Farnborough, which is our biggest show generally, it’s probably 15 to 20. So, to have 35. And they were mostly Chinese companies, most of which we you wouldn't see in the UK yet, but a lot of which you will see soon. They are coming, you know.**

**Wow. It's exciting stuff and it's a sort of it's the next stage on the on your journey as a sort of pioneer and, you know, and leader in this field, and the reason I say that is because I'm going back now, we're going to talk about something that you did. Years and years ago, when I was a young man, well, when I was a young man in the in the sort of 80s,**

**I first watched you as Kryten in Red Dwarf, for those of a certain age who will remember you all made up as a robot. And then, so ah I suppose, I've never had this conversation with you, although we know each other well now, you must have started out as an actor or got into acting, but then you went into Scrap Heap Challenge. Were you always tech-head first and an actor second?**

**Yeah, no, I was. I mean, I think it was, you know, it was always in the background. And what I realized was I was not good at being an engineer, but I loved it. And then, you know, long story, but eventually i wrote a play that was at the Edinburgh Festival in 1988. And the producer, Bred Dwarf, came to see that, a matter who I knew. I knew from other work. And he said, do you want to be in this sitcom as a robot and I said no I'm too busy with my own projects! What an absolute doofus!**

**And thankfully he was very patient and understanding and so I met the writers and then I got on really well with the writers and it was and what an amazing job I mean it's been an incredible privilege to be on that show you know.**

**Yeah. It’s been an enduring success for sure.**

 **It's been an enduring success for sure. And so that, I suppose that got you, your television legs going and you got your knowledge of television. And did Scrap Heap Challenge come, was that kind of a concept that you thought up and talked to television producers about or?**

**No, not at all. It's very much, it was very much the idea of an extraordinary woman called Cathy Rogers, who I've actually interviewed quite recently, who trained as a doctor with enormous support from her dad. And then the day after she qualified as and as a GP, she rang her dad and said, don't want to be a doctor.**

**Oh my God!**

**I'm going to work in the telly. Yeah, that was his, I think his response!**

**So she had made a couple of medical documentaries and she's very bright woman, but she went to see Apollo 13, the movie, and then had this sort of inspiration of that, of like, what happens if we had a team of engineers on the ground and they had to make something with instructions from a remote place from an engineer, which is what happened on Apollo 13. I mean, there were the engineers on the ground who had everything that they had on board Apollo 13, and they made oxygen scrubbers out of toilet roll holders and tubes and bits of old T-shirt. You know, so that was the original, original idea. and then it grew and grew. And my involvement was behind the scenes. But I got talked into, you know, appearing on Scrap Heap. I thought, well, it won't run. We'll do one series and it'll be forgotten. And that was life changing.**

**And it was a real jolt for me. So yeah, the show was a great success.**

**So, for people - the unlikely people - who are watching this who've never seen it, just give us an idea of what it what it how it worked then.**

**Yeah. So, it was, what it evolved into, it was a challenge show where two teams of, and they had to be competent, you know, mechanical engineers would compete when they would, we would give them really good tools, a quad bike and a trailer, and a massive scrapyard full of junk. And it was, they were for real. They were real scrapyards with stuff in that we had no idea what was in there. It was massive piles of discarded, you know, everything. I mean, they're obviously, there were a lot of cars, but there were washing machines and tumble dryers and, you know, mechanical engineering bits of lathes.**

**But then they had a genuine 10-hour period to build that machine, whatever it was. And but what we would always do is we'd find, say, a team from Jaguar Land Rover who were brilliant at making cars. That was their, that's their bread and butter. And we'd get them to make a boat or a digger. You know, they wouldn't make a car. We wouldn't ever let them make a car.**

**No, too easy.**

**So, it's too easy for them, yeah.**

**And they were up for it. And I mean, the level of skill of the engineers we met on that show. They had ten hours because of the budget, because we couldn't afford to run the cameras and all the camera crews, a really big crew filming it for longer.**

**So, they had to, so the pressure was on them to complete it. the task in 10 hours, which, you know, 10 hours sounds like quite a long time, but if you're building something from scratch with an engine and a transmission system and wheels and a digger arm and a scraper bucket, or, you know, who knows what, it's a big ask.**

**Yeah. It's only just over a day's work, isn't it?**

**Yeah, yeah. They were just, they were extraordinary. I mean, that was a real privilege to see what they would do, you know, and how they would do it.**

**Yeah. And so, I mean, coming up to date, because I mean, it's still incredibly relevant, even though it's not running at the moment. It's an incredibly relevant format for today. We've got this, everyone's talking about a circular economy on one hand, but then on the other hand, we've seen this sort of regressive economy pushed by the manufacturers of all sorts of goods to build in, you know, built-in obsolescence and, you know, flimsy stuff and plastic and batteries that are bonded to phones so you can't replace the battery. So, we it's like it feels like we've got two...sort of things that are pulling against each other as everyone wants to be, or a lot of people, want to get remake and renew and recycle in a circular economy and we're not educating, or the manufacturers, at least until recently, don't appear to be getting with the program. Is that what you're sensing from your work on Everything Electric and The Fully Charged show?**

**Really, I mean that’s such a complicated debate because in some ways it's the efficiency of manufacturing. So, they're making unit, you know, the motor drive unit is pre-made and it gets slotted in by a robot and it all bolts in together. But it, and the same as you're saying with battery packs and things like that, how complicated that is. And I think in a sense, the mechanical joy that some people got out of an internal combustion engine that broke down all the time! I mean that's really important aspect! Why were you always tinkering with internal combustion engines? Because they were rubbish! And they were really unreliable, and they broke down constantly and I mean I've had, and I've now driven electric cars. I've never had an electric car have a mechanical fault. I've had punctures. But they you know they just go.**

**There's nothing to go wrong is there?**

**There's nothing to go wrong. Yeah. I mean, you can run out, I suppose. I've done that once, but which was really boring because I was filming it and it took forever. But you know that's other than that, there's nothing. Whereas, I mean, all I remember is driving along and hearing, oh, and it stopped.**

**Yeah, exactly.**

**And you'd hear bits of metal drop out the bottom.**

**Yeah. In a sense, I suppose in a sense, the internal combustion engine motor car and all, I suppose, all engineering projects, really, they do, it in fairness to them, I suppose the reason they've been so successful is because they appeal to some kind of intrinsic human desire to tinker and overcome and succeed and perhaps that's where the diehard, you know, petrol heads, we won't name them, but we know where they are. That's one of the reasons they sort of rail against that this new-fangled electric vehicle, because there's nothing for them to really fix on it.**

**yeah**

**And therefore, they can't prove how clever they are and do their tinkering stuff.**

**Yes. But I mean, in a sense, that that only applies to what we would now designate as classic cars. I mean, a modern petrol car, you wouldn’t… even the most avid tinkerer wouldn't. You'd have to strip so much stuff out. It's all electronic. You know, there's no, I mean, if you think of like the crudity and simplicity of a carburettor. I understood how a carburettor worked, where there's a float and it sucks air in and it goes in. You know, now it's an electronic fuel injections, which needs a laptop and, you know, a degree in software engineering. Yeah.**

**Exactly. I and think that’s where the synergy lies, I think, because you can if you can find a way of embracing and enhancing that human ingenuity and desire to tinker, but with modern appliances that are predominantly electrical, then building that circular economy by getting the manufacturers to make things more repairable…**

**Yeah…**

**I did see that, I think the EU has got something called, is it a ‘Right to Repair’ law?**

**Yes. Yes…**

**And I think Apple now do a self-repair kit. I think Samsung do as well. So, they're sort of getting there a little bit. So, they're sort of opening up to the idea that people want to look after their, you know, their products and not just chuck them away after two years and buy the newest phone. They want to have, er, get a decent phone and maybe have upgrades that they you can put in. So I see that as it's maybe a, you know, ah sort of a win-win situation, if you like. So that the manufacturer is providing things that we can... you know, we can tinker with. So that's addressing the need to tinker. Plus, we've got the circular economy of of um of things staying in the economy longer.**

**So, then, so then you’ve got this new concept which I think is very exciting. So, you've sort of updated the Scrap Heap and changed the name and changed the format slightly. So, tell us all about it, Robert.**

**I think it is going to be slightly different because we can't really impose the time limit, you know, because we just don't have the budget for that and the structure of it. So, the idea with what we’re going to do now is, I mean we’ve titled it ZAPHEAP challenge. So, we will use…what I actually think will happen is one of the teams will build two identical battery boxes. They don’t have to be very big. You know they can be three or four kilowatt hours. The machines are only going to run for a few minutes. So, it's not, they don't need a hundred-kilowatt hour battery pack. But so that we can have, in a sense, like the fuel. So, there's a safe box that you can drop over and it doesn't, like you know, all that stuff. It’s properly made but then everything else we want to strip out of old electric cars, use the motors, use the drive systems, use the software. So, we've got these two brilliant teams, one in the UK, in Wales - Richard Morgan and Electric Classic Cars. And then in Amsterdam there is Anni Kloppenburg and his team from New Electric. Their kind of speciality is slightly different. But really bright guys with electronics and with batteries and with converting things.**

**And, you know, they've got those teams. So that's the two teams. So got a Dutch team and a British team. And I don't know what we're going to make yet. That hasn't been decided. I've suggested a few things, but I think the idea is it's not going to be a car. It'll be a machine that does something, you know, I'm not sure what.**

**It's very interesting to talk about the software and I suppose coding and things like that. One of my nephews is a very, very accomplished coder. He does it for a living.**

**And, you know, you watch him doing stuff on his laptop with a screen that's got writing that's so small I can't actually see it. And he's sitting here about four feet away and he's reading it perfectly. And you know, they talk they they type at the speed what you and I would speak. And so, it sounds like it's very much embracing, you know, where we are in the modern world with that generation. And obviously there are plenty of people who are of our generation who can do coding, Robert. I'm not being ageist.**

**Yes, no, not at all.**

**But it’s much more prevalent in folks of my nephews age in their 20s and 30s. So, Zap Heap Challenge is going to embrace all of that as well as the mechanical side. It's going to embrace the modern type of software and coding.**

**Absolutely, no, that's a really critical point, isn't it? And I mean, so I don't think it's going to be overly complex, but clearly if you've got a battery management system and a software system that operates the motor, you know, is the motor control, and you're not using the motor in a car, you're going to have to rewrite the software so that it doesn't… so you can control the motor in a different way. So those sort of things will be really very much part of the show.**

**But then I think the other the other big difference to the way we did the old TV series is we're planning, and I think it's all going to be able to happen, to do the test of the machines in front of an audience at the big Farnborough event in October, which would be...right… it always raises the stakes of it if there's a live audience so I'm really hoping we can… But, I mean, I think it would be great fun to do. And I think certainly those teams have really got up for it... It would be great fun to be able to do that.**

**Absolutely. So, so brass tacks, then let's get to some brass tacks, Robert, the plan is, as I understand it, I mean, ideally, we'd like to see this on network television, like Scrap Heap Challenge was, because that'd be wonderful. But to get people interested in making the show, you've got to produce a pilot episode, am I understanding that right?**

**Yes, that's right. In a sense, it will be a pilot. It will be a sort of pilot episode that we put out on the channel and everything like that. I mean I think it… so I think we're in a very different world now, to even when Scrap Heap was made. I mean, the last one of those was made in 2007, so it's quite a while ago now.**

**Yeah…**

**But there was, you know, people watched broadcast television. People watched television. Young people watched television in 2007, and they kind of don't. And in a way, you know, I know from from having the privilege of seeing the figures of Scrap Heap, which was a successful show, Channel 4 was very proud of it, and rightly so. We've had episodes on the Fully Charged Show on YouTube that have had more people watch them. So, then you go, well, that's weird, because then… and you’re the same, I mean you know a lot of the people we've spoken to with YouTube channels, you just go, well, no BBC channel’s ever had that many views. I mean, you know, I mean Colin Furze, not that I'm jealous and bitter, but my goodness.**

**Not at all, no. But he does, you know, he does dismantle his whole house and build an underground car park. So, you know, you and I don't quite do that, let's face it.**

**But, I mean, he does, you know, he's got he's got viewing figures that are that a big commercial channel would murder for.**

**Absolutely. Yeah, millions, millions of views.**

**Erm, in terms of getting the pilot episode up and running that's where we need some help from a Kickstarter campaign, as far as I understand it, because that's not that's not a cheap thing to do by the sound of it.**

**Yes, absolutely.**

**It's a lot of logistics and outside broadcasts and all sorts.**

**Yeah, it's, I mean, it's kind of crew… because we're got a location to film it in, so we we've got two amazing workshops, we've got tools, and we've got all that stuff. I mean, we need as much help as we can possibly get to do it. So, we would need, you know, we're operating with four people - camera crew and editors- and we need probably 10 on each team to make it work. So, we need hugely more people involved and we need, you know, dedicated sound engineers because that's complicated, because you've got everybody mic'd up and you need to be able to hear them while they're working and all that stuff.**

**So, the Kickstarter, we’ll get… obviously there'll be a link on screen and we'll leave it in the show notes as well of where people can go to look at that Kickstarter campaign. And you know, and I've gone there and I had a look at it and and it's not just chucking your five quid or 10 quid or whatever it is or $20 or whatever people can afford, but there's bits and bobs on there that you can get. I've ordered myself a Zap Heap cap, baseball cap, for example.**

**Actually I should have been…I’ve got a Zap Heap cap and I'm not wearing it. I should have worn it, but it's too hot.**

**Yeah, of course. Well, I'm sorry. Yeah. Did we say you were down in Australia having a horrible time in the sunshine, Robert? Yeah. Thanks for reminding us.**

**It's awful. People don't know how uncomfortable it is when you're this hot.**

**Yeah, I'm sure. Yeah. Terrible. Um, yeah, yeah, so there's perks and things and I think there's T-shirts and all sorts that people can get. So, I think essentially, I think what I'm understanding is is that we are basically saying to everyone watching, you know, if you don't mind, go and have a look at the Kickstarter.**

**Yeah. Yeah…**

**This is… personally, I think this is an absolutely fabulous project.**

**I loved watching Scrapyard. Scrap Heap Challenge when I was when I was a younger man. It was just madcap. You were brilliantly madcap in it and with your crazy leather gear on and your goggles and everything. It was brilliant. And I think that's something that could inject a bit of the joy back into, you know, the modern world. God knows there's enough bloody doom and gloom around at the moment. And Scrap Heap Challenge was a joyful thing to watch.**

**It was great fun, a bit wacky. But showed human ingenuity and I think genuinely was inspirational. I'm sure it led to a lot of young people going into a career in engineering and what have you. And we need a bit more of that in these days, which is why I'm a very big advocate of this. I think it's a wonderful idea. And if people can support it, then I think, you know, for whatever they can afford, five or 10 quid or whatever, it's going to make a difference.**

**And are we going to get, are you staying Australia now, Robert, or are we going to get you back for everything Electric London?**

**No, no, I actually leave the day after tomorrow. So, I'm on my way back home.**

**Okay….**

**I've been here a long time and it's been a great privilege. We filmed a lot of stuff here.**

**Yeah, yeah, yeah, we've started to see some of the videos. Brilliant. Alright, well, so I'll see you at Everything Electric London on the 16th, 17th and 18th of April.**

**Absolutely, yes!**

**Looking forward to seeing you there.**

**No, I'm really looking forward to that. Yeah.**

**And that hopefully that'll be a successful one. It sounds like that's going to be a pretty big one as well.**

**I think it's going to be quite big. Yeah. Yeah. And there's a lot of, I know there's a lot of cars that will be effectively unveiled there, which is a thing that I never expected us to be able to do, but that is starting to happen. Happened a lot in Sydney. a lot of cars were sort of launched at the event. Makes sense.**

**It does…**

**It's got clout!**

**Everyone talks about it, Robert. I don't want to float your boat too much or blow your trumpet or whatever the phrase is, but you know everyone talks about it as the event that you need to be at. Everything electric is it!**

**So well done to you and Dan and all the people.**

**Exactly. There's an amazing team that put it all together. I have less and less to do with it. Basically, it's out of choice.**

**“Can we keep Robert well away from the organising? Otherwise, it'll be absolute chaos!”**

**Yeah…**

**So, I turn up on the day and do my job. But yes, I don't organise it.**

**Yeah. Wonderful. Well, look, have a safe trip back from Australia.**

**Thank you.**

**And thank you very much for coming on. I appreciate that.**

**No, it's my pleasure.**

**And I look forward to seeing you at Everything Electric. And all power to your elbow, Robert. Thanks very much.**

**Thanks very much, Dave. Alright. Thanks a lot.**

**Cheers**

**That’s it for this week.**

**Thanks, as always to the amazing folks over at Patreon, who help me keep this channel independent and free of ads and sponsorship messages and many of whom have already chucked a bit of wonga into the Zap heap kick starter. Please do jump over to the Kickstarter page if you’d like to see Zap heap become a reality and you feel you could spare a few dollars to make it happen.**

 **If you’re in the UK, then don’t forget to visit the Everything Electric LONDON website to check out what’s on and get your discounted tickets using the Just Have a Think code.**

**And of course, you can really hugely support the channel completely for free simply by hitting the subscribe button on YouTube and clicking on all notifications to help us get noticed by the YouTube algorithm so that you get to see more videos like this each week. That’s just a couple of clicks away, either down there or on that icon there.**

**Most important of all though, thanks very much for watching! Have a great week, and remember to just have a think.**

**See you next week.**