

	Code	Description	Participants who mentioned	Examples
Bot development issues	Platform limitations	Restricted bot actions	P5, P10	"There are limitations to the API. Most of the things I want to do is possible to be done. But there are still a few things that just cannot be done with the API. So that's a problem that I face" [P5] if they make a PR I can directly adjust that PR myself like the code... That ability is not available through the API. I cannot build the bot. How do I say this? I cannot emulate that using API calls, it's GitHub limited the bot so that the bot cannot push a commit to the PR. [P5]
		Restricted bot communication	P3, P4	ideally I think that the platforms would offer more integration points for these bots, because basically to communicate bots have use comments. [P3] Part of the problem is that the bot have to interact with the tools it has. So, it has comments and it has pull requests. And that is really the only sort of interaction it can do. [P4]
	Technical overhead to host and deploy bots	-	P7, P13, P14, P19	there's been technical overhead to maintain the bot. For a while the bots was running on a physical machine. [P7] I supposed maintaining them could be a problem. Like, I mean, when someone has to spend time maintaining the bot itself, at some point there is going to be a question. There is some trade off, right? The bot saves you time but it also costs time to maintain. [P19]
	Challenges in building complex bots	-	P4, P11, P12, P18	I think a lot the ways people are building bots, they just automating a single thing. We don't have that. We just have one bot that does everything. I think it is hard to build a bot that has lot of capabilities. [P12] As a developer, I tried to build some bots using natural language processing. It is challenging. [P18]
Bot adoption issues	Discoverability issues	Difficult to find an appropriate bot	P4, P6, P9	It's a bit harder to find the right application. And also the discovery of the application is how to say not so transparent because I don't know how users find our applications. [P9] From one it is discovery, right? There are actually really good ideas people could do with a bot and GitHub. But, as a developer, I don't know and I do not have time to search for it. [P4] there is a lack of awareness that you like can use bots and that like bots are available to you... to like help you. So, I think like a lot of people are like... are doing things they like don't need to be doing because like, they could have a bot do that for them, but they don't realize that's an option. I think that's one thing. [P6]
		Limited search mechanism for bots	P4, P6, P10	Primarily I do and part of the reason is, there really isn't a good discovery mechanism for other bots. [P4] I don't think it's very clear at all, like you can even use a bot or like how to use a bot or like where to find bots. In the marketplace, I don't know actually how much people use that. I don't even know if there is a category for bots. [P6]
	Managing bots' configuration	Difficult to get a tailored configuration	P1, P8, P10, P16	We do see users who, you know, struggle to get the right configuration for them. [P8] It is easy to install the bot with the basic configuration. However, it is not easy adjust the configuration to your needs. [P10] Managing the configuration for bots [P1] it could be hard to add to all the projects if you have a large number of projects, for example. [P14]
		Limited configuration	P9, P10, P14	So some of them just allow you to add the whole organization. Others enable you to like a few projects at a time for example. I think it also for example, I mean bot could analyze your git code organization and add new projects. Some doesn't. [P14]
		Burden to set up configuration files	P4, P15	It is like a whole configuration file you have to write. That is a lot of work, right? [...] Anytime I have to learn a new configuration file, I don't like it. It sucks. [P4] Now, instead of having user interface that I can go click on I have to read a bunch of docs and figure out how to make a config. [P15]
	Convincing developers to use the bot	-	P4, P10, P14	We have some really good tools we could leverage for developers, but they're not gonna want to just use these tools randomly. And how do you convince them to use it? I don't know. I think that's the biggest problem for bots in general. [P4] I've induced them in a large scale at a place I worked, but I think like it... Initially you have to have on sort of opt in strategy to get people to adopt it. And if people like it, I think it will spread to the company. [P4]
	Technical complexity issues	Bot increase the barrier for new maintainers	P3	I think they can introduce complexity to the project and increase the barrier to onboarding new maintainers. If these bots need to be configured and you need to understand how they work [P3]
		More work to monitor bots	P10, P12, P15	And I think for the maintainers, it gives them a little bit more work in some cases, because they have to monitor the setup and make sure everything is going well [P15]
		Handling bot failures	P3, P9, P10, P17, P14	Oh, I think they make you they make everything a little bit more complex, right? [...] So I guess it's adding more technical complexity to the project. But what that means is that we can do many more reviews, so usually it works fine, but when it doesn't, it's the perfect more technical. [P12] If you rely on these bots and they stop working for some reason then it is a problem. If I automated by releases with semantic-release, and then are some kind of bug in semantic release and I don't know why it basically blocks me to create new releases. Because I automated everything, it is kind hard to manually create the releases [P3]
	Ethical issues	Bots introducing noise	-	P1, P3, P7, P8, P9, P12, P13, P14, P16, P19, P20, P21
Bots with biased behavior		P3, P9	It is a problem with bots in general. But I could see with you have a bot that works as GreenKeeper in a project and it has some kind of bias built into it, it would be a huge problem. [P3] Yeah, like you there's no criteria to verify the use of you so that the bot is maintained, and is representing the opinion of a specific entity. [P9]	
Bots with malicious intent		P9, P18	is probably is this good bot or a bad bot because it's about both it could steal our private code, right? [...] It is a bot that actually has malicious intent. [P9] The other option there is, again, related to trust, right, because nobody enforces the bot to disclose. If they are lying for whatever reason, think about it as you can use the bots to manipulate the opinions of developers, right? Like the news, right? They can actually say something that they know is not true, they do it because they will only be very simple as you actually provide a suggestion saying, "Hey, guys, we have a security vulnerability." You know, it's not there, but you're just trying this, you can actually ask a young developer to make something which might introduce a security vulnerability. [P9]	
Bots impersonating developers		P3, P6, P12, P15	The only thing I mentioned is that bots that pretend to be humans can often be met with confusion. So identifying a bot, as a bot, in as many clear ways as possible is really, really important. [P15] This is the confusing thing that we were talking about recently is that it posts the pull requests as like one of the engineers on my team. That's kind of confusing because like it's not always that engineer does it. [P6] Because like, if you're expecting about if you're expecting, like an avatar, like someone to like, interact like a human and then it doesn't I think that's very, that's confusing and like, sets you up for bad expectations. [P6]	
Bots can enforce inflexible rules		P3, P7, P15, P17	The social issues are largely down to about being inflexible and not meeting somebody's expectations. [P7] Um, and I've seen a lot of people have problems with that because they say, why is this bot closing my issue that I, you know, so painstakingly opened? And, you know, I shared my thoughts, why is this bot coming along and just, you know, closing my work. [P17] It's not flexible enough and then that combined with our linting and testing suite is too strict. So the biggest complaints we've gotten are that our lint rules and test rule tests are too strict. And of course the bot enforces that. So they'll say things like, wow, the bot is strict. Like, yeah, that's because it's all just doing this thing. "Did you pass the tests? Yes, no." The tests are very strict. So definitely, we've had complaints of saying, "Wow, it's hard to get." It's hard to get a PR from start to finish to pass all the tests and get the bot to accept it. [P7]	

Bot interact	Expectation breakdowns	For some developers is strange interacting with a bot	Some developers do not feel comfortable interacting with a bot	P5, P12	"Hey, I'm here to help you" is not super weird. I mean, I think for some people, it's still quite strange, and they're quite surprised by it. [P12] they just say like, receiving thanks from a person is different than thanks from a bot. That's a social aspect... They just, like, "it's not the same." It feels less sincere to them. [P5]
		Bots can intimidate newcomers	Some newcomers might feel intimidated by bots' interactions and feedback	P2, P12, P17	It can be intimidating, especially if it's the first time you're contributing. [P2] I think there's also, you know, new contributors, I mean to an open source project, interacting with the bot that they've never seen or heard of before, that can be really confusing. And you know, that can be difficult for or intimidating for open source contributors. [P17] because it's not obvious what's happening like I think if you're new to a project then You don't... you might not be expecting bots. Right? So I think it's, I think it's a sort of... Yeah, if you don't know to expect it, then that could be confusing. [P12]
	Bot communication issues	Bots do not contextualize their actions	Bots do not understand the context of what they are doing	P4	Communication is hard, right? You know, a bot is doing a job and it has to communicate something, whether it's that you have a typo and trying to fix the typo, or your test doesn't pass. It doesn't tell you it. A human can be like, it's not passing because we change this and all these things happen. They don't understand. Let me see... It doesn't understand the context of why something's wrong. You know, a typo. [P4]
		Non-comprehensive feedback	The feedback provided might be unclear, or even poor	P4, P15, P17	Well, you know, something that will comment with information that's unclear. And then you then need to go and like ask a human for clarity. [P17] It's great to see yes or no, but if it's not actionable, then it's not useful for you. [P8]
		Bots do not provide actionable changes	The feedback provided by bots are not actionable	P8, P9	If the answer is like, "Hey, you decreased coverage," or like "you didn't meet some standard." How can you go about fixing it and these are like where you should look first. And so being able to provide that I think is extremely important. [P8]
		Interacting with the bot requires previous knowledge	Understanding the bot requires other technical knowledge not related to the bot	P2, P5, P6, P12	I've seen it even in maybe it's my own bot... people did not know how the auto merging works. But they misuse [the bot]... so allowed it to do is... just write the email to the mailing list saying "this is how it works." [P5] And then so they maybe do a bit more... but basically, some people fail to understand the review process and then also can get frustrated with all the [bot] notifications. [P12]
	Bots being intrusive	Spamming	Some bots are designed to spamming repositories	P4, P13, P16	I didn't give [to the bot] explicit authorization to enter the repository, it generates a notification that you did not request, which is the pull request. [P16] [...] people want to have agency, they want to have choice. [...] They want to know that they are being corrected because they asked to be corrected. So when I asked for you to do code coverage, and you tell me I'm failing my code coverage, I asked for that. [P4]
		Modifying commits/pull requests	Some bots can be intrusive, modifying commits and pull requests created by humans	P7, P21	let's say you have a very large line of code and the bot goes there and breaks that line for you. It is intrusive because it is changing what the developers did. [P21]