

How Bots may Play a Role in Your Development Project

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1. THE EMERGENCE OF BOTS

From the earliest days of computer programs, developers have imagined the emergence of programs that can act, talk and think like humans. Such programs would not only automate tasks that humans might do, but they could also work with humans to solve intellectual tasks that cannot be entirely automated. The hope, even as far back as 1966, was for these programs to pass the Turing Test (proposed in the 1950 paper Computing Machinery and Intelligence [s]), where humans could be fooled into believing that they are interacting with an intelligent human rather than a mere program (reference Eliza Bot [x]).

The term “bot” was used to describe the realization of this vision quite early on, but today the term is used to describe a conversational style user interface or an anthropomorphized script or agent that can automate rote and tedious tasks. Such bots today may fetch or share information, extract and analyze data, detect and monitor events and activities in communication and social media, connect users with each other or with other tools, or they may provide feedback and recommendations on individual and collaborative tasks. Bots are not (typically) intended to fool the end user into believing a bot is a real person, but many bots do have a personality that is engaging and pleasant to interact with.

The term “chatbot” is commonly used to emphasize the conversational style user interface of many bots, especially those that use natural language processing rather than simple commands. Bots typically reside on popular platforms where users work or play with other users, and frequently integrate other services and micro-services into these channels, providing a conduit between users and other software services.

Bots are rapidly becoming a *de facto* interface for interacting with services in just the past few years. In part, this is because of the widespread adoption of messaging platforms (e.g., Facebook for social networking and Slack by developers) and in part because of the advancement of natural language processing, which many bots (but not all) lever-

age.

Another driver is the prevalence of “big data” and machine learning algorithms for analyzing data across many domains. Bots provide a convenient way for developers to generate a user interface for interacting with these algorithms and data.

Developers use bots as well as create them. For developers, the transition from command line interfaces to interacting with bots through the messaging interface feels intuitive and has the advantage of bringing transparency of invoking and customizing services in a communication channel, while non-technical users are also embracing the notion of bots as opposed to installing and relying on apps that are not well integrated with their messaging environment.

All of the major companies clearly recognize the value that bots bring in terms of integration of services, users and communication channels. Facebook aims to “replace apps” one bot at a time in their messaging platform [x], while Microsoft claims that “conversation as a platform” is the operating system of the future rather than Windows [x]. Amazon’s Alexa, Apple’s Siri and Google’s Now platform are also showing agreement with this rapid shift towards bots. Software developers will also recognize many bots in the platforms they frequently use to connect with other developers and services, such as Slack [x] and HipChat [x].

In this column, we first discuss how bots can be used to automate many end user tasks and to fill numerous roles across a wide variety of user domains. We provide some background for developers on how they can create bots and how they can host these bots on various platforms. These platforms support one or more frameworks that developers can leverage to support the rapid creation and design of bots. We also discuss some design guidelines for bots, pulling ideas from the emerging area of human-robot interaction. In a sidebar, we look at how developers themselves use bots in their development work. We call out this domain because to quote XXX from StackOverflow, “developers are writing the script for tomorrow” and thus we see examples of sophisticated and innovative bots emerging that pave the way for how bots may be created for other domains. Finally, we conclude this column with some considerations and advice for developers wishing to develop or use bots within their own development projects.

2. BOTOLGY: UNDERSTANDING THE ROLES BOTS FULFILL

It has been surprising to see the rapid development and adoption of bots in just a few years. Bots are being designed to support a wide variety of tasks and roles. We summarize

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the main roles here, and provide examples of bots that supports the tasks that are representative of these roles.

more general roles (e.g., transactional, informational, productivity, collaboration...)

Give general examples

3. HOW TO CREATE BOTS AND WHERE TO HOST THEM

[Carly]

There is a need to distinguish between the services used to build bots (Creation Platforms) and the platforms where they live (Distribution Platforms). Although simple chat-bots can be built from scratch and self-hosted, many developers choose to leverage a variety of third-party technologies to streamline the process.

Many large companies, such as Microsoft and Facebook for example, offer a comprehensive set of tools to support both the creation and distribution of bots. Other companies, provide specialized solutions for specific aspects of bot creation and distribution.

3.1 Distribution Platforms

The distribution platforms are where the bots can be accessed by users. Bot distribution platforms can be general purpose, such as FB Messenger, or specific to a domain such as Slack in Software Development.

Distribution platforms offer many benefits to developers: access to a user base¹, defined interactions, marketing¹, and collecting payments¹. Launching your bot on a platform that has a stable user base helps overcome the cold start problem that many new applications face. When selecting a user base, consider the size / demographics of the user base and user cost to access platform. The distribution platforms also define and standardize how users can interact with the bots. The most common bot interaction mechanisms include text (responding to the bot in natural language), commands (using a set of predefined keywords or phrases), selection (directly clicking on one of the presented options), and sometimes voice.

Distribution platforms also offer the ability to market or promote the bots. Popular distribution platforms offer “bot stores” where users can go and shop for bots. Many third-party sites also maintain catalogs of bots across many distribution platforms.

Lastly, many distribution channels offer means of collecting payments from users. This is particularly useful for transactional bots.

A summary of the popular distribution platforms and technologies are included in figure X.

3.2 Creation Platforms

Developer ecosystem for the different platforms... plug in to these communities...

The creation platforms are where the bots are designed and built. Creation platforms offer many benefits to developers: support for specific distribution channels, and access to an active development community. A successful creation platform offers software foundations in the form of APIs, tool sets, services, or frameworks and a developer

ecosystem for support¹. The creation platforms can support the development of bots for specific distribution platforms, or many produce general bots that can be deployed on multiple platforms. The services they provide range from documentation and code templates to no-code required bot building interfaces. Surrounding the creation platforms are developers using the same technologies, driving innovation and new use cases for bots. They provide software expertise in the form of tutorials, articles, discussions, and answering questions.

A summary of the popular creation platforms and technologies are included in figure X.

3.3 Design guidelines

4. TAKEAWAYS

[Peggy]

Bots are everywhere: pay attention to how bots are used around you, in cars, in the home but also watch how other developers use Bots in their development activities (reference FSE visions paper)

Bot ethics: Reference Asimov’s rules for Robots here.. Should this be updated for Bots?

Bots may ease or increase collaboration friction... choose Bots not to remove collaboration (and in turn creativity) but use them to enhance collaboration (reference CSCW workshop paper)

5. SIDEBAR

[Peggy]

Software bot usage in software development.

6. REFERENCES

¹<https://medium.com/mobile-lifestyle/messenger-vs-skype-vs-slack-vs-telegram-how-to-spot-the-winners-adc34b4ca066>