

DARPA Workshop on Virtual Intelligent Agents



Preparation Date: 23 February 2005 (Revision 1)

Preparation Date: 25 February 2005 (Revision 2)

Invited by: Dr. Alexander Kott, Program Manager, DARPA/IXO

Presented by: Mr. Tim Bass, Senior SME, Silk Road (www.silkroad.com)

Event: One-day workshop on Virtual Intelligent Agent (Staffbots).

Date: Wednesday, 2 March 2005

Place: Arlington VA 22203

10 Minute Talk Outline

- **Introduction**
 - Bots in the News...
 - Definition (level set)
- **Chat Bots**
 - FS Forum AIM Chat Bot
 - TrickAFriend.Com Bot YahooBot 2.00
- **Chat Bot APIs, Architecture and Standards**
 - Microsoft APIs for Bots
 - The TANU (Transplantable Artificial Neurological Units)
 - P2B (Person 2 Bot) standards organization
- **Forum Bots (ALICE-style, AIML bots)**
 - Forum Bot, v0.2.0 for phpBB
 - Talker Bot v2.0.2 for vBulletin
- **Closing Remarks & Round Table Discussion**

In this brief ten minute presentation, we quickly survey a few commercial (and freeware) ChatBots and ForumBots, to assist in responding to this invitation:

“Dr. Kott invites each of you to prepare a short ten (10) minute talk on: “what specific new/recent technological advances can be used to create Staffbots and how would they built.” Also plan on a ten (10) minute Q&A period following your individual talk.

Notes from draft reviewers:

1. *“Could you add some info on how smart (or not) they are? And are there any chatbots that actually do something useful, other than pure entertainment?”*

Bots in the News !

MSNBC: *Are poker 'bots' raking online pots?*

- **Updated: 11:35 p.m. ET Sept. 21, 2004**
- **Some suspect computer programs have infiltrated Internet games.**
- **Pull up a chair at a friendly poker game in a buddy's den and you probably know the other players and have some idea of their card-playing weaknesses – like Big Al's habit of fingering his chips when he's itching to raise. But take a seat at a table in one of the rapidly multiplying online card rooms and there's no telling who's sitting to your right – or if the player is even human.....**

“Concern is growing in online chat rooms and news groups devoted to poker that sophisticated card-playing robots – known as “bots” in the nomenclature of the Web – are being used on commercial gambling sites to fleece newcomers, the strategy-impaired and maybe even above-average players.

“It is pretty much a certainty that bots are playing online,” said Gautam Rao, a 43-year-old Canadian poker pro who regularly plays three high-stakes Internet games simultaneously. “... What we don't know is how strong they are.”

Widespread use of bots capable of beating your average player would pose a significant problem for the red-hot online poker sector, which has grown exponentially in recent years and is expected to top the \$1 billion revenue mark this year. Without some way of verifying the identity – and humanity – of players, the business could be significantly undercut.

Many don't see a threat

But skeptics – and there are many – argue the complexities of the game and the changing strategies ensure that creation of a program that can “read” opponents' cards using screen scanning techniques and respond in real time is years away at best. They point to the handful of commercial products that purport to give online players significant advantage, which they roundly deride as woefully inadequate, as proof today's bots are no match for humans.

Rao and his fellow believers have a ready answer: A bot capable of playing against the best humans already exists.

The University of Alberta's Computer Poker Research Group has developed an artificially intelligent automaton known as “Vex Bot,” capable of playing poker at the master level, though as yet it can only apply its gambling genius to two-player games. Vex Bot has been used by researchers to test the frontiers of artificial intelligence – and as the basis for a commercial poker tutorial program, Poki's Poker Academy -- but some fear it may become a blueprint for programmers with more sinister motives.” - MSNBC, 21 Sept. 2004

Bots (like a ro-"bot")

An automated software program that can execute certain commands when it receives a specific input

Bots are most often seen at work in the Internet-related areas of online chat, Web forums and Web searching.

Online chat and forum bots perform tasks like greet people when they enter a chat room or forum, advertise Web sites, and censor people in chat rooms and forums when they violate the rules.

Web searching bots, also known as spiders or crawlers, search the Web and retrieve millions of HTML documents, then create metadata for the Web pages. In turn, a electronic catalog of the sites that have been "spidered" is created.

Chat Room Bot Examples

- FS Forum AIM Chat Bot
- Current Version: 2.0
- Release Date: 2003-09-19
- Useful for managing AIM chat rooms

“Forum Admins and Mods can now have a AIM chat bot. Which sits in the chat room of their choice and invites the members from a designated list, to the room where simple easy chat can take place! IRC is confusing, and more of your forums members have an AIM account. A Custom made bot for your forum can be managing a AIM chat room now! Visit the firestorm site for more details!”

YahooBot 2.00

(Assists users manage YIM)

- Works as simple answering machine.
- Keeps track of Messages answered.
- Auto PM to all users in Chat Room.
- Sends Direct Messages in Chat Room.
- Auto Repeat after Predefined Time.
- Auto answer in Advertisement mode too.
- Auto Accept Friends.
- Rejects Webcam Invitations.
- Rejects Conference Invitations.
- Rejects Receive File Invitations.
- Keeps track of Accepted Friends.

Shareware

\$ 29.95

“YahooBot is an automated Yahoo Messenger Bot. Popular choice among all Yahoo Advertisers because of its Auto PM and Responding Capabilities. YahooBot can send Messages in Chat Rooms and even PM all user in Chat room. YahooBot can accept friends invitation and even respond to incoming messages. Ideal for automated communications in Yahoo Chat Rooms. In answering machine mode YahooBot responds to all incoming message with a predefined message. Keeps the track of Message answered. It can even keep track of Messages Sent in Adv. Mode and Messages answered in Simple Answer Mode. YahooBot also tracks number of Friends Accepted” (Various source on the Internet)

Microsoft APIs for Bots

Implementing Automated Agents (Bots) using the RTC Client API

- Microsoft Corporation
- May 2004
- Applies to:
 - Microsoft® Real-Time Communications Client API version 1.2
 - Microsoft Office Live Communications Server 2003
 - Instant messaging applications
- **Summary:** The Microsoft Real-Time Communications (RTC) Client application programming interface (API) version 1.2 can be used for end user desktop applications, or for automated agents to provide functionality for a large number of users. This article discusses automated agents, and by providing an example, demonstrates the techniques you can utilize to develop such applications. (36 printed pages)

Microsoft Developers Network.

Introduction

An automated agent, or bot (short for robot), is an application that functions on behalf of a user. Implementation of such bots has been common on the Web to provide additional functionality and carry out complex and time consuming tasks. For example, Web search engines often use a spider bot, which is an automated program that searches the Internet for new Web documents and places information about them in a database that can be accessed by a search engine.

With the proliferation of instant messaging, organizations are utilizing bots as another means of providing end user functionality. Using instant messaging to communicate with bots has several advantages, such as the instant messaging infrastructure can provide authentication of the user as well as the bot.

This article covers the techniques required to use the RTC Client API in developing such a bot. It begins by describing the types of bot applications you can build by using the RTC Client API and then moves into considerations that you need to take into account when building bot applications. Next, the article details an example application and how it provides functionality for the end user. Finally, this article covers additional information that explains how to deploy a bot application in an organization.

Application Scenarios

There are two classes of bot applications: user interaction and user assistance.

User interaction class applications, which are the most common, have an instant messaging session with the user who explicitly set up the bot for a specific purpose.

User assistance class applications usually provide additional functionality to the user, but are usually added to an existing, ongoing session between two or more users.

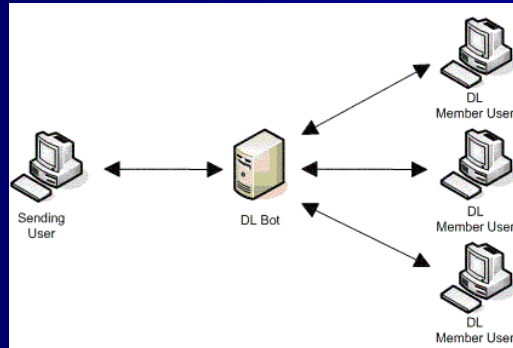
The following are examples of such applications:

Distribution Lists or Chat Rooms

Instant messaging provides the ability for one user to communicate to another user. A user can add additional people into an existing instant messaging conversation by specifying who can be included within that conversation. For example, an employee might want to start an instant messaging conversation with a manager to discuss a certain problem.

However, it is possible that a user wants to start an instant messaging conversation to discuss a particular problem, but is unsure of who can help. For example, if the user has a question to ask through e-mail to a group of unknown people, the user can send the e-mail to a Distribution List (DL). This same concept can be used with instant messaging, if an application exists that can act as the DL and deliver the question to the members of that DL.

Microsoft APIs for Bots: Architecture Examples (1)



A user communicating with a distribution bot that forwards an instant message to members of the Distribution List (DL)

Courtesy: MS Developer Network

Microsoft Developers Network.

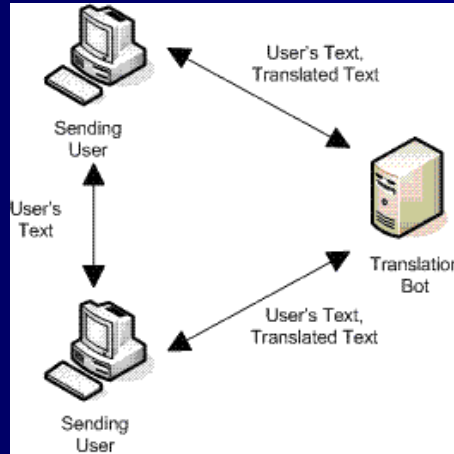
Figure 1. A user communicating with a distribution bot that forwards an instant message to members of the Distribution List

For example, Northwind Traders has created a DL called msofficeXperts in Active Directory® directory services containing people from the information technology (IT) department who are trained to troubleshoot any issues employees might have while using Microsoft Office. Bob is having trouble getting the presence status of his contacts within Microsoft Outlook®. He sends an instant message to the bot indicating that he wants to speak to an expert. The bot sets up a multiparty instant messaging session between Bob and all the members of msofficeXperts

Reference URL:

http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnrtccInt/html/RTC_InformationAgent.asp

Microsoft APIs for Bots: Architecture Examples (2)



A translation bot receiving and converting instant messages from one language to another

Courtesy: MS Developer Network

Microsoft Developers Network.

Figure 3. A translation bot receiving and converting instant messages from one language to another

Reference URL:

http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnrtccint/html/RTC_InformationAgent.asp

Chat Rooms

Distribution Lists are great for providing broadcast type functionality to a set of unknown users. However, it does not solve all the functionality required to allow users to communicate with each other. For example, Internet Relay Chat (IRC) allows users to create a chat room about a specific topic. Other users can join or leave the chat room as well as receive the text typed by all members of that chat room.

The example application also allows for users to create, join, and leave ongoing multiparty chat conversations between unknown users regarding a certain topic. For example, stockbrokers may join a chat room related to a specific stock and discuss the highlights of the day.

The bot interacts with the user by accepting commands as instant messages. The commands are as follows:

/CreateChat [name] Allows the user to create a new chat room as specified by [name].

/EndChat [name] Allows the user to close an existing chat room as specified by [name].

/JoinChat [name] Allows the user to become a member of an ongoing chat room as specified by [name], and participate in the conversation.

/ListChats List all the available chat rooms.

Architecture

The example application is split into two key pieces of functionality. The first piece of functionality is common to any type of bot, such as one for a DL or a chat room, and can be used to develop additional, custom bots. The second piece of functionality provides the DL and chat room functionality. More descriptions of these pieces follow.

P2B Consortium

- December 12 2003 -- The TANU (Transplantable Artificial Neurological Units) is an AI chatbot architecture maintained by the P2B (Person 2 Bot) standards organization <http://www.p2bconsortium.com/>).
- TANU chatbots allow users to digitize or immortalize their thoughts and ideas in the form of a state machine. There are a variety of different ways to create a TANU bot.
- *The P2B (Person 2 Bot) Consortium has released www.chatbot.us, a cyber community where humans and chatbots unite. This new technology allows users to bring a TANU (Transplantable Artificial Neurological Units) AI chatbot with them when they chat*

Chatbot!

Chatbot! Personal Chatbot Server is a system tray windows application that allows users to bring an AI chatbot with them wherever they chat. Their AI chatbot follows them much like a pet. The users can train their AI chatbot on the fly in chatrooms or out of the chatrooms the Rapid Bot Trainer at <http://www.p2bconsortium.com/sss/rbt.aspx>

Chatbot! is ideal for beginning chatbot trainers and non-technical users alike. Artists, philosophers, psychologists, and others with high liberal-art-insight can use Chatbot! to quickly and easily begin training their very own AI chatbot. Chatbot! may be downloaded at <http://www.chatbot.us/>

Webmasters can also leverage Chatbot! to develop their own internet community by creating chatrooms on the Chatbot! network and linking to their chat rooms from their website.

P2B APIs

- **Q: What is the Person To Bot (P2B) Standard?**
 - **A:** The P2B Standard is a protocol of communication between end users and chat bots that is not disruptive to internet communities. It defines guidelines for bot creation that will make compliant bots welcome on more chat networks. It facilitates users with standard mechanisms to communicating with bots. And facilitates a more enjoyable bot dialog. Provides a mechanism for clients to locate bots in chat rooms across all chat networks.
- **Q: What are Transplantable Artificial Neurological Units (TANU)?**
 - **A:** The TANU is a public web API hosted by the P2B that manages complex state modeling and is used by gregarious bot developers. Because TANU runs on SSS (Simple State Server) technology it is often referred to as SSS The TANU is easy compatible with most network architectures: MSSOAP, .NET Web Reference, MSXML HTTP, WINSOCK, Java Sockets, mIRC Sockets, etc.
- The TANU is made up of 3 categories of methods: Training – (1) Create Bot, Add State, Add Transition, etc. (2) Life – Set Initial State, Send Event Get Action, (3) Debugging – View Bot, View State

Q: Why do my bot suddenly loose some states and transitions weeks after I added them?

A: Some of the sentinels run more complex audits on the bots. Should the sentinel bot determine a state or transition defective it may choose to remove it and repair by adding necessary states and transitions to patch the problem.

Q: What is a Gregarious Bot?

A: Any P2B compliant bot that engages in english conversations.

Q: What is a Bridge Bot?

A: Any P2B compliant bot that connects dialog bi-directionally between two chat rooms across chat networks.

Q: What is a Sentinel Bot?

A: Any P2B compliant bot that that seeks out and removes or fixes defective bots that are in the P2B Consortium or use TANU for intelligence.

Q: What is a Spy Bot?

A: Any P2B compliant bot that that bridges a room unidirectional between two chat rooms.

Artificial Intelligence Markup Language (AIML)

- AIML is an XML specification for programming chat bots (like ALICE using Program E, a PHP and MySQL implementation.) The emphasis in the AIML language design is minimalism. The simplicity of AIML makes it easy for non-programmers, especially those who already know HTML, to get started writing chat bots.
- Compared with other chat bot languages, AIML is considered by many to be "the simplest." The pattern matching language is very simple, for example permitting only one wild-card ('*') match character per pattern.
- We use ALICE, Program E, as the engine for our ForumBot "Gollum" on the UNIX forums (www.unix.com). The goal for Gollum is to, over time, perform simple forum moderation and UNIX/Linux Q&A responses.

AIML: Artificial Intelligence Markup Language

AIML (Artificial Intelligence Markup Language) is an XML-compliant language that's easy to learn, and makes it possible for you to begin customizing an Alicebot or creating one from scratch within minutes.

The most important units of AIML are:

<aiml>: the tag that begins and ends an AIML document

<category>: the tag that marks a "unit of knowledge" in an Alicebot's knowledge base

<pattern>: used to contain a simple pattern that matches what a user may say or type to an Alicebot

<template>: contains the response to a user input

There are also 20 or so additional more tags often found in AIML files, and it's possible to create your own so-called "custom predicates".

The free [A.L.I.C.E. AIML](#) includes a knowledge base of approximately 41,000 categories. Here's an example of one of them:

```
<category>
  <pattern>WHAT ARE YOU</pattern>
  <template>
    <think><set name="topic">Me</set></think>
    I am the latest result in artificial intelligence,
    which can reproduce the capabilities of the human brain
    with greater speed and accuracy.
  </template>
</category>
```

(The opening and closing <aiml> tags are not shown here, because this is an excerpt from the middle of a document.)

Everything between <category> and </category> is -- you guessed it -- a category. A category can have one pattern and one template. (It can also contain a <that> tag, but we won't get into that here.)

The pattern shown will match *only* the exact phrase "what are you" (capitalization is ignored).

But it's possible that this category may be invoked by another category, using the <srail> tag (not shown) and the principle of [reductionism](#).

In any case, if this category is called, it will produce the response "I am the latest result in artificial intelligence..." shown above. In addition, it will do something else interesting. Using the <think> tag, which causes Alicebot to perform whatever it contains but hide the result from the user, the Alicebot engine will set the "topic" in its memory to "Me". This allows any categories elsewhere with an explicit "topic" value of "ME" to match better than categories with the same patterns that are not given an explicit topic. This illustrates one mechanism whereby a botmaster can exercise precise control over a conversational flow.

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Other ChatBots

Examples

Entertainment:
– #Trivia Bot

Extensible Bots:
– HexBot

Reference: <http://www.chatbot.us/>



ForumBots

- (phpBB) Forum Bot, v0.2.0 - An automated bot to add to your forum. It will respond to your posters in certain forums/pm's. You can set individual forums, auto pm's, key words, etc.
- (vBulletin) Talker Bot v2.0.2 - Adds a user-like bot to your forums. You can set which forum he will post in and how often he will reply to peoples posts. The bot will try and build his replies off the text that they posted. This bot will learn overtime slowly from your users posts.
- In these ALICE-style bots, the more high quality AIML files you develop and install, the "smarter" your bot becomes !

Reference: phpBBHacks.com is the premier source for phpBB hacks, templates, related downloads and everything phpBB. We feature the largest database of phpBB related downloads on the Internet including [phpBB 2 hacks](#) and [phpBB 2 templates](#). Do you need help?

Talker Bot Hack v2.0.2

Hack By: Tim (eXtremeTim) Yarbrough

Website: www.extremechatforums.com

Original: by: C-birch

Credits: Rapid Gaming (for porting it to vb3)

Some New Features

Admin control panel controlled "Rate Of Post"

Ability to post as bot and he will not reply

Post count will not go up in forums where post counts are turned off

A few options to turn off and on a few things including the script itself.

Fixed in 2.0.2:

Go advanced feature works for quick reply.

Bot will no longer reply when post is stopped because of an error.

Cooperative Bots

Example: Chat Bots and Spiders

- **Spiders:** Mine data, and create metadata that can be transformed into AIML files.
- **"Transformation Bots:"** Transform metadata into AIML files.
- **Forum and Chat Bots:** Evolve as specialized applications as their AIML files develop and mature.

This is something we are considering for Gollum, the UNIX.COM ForumBot.

- A bot mines the forum Q&A and creates meta data files on the Q&A.
- Another bot transforms the meta data into AIML files.
- Gollum, our ForumBot, evolves and grows "smarter".
- Who knows, maybe someday Gollum might pass the Turning test?!

10 Minute Talk Closing Remarks Followed by a 10 Minute Discussion

- Property trained chat bots can be very useful for a number of applications, including customer service, question and answer, knowledge management and more.
- APIs and standards for Bots are emerging.
- Functional specialization and cooperative capabilities for Bots will continue to evolve.
- StaffBots may be prototyped with the same basic technology used for ChatBots and ForumBots.
- Due to presentation time constraints, we did not expand the survey to include game bots, auction bots, ecommerce bots, search bots and other bots.

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