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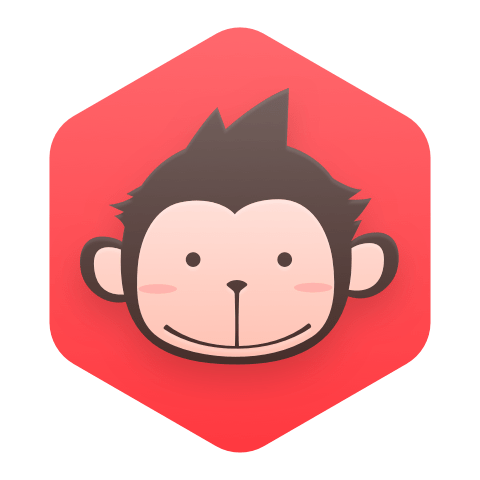
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**Introduction to Python secondary development AutoCAD**



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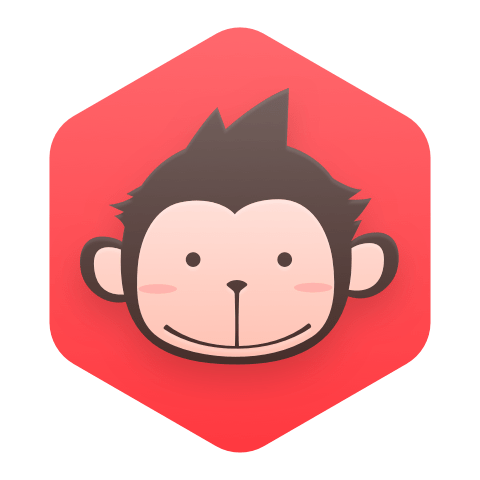
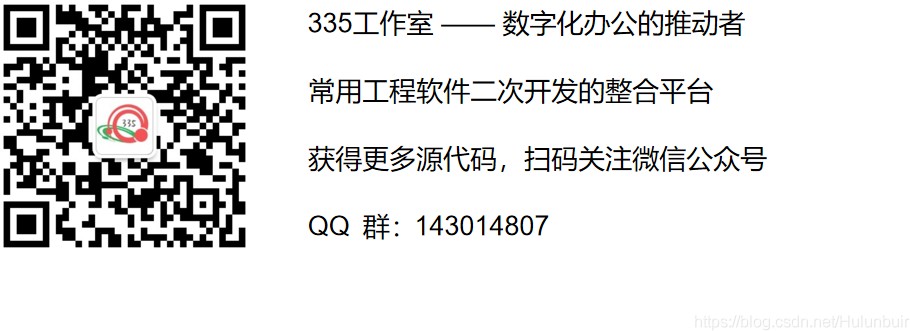
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|  | [私信](https://im.csdn.net/chat/Hulunbuir) 关注 | Your browser is currently zoomed, and the page may be misaligned. It is recommended to display at 100% size.  **一、前沿**    AutoCAD（Autodesk Computer Aided Design）是 Autodesk（欧特克）公司首次于 1982 年开发的自动计算机辅助设计软件，在土木建筑， 装饰装潢，工业制图，工程制图，电子工业，服装加工等诸多领域有着广泛的应用，主要用于二维绘图、详细绘制、设计文档和基本三维设计， 现已经成为国际上广为流行的绘图工具。    上世纪 80 年代末 90 年代初， Guido van Rossum 在荷兰国家数学和计算机科学研究所设计出计算机程序设计语言 Python 。 Python 是一个高层次的结合了解释性、编译性、互动性和面向对象的脚本语言，具有很强的可读性。相比其他语言，语法结构更具特色。同时，它也是一种 跨平台的计算机程序设计语言，越来越多地用于独立的、大型项目的开发。    为什么采用 Python 语言二次开发 AutoCAD ?    • Python 是一种代表简单主义思想的语言，简单易学，应用范围广泛 。    • Python 拥有大量第三方库，可轻易实现各种应用程序间的数据交换，如 AutoCAD 与 [Excel](https://blog.csdn.net/Hulunbuir/article/details/100671474) / [Word](https://blog.csdn.net/Hulunbuir/article/details/102579280) 间的数据交换。    • 只要具有基础的 Python 编程能力，就可实现对 AutoCAD 的二次开发，而不必特意学习 VBA 或者 LISP 。    吾生也有涯，而知也无涯，以有涯随无涯，殆己。    总之，人的精力是有限的， Windows 平台上的应用程序是各种各样的，我们力争只熟练掌握一门编程语言就能将各种应用程序串联起来，以实现数据的顺利传递，从而大幅度地提高工作效率和质量。这也是我当时在全网参考代码很少的情况下坚持用 Python 调用 CAD 的原因。    这个过程并非顺利，本人纯野生学习 Python，很多小 bug 都要查很久的资料才能解决。因粗心看错了帮助文档的参数定义，在绘制椭圆这卡了将近一个月；因不了解 CAD 系统对颜色的定义规则，在模型空间背景色设置上卡了将近3个月，通过不断测试，硬是靠最原始的总结规律得到了颜色指定的换算公式；因不了解 Python 中的数据类型如何对应 AutoCAD 中的 Variant，图案填充这又卡了好几个月，最终在 [ke1078](https://me.csdn.net/weixin_44126907) 大神的帮助下，顺利实现了图案填充的绘制。    为了使后续的学习者少走弯路，把宝贵的时间用于所研究的问题上，而非软件操作层面，特此，将本人所了解到的 Python 语言二次开发CAD 的有关内容记录在此系列博客上。还需说明的是，因本人能力和水平确实有限，博客中的有关表述可能不严谨，甚至错误，还请大家及时批评指正。 |
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# 二、ActiveX Automation

### AutoCAD 二次开发主要接口有 ObjectARX 接口、.net API 接口、AutoLisp 接口、ActiveX (com) 接口，更多详见： [AutoCAD二次开发简介](http://www.arxref.com/?id=5)

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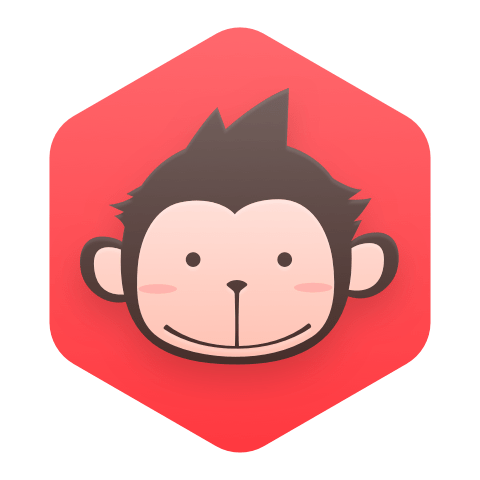
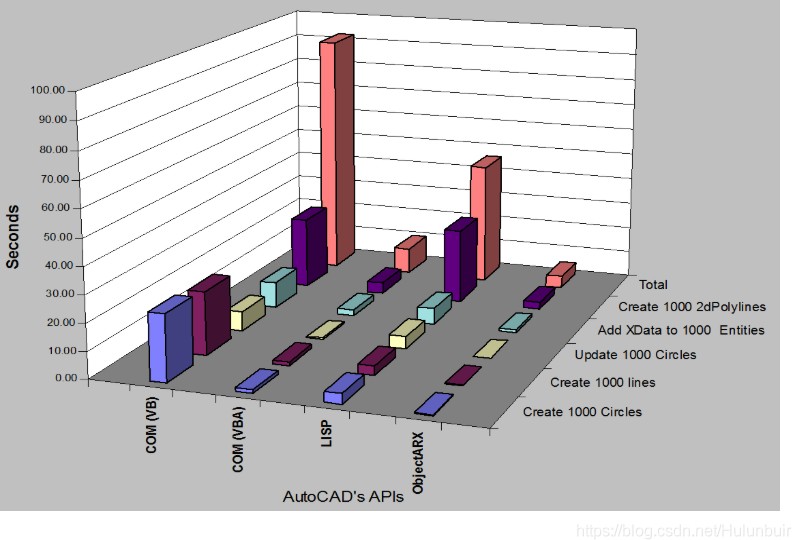
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|  | [私信](https://im.csdn.net/chat/Hulunbuir) 关注 | Your browser is currently zoomed, and the page may be misaligned. It is recommended to display at 100% size.  AutoCAD API Performance    ActiveX Automation 是 ActiveX 为 Windows 用户提供的一项重要技术，可以使各应用程序间通过数据嵌入或链接的方式共享数据，并在  Windows 系统统一管理下进行协调，让这些应用程序以一定的流程相互沟通，相互控制，即一个程序暴露其可用对象，另一个程序控制这些对象，设置属性、调用方法，从而实现某种功能，完成所要求的动作。    AutoCAD 程序开放某些对象给 Windows 系统，使用程序语言并通过 ActiveX Automation，我们就可以对这些对象进行存取。 AutoCAD ActiveX 接口的主要构件就对象，每一个显露的对象均精确代表一个 AutoCAD 组件。    AutoCAD 以分层结构来组织对象，分层结构的视图称为“对象模型”，如下图所示。Application 对象是 AutoCAD ActiveX Automation 对象模型的根对象，通过它，用户可以访问任何其他的对象或任何对象指定的特性或方法。对象模型给出了上级对象与下级对象之间的访问关系。    AutoCAD对象模型 (部分) |
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### AutoCAD 对象都至少具有一个属性，用于描述对象。例如，圆具有半径、面积、线型等属性，通过这些属性能描述出一个具体的圆。

  • 参考资料： [AutoCAD ActiveX 二次开发技术](https://max.book118.com/html/2017/0604/111669115.shtm) 。

**三、开发文档/工具**

**3.1 AutoCAD Help**

  AutoCAD 二次开发的两个官方帮助文档： ActiveX Reference Guide 和 ActiveX Develop’s Guide 可在 CAD 的安装目中获得，两个文件名分别为：acadauto.chm 和 acad\_aag.chm 。

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### 可按如下方式获取： 首先，安装文件搜索神器 [**Everything**](https://www.onlinedown.net/soft/85579.htm)；然后，在搜索栏内输入 acadauto.chm，便可看到 ActiveX Reference Guide 文

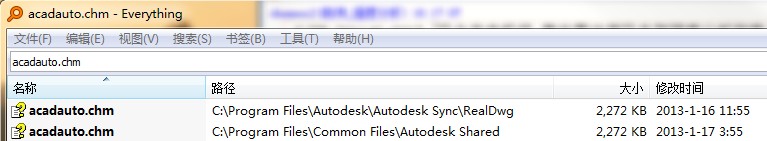
[原创](https://dalnur.blog.csdn.net/) [周排名](https://blog.csdn.net/rank/list/weekly) [总排名](https://blog.csdn.net/rank/list/total) 访问 等级

然存在。

件及其所在路径，该文件是随 程序的安装一起附带到你的电脑内的，只要你安装了 ，该文件必

AutoCAD CAD

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|  | [私信](https://im.csdn.net/chat/Hulunbuir) 关注 | Your browser is currently zoomed, and the page may be misaligned. It is recommended to display at 100% size.    帮助文档的获取  **3.2 ArxDbg**    ArxDbg 是 ObjectARX SDK 中包含多年的示例项目的名称。它的主要目的是演示如何使用 ObjectARX API，但它本身就是一个完全独立的实[用程序。ObjectARX 程序员经常在开发期间使用此实用程序来测试和执行他们的应用程序代码。更多详见： [ObjectARX] ArxDbg介绍、自动加载及其下载 。](https://blog.csdn.net/qq_40416052/article/details/82832475)    ArxDbg    • 下载链接： [ACAD二次开发必备辅助工具-ArxDbg 2005-2021各版本](http://bbs.xdcad.net/forum.php?mod=viewthread&amp;tid=676104&amp;highlight=ARXDBG) 。  **四、可用Python库**    在介绍各种 Python 库前，有必要对 AutoCAD 的文件系统做一个简单的了解。 |
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  dwg 是 AutoCAD 以及基于 AutoCAD 的软件保存设计数据所用的一种专有文件格式 (AutoCAD的图形文件)。

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| **contents**  7.3 Dynamic block  8. Color  Nine, important methods   * 1. SendCommad   2. GetEntity   3. SetXData/GetXData   X. Documents   * 1. Save as .dwg/.dxf   2. Save as .pdf |  |
| 10.3 Save as .jpg/.png [Hulunbuir](https://dalnur.blog.csdn.net/)  [11. Ackn](https://dalnur.blog.csdn.net/)o码w龄led3年gement[s暂无认证](https://i.csdn.net/%23/uc/profile?utm_source=14998968)  [124. 2](https://dalnur.blog.csdn.net/)Descr[i1p万tio+n](https://blog.csdn.net/rank/list/weekly) [8493](https://blog.csdn.net/rank/list/total) 26万+ |
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  dxf 是 AutoCAD 绘图交换文件，它是 Autodesk 公司开发的用于 AutoCAD 与其它软件之间进行 CAD 数据交换的 CAD 数据文件格式。

  dxf (图形交换文件) 是一种开放的矢量数据格式，它包含对应的 dwg 文件的全部信息，主要用于不同版本 CAD 间的数据交换。可以分为两类：ASCII 格式和二进制格式；ASCII 具有可读性好的特点，但占用的空间较大；二进制格式则占用的空间小、读取速度快。由于 AutoCAD 是最流行的 CAD 系统，DXF 也被广泛使用，成为事实上的标准。绝大多数 CAD 系统都能读入或输出 DXF 文件。ASCII 格式的 DXF 可以用文本编辑器进行查看。它包含对应的 dwg 文件的全部信息，不是 ASCII 码形式，可读性差，但用它形成图形速度快，不同类型的计算机哪怕是用同一版本的文件，其 dwg 文件也是不可交换的。为了克服这一缺点，AutoCAD 提供了 dxf 类型文件，其内部为 ASCII 码，这样不同类型的计算机可通过交换 dxf 文件来达到交换图形的目的，由于 dxf 文件可读性好，用户可方便地对它进行修改，编程，达到从外部图形进行编辑和修改的目的。

  dwg 格式以及它的 ASCII 格式变体 dxf，已经成为 CAD 制图数据交换中的事实文件标准。

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### .dwg：脱离 AutoCAD 软件环境读写 dwg 格式文件，基本无法实现，通过 COM 自动化操作是一个可选的方案。[1]

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|  | [私信](https://im.csdn.net/chat/Hulunbuir) 关注 | **4.1 pyautocad**  Your browser is currently zoomed, and the page  may be misaligned. It is recommended to display    pyautocad 库由俄罗斯工程师 Roman Haritonov 开发，用于简化使用 Python 语言书写 AutoCAD ActiveX Automation 脚本。主要参考资料 at 100% size.  如下：    • PiPy： [pyautocad 0.2.0](https://pypi.org/project/pyautocad) 。    • GitHub： [reclosedev/pyautocad](https://github.com/reclosedev/pyautocad) 。    • Documentation： [pyautocad’s documentation](https://pyautocad.readthedocs.io/en/latest/index.html) 。    • Blog： 1. [Python3操作AutoCAD：利用pyautocad库能够自动化地进行CAD画图](https://blog.csdn.net/Tong_T/article/details/83029695). [陆壹爵爷](https://blog.csdn.net/Tong_T) 。         2. [利用python控制Autocad：pyautocad](https://blog.csdn.net/bsider/article/details/44998767). [bsider](https://blog.csdn.net/bsider) 。    pyautocad库与AutoCAD的连接    事实上，pyautocad 库仅仅起到了接口作用，pyautocad 利用 comtypes.client 启动或连接 CAD ([pyautocad源代码](https://pyautocad.readthedocs.io/en/latest/_modules/pyautocad/api.html#Autocad))，如下图所示： |
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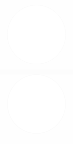
pyautocad源代码 (部分)

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| 9.3 SetXData/GetXData | |
| X. Documents | |
| 10.1 Save as .dwg/.dxf | |
| 10.2 Save as .pdf | |
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1 import comtypes.client

### 2

1. try:
2. acad = comtypes.client.GetActiveObject('AutoCAD.Application', dynamic=True)
3. except WindowsError:
4. acad = comtypes.client.CreateObject('AutoCAD.Application', dynamic=True)



1. acad.Visible = True

### pyautocad启动/连接CAD的Python代码

**4.2 pywin32**



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### pywin32 是一个 Python 库，为 Python 提供访问 Windows API 的扩展，提供了齐全的 windows 常量、接口、线程以及 COM 机制等。了解更多详见博客：[如何利用Python和win32编程避免重复性体力劳动（一）](https://blog.csdn.net/seele52/article/details/17504925) 。主要参考资料如下：

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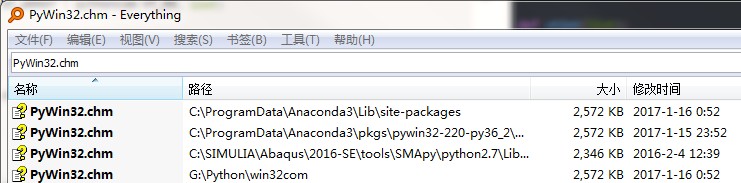
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|  | [私信](https://im.csdn.net/chat/Hulunbuir) 关注 | • 与 CAD 的连接 Your browser is currently zoomed, and the page  may be misaligned. It is recommended to display  1 *#!/usr/bin/env python* at 100% size.  2 *# -\*- coding: utf-8 -\*-*  3  4 """  5 =============================   1. Author: DalNur 2. Email: [liyang@alu.hit.edu.cn](mailto:liyang@alu.hit.edu.cn) 8 ============================= 9 """   10  11 import win32com.client as win32  12   1. wincad = win32.Dispatch("AutoCAD.Application") 2. doc = wincad.ActiveDocument 3. msp = doc.ModelSpace   16  17 doc.Utility.Prompt("Hello! Autocad from pywin32com.\n")  18  19 print(doc.Name)    • 示例    win32com连接CAD示例 (与Excel交互)    • pywin32 Help    首先确保你已经成功安装了 [**pywin32**](https://www.cnblogs.com/achillis/p/10462585.html) 模块，然后在搜索神器 [**Everything**](https://www.onlinedown.net/soft/85579.htm) 的搜索栏中输入 PyWin32.chm，便可得到其所在的路径。 |
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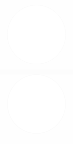
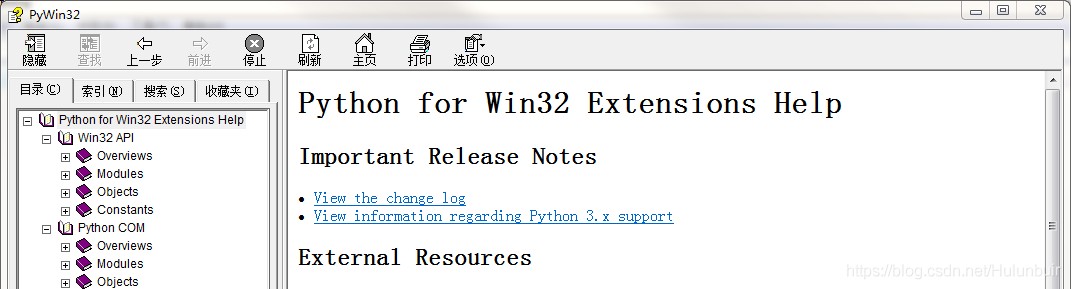
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**4.3 ezdxf**

  • Github： <https://github.com/mhammond/pywin32>。

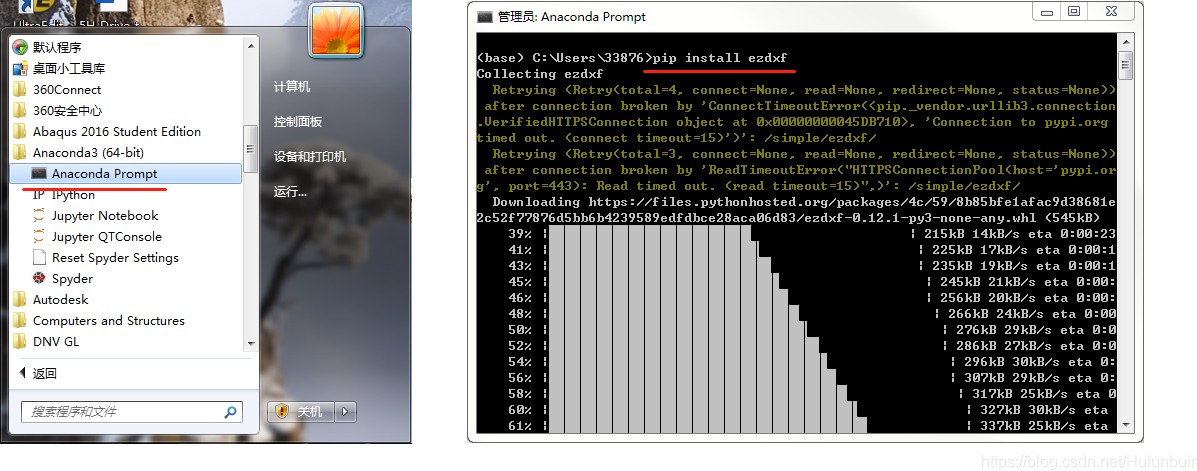


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|  | [私信](https://im.csdn.net/chat/Hulunbuir) 关注 | 如已安装 Anaconda，在 Anaconda Prompt 中键入 pip install ezdxf 便可自动完成该库的导入，如下图所示；如未安装 Anaconda，也可 pip  手动导入，其在 PyPI (Python Package Index) 上的注册地址为：<https://pypi.org/project/ezdxf/>。  Your browser is currently zoomed, and the page  may be misaligned. It is recommended to display at 100% size.    • Github： <https://github.com/mozman/ezdxf>。    • Documentation： <https://ezdxf.readthedocs.io/en/stable/>。    • Blog： [使用Python读写DXF和DWG文件](https://www.dazhuanlan.com/2019/12/11/5df0b1f10ece1/) 。    • 示例  1 import ezdxf  2   1. *# Create a new DXF document.* 2. doc = ezdxf.new(dxfversion='R2010')   5   1. *# Create new table entries (layers, linetypes, text styles, ...).* 2. doc.layers.new('TEXTLAYER', dxfattribs={'color': 2})   8   1. *# DXF entities (LINE, TEXT, ...) reside in a layout (modelspace,* 2. *# paperspace layout or block definition).* 3. msp = doc.modelspace()   12   1. *# Add entities to a layout by factory methods: layout.add\_...()* 2. msp.add\_line((0, 0), (10, 10), dxfattribs={'color': 7}) 3. msp.add\_text( 4. 'Test', 5. dxfattribs={ 6. 'layer': 'TEXTLAYER' 7. }).set\_pos((0, 0.2), align='CENTER')   20   1. *# Save DXF document.* 2. doc.saveas('test.dxf') |
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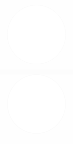
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| **contents**  7.3 Dynamic block  8. Color  Nine, important methods   * 1. SendCommad   2. GetEntity   3. SetXData/GetXData   X. Documents   * 1. Save as .dwg/.dxf   2. Save as .pdf | | ezdxf生成.dxf文件  **4.4 dxfgrabber**    • Github： <https://github.com/mozman/dxfgrabber>。    • Documentation： <https://dxfgrabber.readthedocs.io/en/latest/>。 | | | | | |
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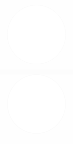
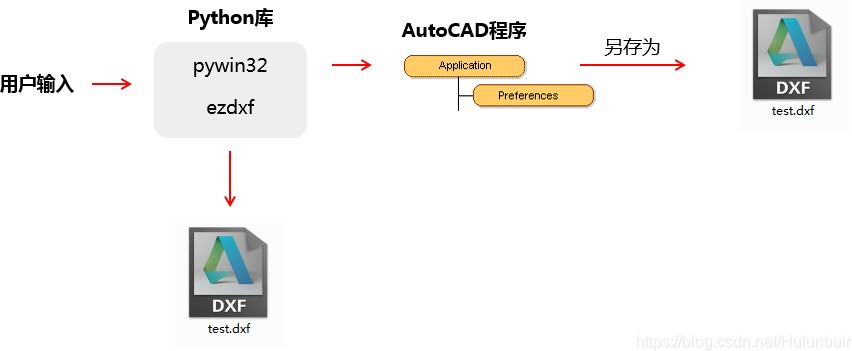
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|  | | **五、与CAD的连接** |  |
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|  | **5.1 ProgID** |  |
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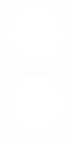
32 msp = doc.ModelSpace

33

34 dwgobj = acad.ActiveDocument.Application.Documents.Add("")

如果电脑中安装了不止一个版本的 AutoCAD 为了顺利完成指定版本 CAD 的调用则需指定 ProgID，即

×××.Dispatch(“AutoCAD.Application.19”)，其中 “AutoCAD.Application.19” 就是 2014 版 AutoCAD 的 ProgID。如下代码将建立起 Python 与



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"""

from pyautocad import Autocad, APoint

import comtypes.client import time

*# 1.CAD*自动启动

ProgID = "AutoCAD.Application.19" *# 2014*版*CADProgramID*

try:

acad = comtypes.client.GetActiveObject(ProgID, dynamic=True) except WindowsError:

acad = comtypes.client.CreateObject(ProgID, dynamic=True) acad.Visible = True

print("The program will pause for 60 seconds.") *#* 防止报错

time.sleep(60) *#* 程序暂停*60s*运行

10.3 Save as .jpg/.png [Hulunbuir](https://dalnur.blog.csdn.net/)

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*# 2.*连接方式的转换

acad = Autocad(create\_if\_not\_exists=True)

acad.prompt("Hello! AutoCAD from pyautocad.") doc = acad.ActiveDocument

print(doc.Name)

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7.3 Dynamic block

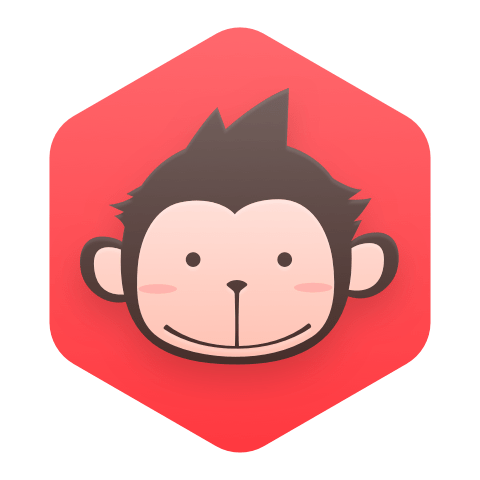
8. Color

Nine, important methods

* 1. SendCommad
  2. GetEntity
  3. SetXData/GetXData

X. Documents

* 1. Save as .dwg/.dxf
  2. Save as .pdf



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[creation](https://mp.csdn.net/)

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| **AutoCAD 版本** | **ProgID** |
| 2010 | AutoCAD.Application.18 |
| 2014 | AutoCAD.Application.19 |

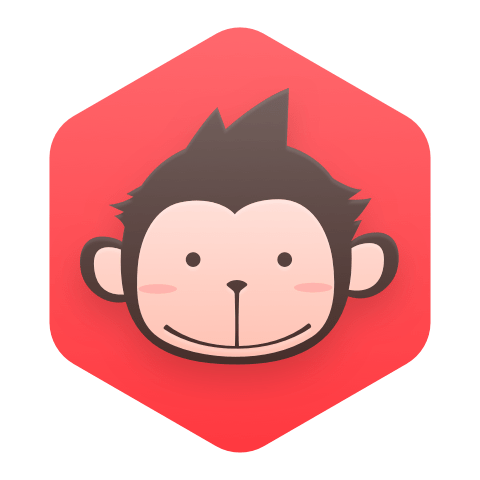
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|  | [私信](https://im.csdn.net/chat/Hulunbuir) 关注 | 2010 版 AutoCAD 的连接：  Your browser is currently zoomed, and the page   1. *#!/usr/bin/env python* may be misaligned. It is recommended to display 2. *# -\*- coding: utf-8 -\*-* at 100% size.   3  4 """  5 =============================   1. Author: DalNur 2. Email: [liyang@alu.hit.edu.cn](mailto:liyang@alu.hit.edu.cn) 8 ============================= 9 """   10   1. import win32com.client 2. import pythoncom   13   1. wincad = win32com.client.Dispatch("AutoCAD.Application.18") 2. doc = wincad.ActiveDocument 3. doc.Utility.Prompt("Hello! Autocad from pywin32com.\n") 4. msp = doc.ModelSpace 5. print(doc.Name)     根据 CAD 版本的不同， ProgID 可能会发生变化，部分版本 CAD 的 ProgID 如下：    常见版本 CAD 的 ProgID 详见博文： [autocad application 版本](https://blog.csdn.net/xiaokcehui/article/details/48492915) 。    另外，CAD 的 ProgID 可在官方二次开发帮助文档 ActiveX Reference Guide 中查看，具体操作如下图所示：    ProgID的查看  **5.2 示例**  1 *#!/usr/bin/env python* 2 *# -\*- coding: utf-8 -\*-* 3  4 """  5 =============================   1. Author: DalNur 2. Email: [liyang@alu.hit.edu.cn](mailto:liyang@alu.hit.edu.cn)   8 ============================= |
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设为当前文件。

[35](https://ac.csdn.net/?short_code=13271b93) dwgobj.Activate() *#*

[36](https://ac.csdn.net/?short_code=13271b93) doc = acad.ActiveDocument



### 37

print(doc.Name)

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38 msp = doc.ModelSpace

### 39

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40 *# 3.*创建图元

41 x1, y1 = 0, 0

42 x2, y2 = 100, 100

1. p1, p2, = APoint(x1, y1), APoint(x2, y2)
2. msp.AddLine(p1, p2)

### 45

1. *# 4.*文件保存
2. directory = r"D:" *#* 工作目录
3. dwgname = "ZK.dwg" *#* 工作目录
4. path = directory + "\\" + dwgname
5. dwgobj.Close(True, path)

### 51

1. *# 5.*程序退出
2. acad.ActiveDocument.Application.Quit()

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**六、数据转换**

  目的： 为了保证程序的顺利运行，用户输入的数据类型需转换成 CAD 能识别的数据类型。

  说明： 本人非计算机专业出身，以下表述纯属个人理解，不妥/错误之处还请各位批评指正。

  Python 中的数据类型较少，且对数据本身的要求也较为宽松，如一个列表中的各个元素可以分别属于不同的数据类型，这虽然有利于降低程序的编写难度，但也对 CAD 的二次开发产生了一些不必要的麻烦。

  在 CAD 二次开发过程中，很多函数/方法的参数要求输入的数据类型为 ***Variant (array of objects)*** ，但在 Python 中似乎又没有哪一种数据类型与之直接相对应，若采用 ***list*** 代替 ***Variant***，那么程序无法顺利执行，报错为 “ 对象数组无效 ”。因此，需要某种转换方式，将 Python 中定义的变量转换为能够被 CAD 识别的数据类型 ***Variant*** 。

### VARIANT 结构体主要是使用在 COM（组件对象模型）中用于传递参数使用，它的存在主要是为了保持一个在 COM 参数传递方法的统一性，它几乎包含了所有普通常用类型的数据类型的传递，如整型，浮点型，布尔型等，以及相应类型的指针类型，如整型指针。[2]

  部分类型与变量对应关系如下表：

Strongly not

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nd

highly recomme

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|  |  |
| --- | --- |
| **Member name** | **Description** |
| VT\_EMPTY | Indicates that a value was not specified. |
| VT\_R8 | Indicates a double value. |
| VT\_DISPATCH | Indicates an IDispatch pointer. |

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### 另外，NumPy arrays can be passed as VARIANT arrays arguments. The array is converted to a SAFEARRAY according to its type. [3] ( 此为 comptypes 库帮助文档原文，本人对计算机了解有限，为了不曲解原文，此处不做翻译)，部分对应关系如下：

|  |  |
| --- | --- |
| **NumPy type** | **VARIANT type** |
| int32, int, intc, int\_ | VT\_I4 |
| uint32, uint, uintc | VT\_UI4 |
| float64, float\_ | VT\_R8 |

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7 Email: [liyang@alu.hit.edu.cn](mailto:liyang@alu.hit.edu.cn)

8 =============================

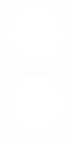
9 """

[comtypes 是一个轻量级的 python com 包，其中文网站详见：https://www.cnpython.com/pypi/comtypes；官方文档详见：comtypes 1.1.3](https://pythonhosted.org/comtypes)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
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| 10.2 Save as .pdf | |
| 1 | | | *#!/usr/bin/env python*  *# -\*- coding: utf-8 -\*-*  """  =============================  Author: DalNur | | | |
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| [**Hulunbuir**](https://dalnur.blog.csdn.net/) | focus on |  | 170 | 341 | 600 | Column list |

[documentation 。](https://pythonhosted.org/comtypes)

  NumPy 是用 Python 进行科学计算的基础软件包，其官方的中文文档详见网站： [Numpy 中文网](https://www.numpy.org.cn/) 。



  在 Python 调用 AutoCAD 过程中，常用的数据转换函数如下：

report





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[10](https://ac.csdn.net/?short_code=13271b93)

[11](https://ac.csdn.net/?short_code=13271b93) import win32com.client

### 12

import pythoncom

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13

1. wincad = win32com.client.Dispatch("AutoCAD.Application.19")

Your browser is currently zoomed, and the page may be misaligned. It is recommended to display at 100% size.

1. doc = wincad.ActiveDocument
2. doc.Utility.Prompt("Hello! Autocad from pywin32.")
3. msp = doc.ModelSpace
4. print(doc.Name)

### 19

1. def vtpnt(x, y, z=0):
2. """坐标点转化为浮点数"""
3. return win32com.client.VARIANT(pythoncom.VT\_ARRAY | pythoncom.VT\_R8, (x, y, z))

### 23

1. def vtobj(obj):
2. """转化为对象数组"""
3. return win32com.client.VARIANT(pythoncom.VT\_ARRAY | pythoncom.VT\_DISPATCH, obj)

### 27

1. def vtfloat(lst):
2. """列表转化为浮点数"""
3. return win32com.client.VARIANT(pythoncom.VT\_ARRAY | pythoncom.VT\_R8, lst)

### 31

1. def vtint(lst):
2. """列表转化为整数"""
3. return win32com.client.VARIANT(pythoncom.VT\_ARRAY | pythoncom.VT\_I2, lst)

### 35

1. def vtvariant(lst):
2. """列表转化为变体"""
3. return win32com.client.VARIANT(pythoncom.VT\_ARRAY | pythoncom.VT\_VARIANT, lst)

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...

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**七、绘图**

  本部分仅介绍一些复杂图形的绘制，更多基础图形的绘制详见博客：[Python AutoCAD 绘图](https://blog.csdn.net/Hulunbuir/article/details/96589272) 。

**7.1 倒角矩形**

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*#!/usr/bin/env python*

*# -\*- coding: utf-8 -\*-*

"""

=============================

Author: DalNur

Email: [liyang@alu.hit.edu.cn](mailto:liyang@alu.hit.edu.cn)

=============================

"""

from pyautocad import Autocad, APoint, aDouble

import math

pyacad = Autocad(create\_if\_not\_exists=True)

pyacad.prompt("Hello! AutoCAD from pyautocad.") print(pyacad.doc.Name)

[L, B, R] = [400, 200, 50] *# L*、*B*、*R*分别为矩形的长度、矩形的宽度及圆角半径。

x = [0.5 \* (L - 2 \* R), 0.5 \* L] *#* 倒角矩形各关键点横坐标的绝对值；

y = [0.5 \* (B - 2 \* R), 0.5 \* B] *#* 倒角矩形各关键点纵坐标的绝对值；

pnts = [APoint(x[0], -y[1]), APoint(x[1], -y[0]), APoint(x[1], y[0]),

APoint(x[0], y[1]), APoint(-x[0], y[1]), APoint(-x[1], y[0]),

APoint(-x[1], -y[0]), APoint(-x[0], -y[1])]

pnts = [j for i in pnts for j in i] *#* 将各点坐标顺序变换为行数据

pnts = aDouble(pnts) *#* 转化为双精度浮点数

plineObj = pyacad.model.AddPolyLine(pnts) plineObj.Closed = True *#* 闭合多段线

bulgeValue = math.tan(math.pi / 8) *#* 凸度，为四分之一倍圆弧所对圆心角的正切值。

[plineObj.SetBulge(2 \* i, bulgeValue) for i in range(4)]

*#* 将多段线的第*1*、*3*、*5*、*7*部分设置为凸度为*bulgevalue*的圆弧。

Strongly not

Not recomme

so so recomme

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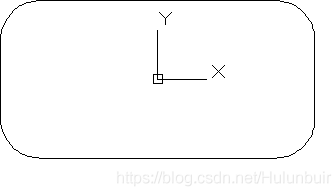
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  2. GetEntity
  3. SetXData/GetXData

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  2. Save as .pdf

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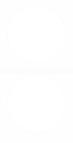
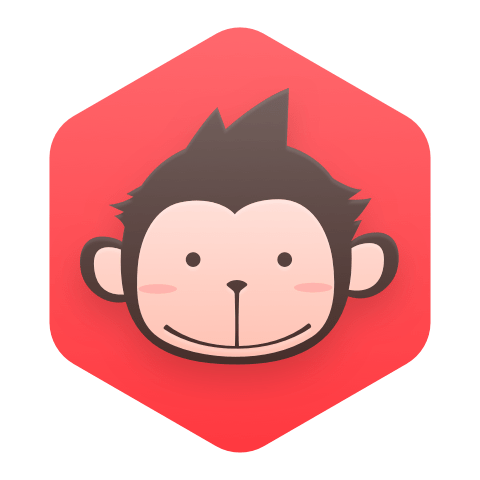
**7.2 闭合多段线图案填充**

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4 """

5 =============================

* 1. Author: DalNur
  2. Email: [liyang@alu.hit.edu.cn](mailto:liyang@alu.hit.edu.cn) 8 ============================= 9 """

### 10

1. import pythoncom
2. import win32com.client

### 13

1. wincad = win32com.client.Dispatch("AutoCAD.Application")
2. doc = wincad.ActiveDocument
3. doc.Utility.Prompt("Hello! AutoCAD from pywin32.")
4. msp = doc.ModelSpace

### 18

1. def vtobj(obj):
2. return win32com.client.VARIANT(pythoncom.VT\_ARRAY | pythoncom.VT\_DISPATCH, obj)

### 21

1. def vtfloat(lst):
2. return win32com.client.VARIANT(pythoncom.VT\_ARRAY | pythoncom.VT\_R8, lst)

### 24

25

26 [ptnName, ptnType, bAss] = ["ANSI31", 0, True]

### 27

28 pnts = [100, -50, 0, 100, 50, 0, -100, 50, 0, -100, -50, 0]

29 pnts = vtfloat(pnts)

### 30

1. plineObj = msp.AddPolyLine(pnts)
2. plineObj.Closed = True

### 33

1. outerLoop = []
2. outerLoop.append(plineObj)
3. outerLoop = vtobj(outerLoop)
4. hatchObj = msp.AddHatch(ptnType, ptnName, bAss)
5. hatchObj.AppendOuterLoop(outerLoop)
6. hatchObj.Evaluate() *#* 进行填充计算，使图案吻合于边界。

### 闭合多段线的图案填充

Strongly not

Not recomme

so so recomme

nd

highly recomme

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[Python language to create HyerMesh Tcl command flow](https://dalnur.blog.csdn.net/article/details/119957937)

**7.3 动态块**

### 创建动态块的标准流程为：创建普通块(B) → 编辑块 → 指定参数 → 设置动作，详见： [AutoCAD-如何创建动态块](https://jingyan.baidu.com/article/0320e2c113b5d01b87507bc0.html)。

  创建如下图所示的动态块，块的名称为 door，由矩形、圆弧及直线三个图元构成，并具有三种用户自定义状态，分别为缩放、旋转和翻转。

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* 1. SendCommad
  2. GetEntity
  3. SetXData/GetXData

X. Documents

* 1. Save as .dwg/.dxf
  2. Save as .pdf

1 *#!/usr/bin/env python* 2 *# -\*- coding: utf-8 -\*-* 3

10.3 Save as .jpg/.png [Hulunbuir](https://dalnur.blog.csdn.net/)

[11. Ackn](https://dalnur.blog.csdn.net/)o码w龄led3年gement[s暂无认证](https://i.csdn.net/%23/uc/profile?utm_source=14998968)

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4 """

5 ==============================

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6 Author: Wang Yifang (SINOMACH)

7 ==============================

8 """

report

1340. 1R2eferen9c9e2s

507

867

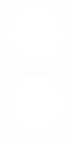
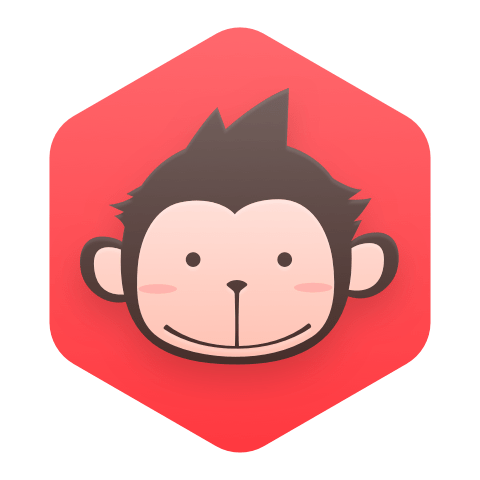
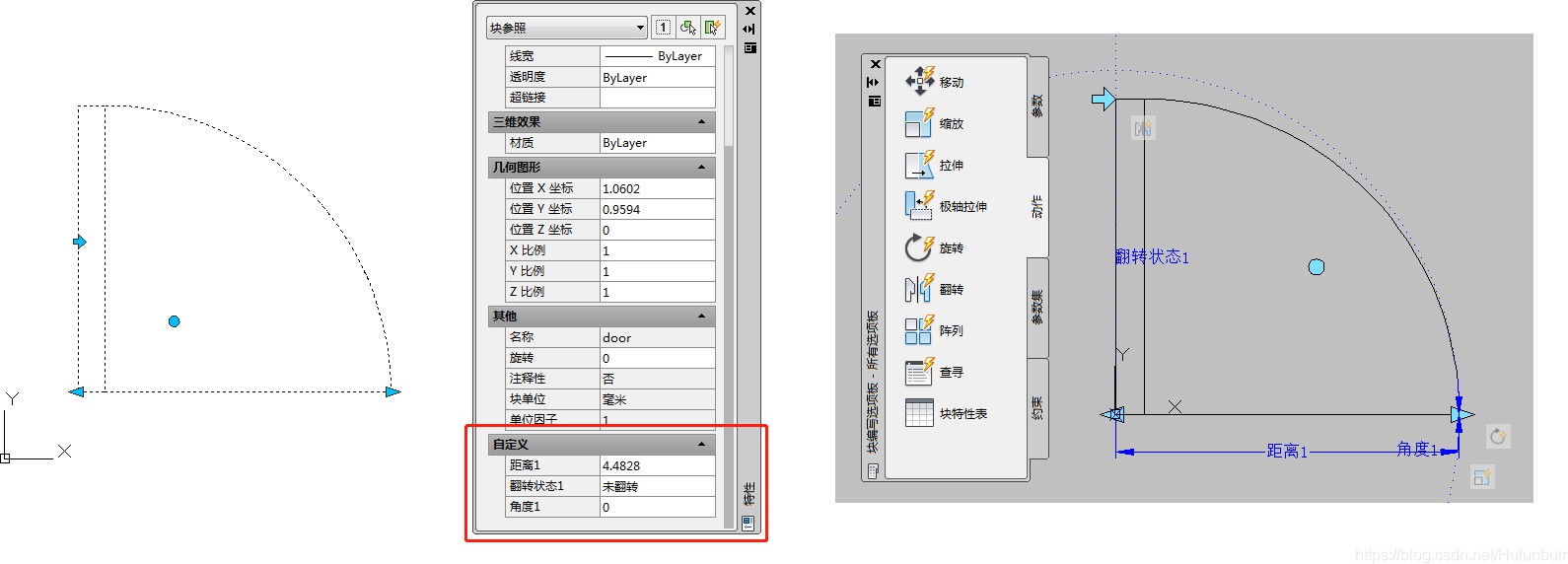
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[9](https://ac.csdn.net/?short_code=13271b93)

[10](https://ac.csdn.net/?short_code=13271b93) import win32com.client

### 11

acad = win32com.client.Dispatch("AutoCAD.Application")

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it

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co

[Python AutoCAD drawing](https://dalnur.blog.csdn.net/article/details/96589272#comments_18230981)

[Hulunbuir:](https://dalnur.blog.csdn.net/) Then your CAD version is not 2

014. The .19 means the 2014 version of ...

C

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hy

[ANSYS finite element analysis contact a…](https://dalnur.blog.csdn.net/article/details/106314787#comments_18101596) [Hulunbuir:](https://dalnur.blog.csdn.net/) Absolutely, just ask, it will definit ely be resolved.

...

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12

1. *# iterate through all objects (entities) in the currently opened drawing*

Your browser is currently zoomed, and the page may be misaligned. It is recommended to display at 100% size.

1. *# and if its a BlockReference, display its attributes.*

### 15

1. for entity in acad.ActiveDocument.ModelSpace:
2. name = entity.EntityName
3. print(name)
4. if name == 'AcDbBlockReference':
5. if entity.IsDynamicBlock:
6. print("Is dynamic block")

### 22

1. block\_ = entity.GetDynamicBlockProperties()
2. print(block\_)
3. print("print property")
4. for p in block\_:
5. print("{")
6. print(p.AllowedValues)
7. print(p.Description)
8. print(p.PropertyName )
9. print(p.ReadOnly)
10. print(p.Show)
11. print(p.UnitsType)
12. print(p.Value)
13. print("}")

36 print("===================================")

1. *#* 修改动态块的尺寸
2. if p.PropertyName == "距离1":
3. p.Value = float(10)
4. if p.PropertyName == "角度1":

41 p.Value = float(3.14159265/3)

1. *#* 角度为弧度制
2. *# if p.PropertyName == "*翻转状态*1":*
3. *# p.Value = 1*
4. *#* 此功能报错，原因待查明。

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Not recomme

so so recomme

nd

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# 八、颜色

### 长度10 旋转60度

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### 在 AutoCAD 中，颜色设置是普遍存的，如设置图层的颜色，指定标注文字的颜色等等。多数情况下可以通过设置 RGB 值来实现，但有时需要直接指定一个数字来代表该颜色。在此，把代表该颜色的数值变量称为 **颜色标识号** (可能有专门的术语，管它呢，我就这么叫，爱谁谁)，用***clr*** 表示。某一颜色的 clr 值可由该颜色的 RGB 值计算得到，计算公式如下：

*clr* = *R* + 256 × *G* + 256 × 256 × *B*

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* 1. Save as .dwg/.dxf
  2. Save as .pdf

### 例如： 对于白色（R=255,G=255,B=255），其对应的颜色标识号 clr 为 255 + 256 × 255 + 256 × 256 × 255 = 16777215。

  根据上述公式，几种常用的标准颜色的颜色标识号如下：

**颜色**

**clr**

**颜色**

**clr**

0

10.3 Save as .jpg/.png [Hulunbuir](https://dalnur.blog.csdn.net/)

16711680

蓝色

255

红色

16776960

青色

黑色

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16711935

洋红

65535

黄色

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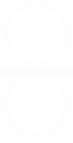
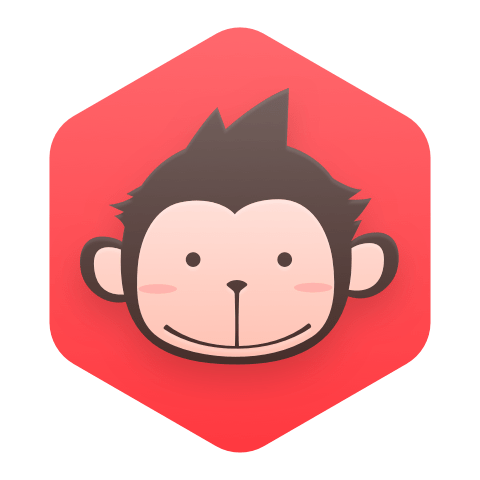
绿色

65280

白色

16777215

1340. 1R2eferen9c9e2s



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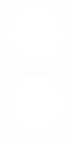
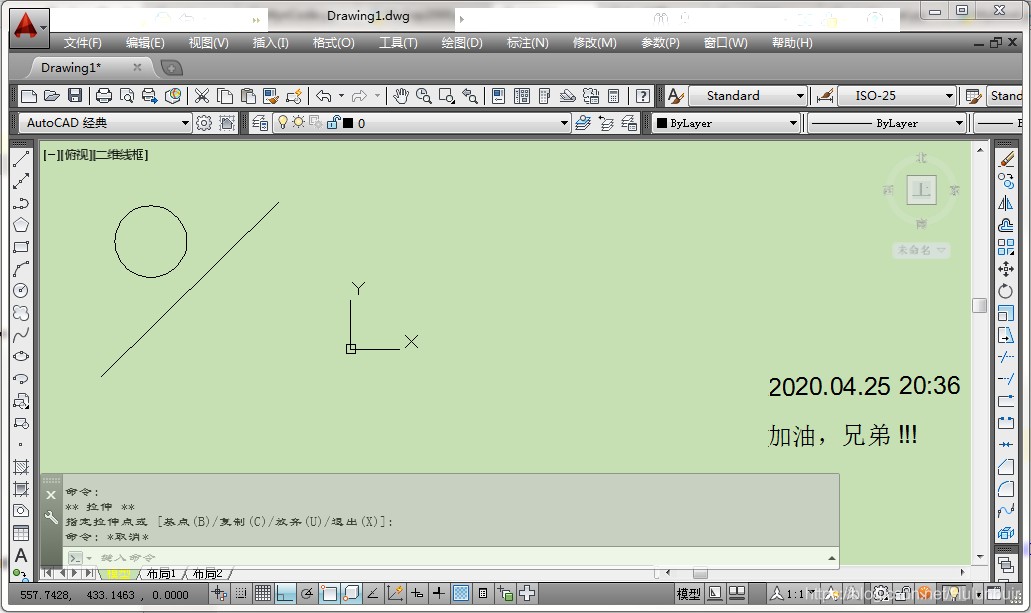
co

C

hy

...

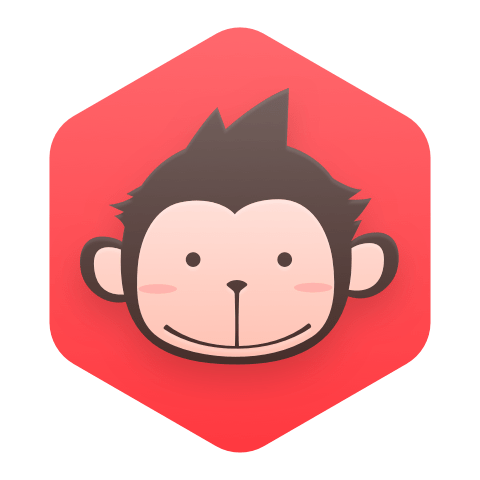
  蓝色的定义： doc.Application.GetInterfaceObject(“AutoCAD.AcCmColor.19”).SetRGB(0, 0, 255) 。



模型空间背景色的设置

  该功能的实现历经波折，卡顿了近三个月，终于，在那一天下班铃响后测试成功。

  值得注意的是，不是所有的颜色指定都可以采用该种方式，如图案填充颜色的设置就是通过直接设置 RGBre的po方rt 式实现的。



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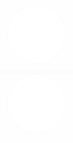
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### SendCommand方式绘制直线的Python代码

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  另一个典型的例子是将程序的预设视图由俯视变更为西南等轴测，将视觉样式由二维线框变更为真实，在 CAD 界面操作后，命令栏让将显示出如下数据：



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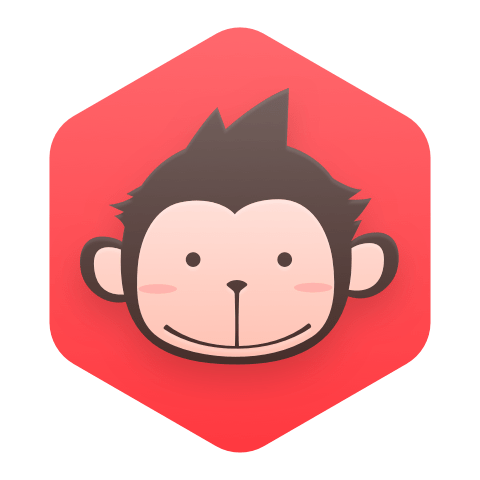
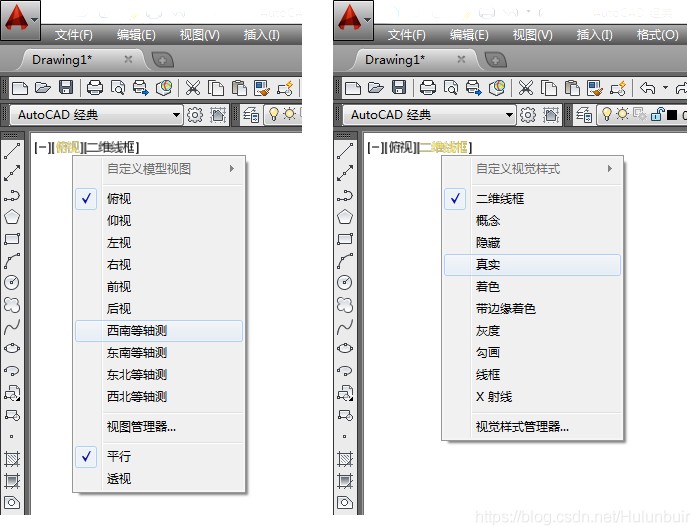
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| 8. Color |  |
| Nine, important methods |  |
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| 9.2 GetEntity |  |
| 9.3 SetXData/GetXData |  |
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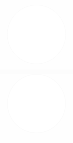
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44

45 DataType = [1001, 1000, 1003, 1040, 1041, 1070, 1071, 1042]

46 Data = ["Test\_Application", "This is a test for xdata",



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def vtpnt(x, y, z=0):

return win32com.client.VARIANT(pythoncom.VT\_ARRAY | pythoncom.VT\_R8, (x, y, z))

def vtfloat(val):

return win32com.client.VARIANT(pythoncom.VT\_ARRAY | pythoncom.VT\_R8, val)

def vtint(val):

return win32com.client.VARIANT(pythoncom.VT\_ARRAY | pythoncom.VT\_I2, val)

def vtvariant(var):

return win32com.client.VARIANT(pythoncom.VT\_ARRAY | pythoncom.VT\_VARIANT, var)

*# Create the line*

startPntCoords = vtpnt(1, 1, 0)

startPoint = msp.AddPoint(startPntCoords) endPntCoords = vtpnt(5, 5, 0)

endPoint = msp.AddPoint(endPntCoords)

lineObj = msp.AddLine(startPntCoords, endPntCoords)

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*# Initialize all the xdata values. Note that first data in the list should be*

*# application name and first datatype code should be 1001*

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7.3 Dynamic block

8. Color

Nine, important methods

* 1. SendCommad
  2. GetEntity
  3. SetXData/GetXData

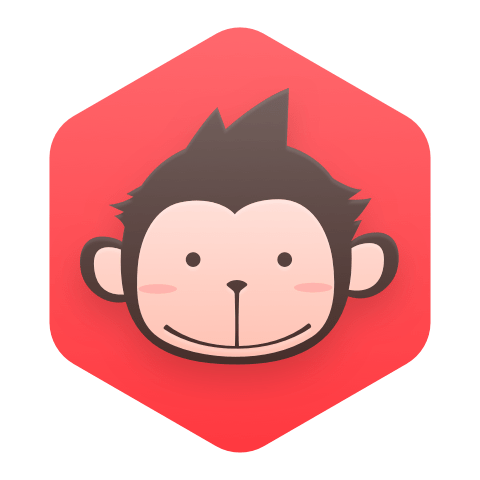
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[47](https://ac.csdn.net/?short_code=13271b93) "0", 1.23479137438413E+40, 1237324938, 32767, 32767, 10]

[48](https://ac.csdn.net/?short_code=13271b93) reals3 = [-2.95, 100, -20]



### 49

*# DataType.append(1010)*

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50 *# Data.append(reals3)*

51 *# worldPos = [4, 400.99999999, 2.798989]*

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1. *# DataType.append(1011)*
2. *# Data.append(worldPos)*

### 54

1. DataType = vtint(DataType)
2. Data = vtvariant(Data)
3. *# Attach the xdata to the line*
4. lineObj.SetXData(DataType, Data)

### 59

1. *# Return the xdata for the line*
2. xtypeOut, xdataOut = lineObj.GetXData("Test\_Application")
3. print(xtypeOut)
4. print(xdataOut)

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...

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**十、文件**

  更多文件相关的操作，详见博客：[Python AutoCAD 文件](https://blog.csdn.net/Hulunbuir/article/details/97395152) 。

**10.1 另存为.dwg/.dxf**

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### 以下方法另存为的文件格式只能是 .dwg 和 .dxf，这与在 CAD 软件中，依次点击 **文件 >> 另存为** 是相对应的。

1. 当前文件另存为.dwg/.dxf

  将当前文件另存为 TestSaveAs.dxf，文件的版本是：AutoCAD 2013 DXF,代码如下：

1 pyacad.ActiveDocument.SaveAs("D:\\AutoCAD\\TestSaveAs", 61)

  上一代码执行完毕后，当前文件被程序关闭，TestSaveAs.dxf 文件被打开，且设定为当前活跃文件。

  Parameter 61 is AcSaveAsType enum, which means that the type of save as file is AutoCAD 2013 DXF, and other commonly used types are as follows:

#### Version .dwg .dxf

AutoCAD 2000 12 13

AutoCAD 2004 twenty four 25

AutoCAD 2007 36 37

AutoCAD 2010 48 49

AutoCAD 2013 60 61

  AcSaveAsType enum can be viewed in the official secondary development help document ActiveX Develop's Guide , and the viewing

method is shown in the following figure:

|  |  |
| --- | --- |
| **contents**  7.3 Dynamic block  8. Color  Nine, important methods   * 1. SendCommad   2. GetEntity   3. SetXData/GetXData   X. Documents   * 1. Save as .dwg/.dxf   2. Save as .pdf |  |
| 10.3 Save as .jpg/.png [Hulunbuir](https://dalnur.blog.csdn.net/)  [11. Ackn](https://dalnur.blog.csdn.net/)o码w龄led3年gement[s暂无认证](https://i.csdn.net/%23/uc/profile?utm_source=14998968) |
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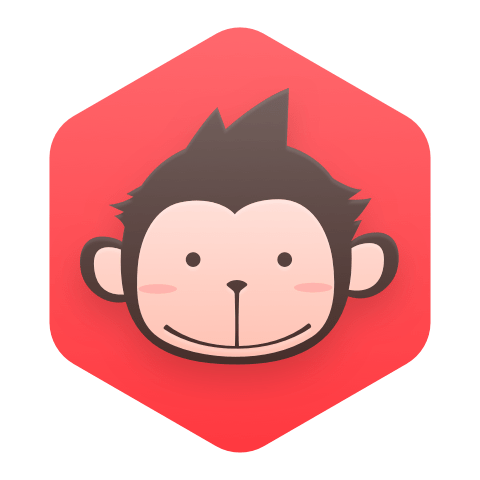
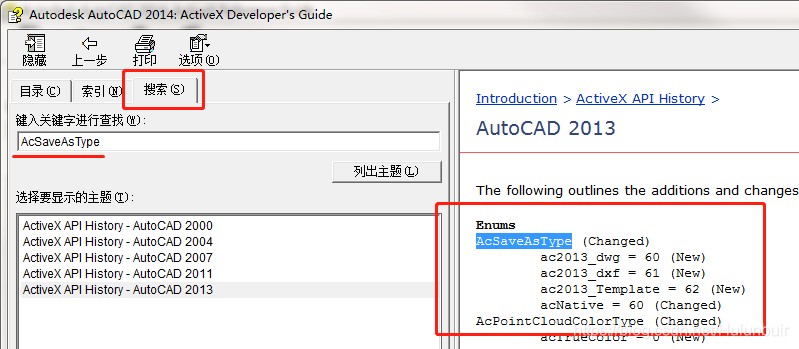
C

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43 obj = pyacad.ActiveDocument.GetVariable("DBMOD")

44 print(obj)



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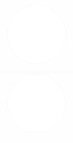
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[creation](https://mp.csdn.net/)



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twent originalValue = ACADPref.PrinterConfigPath \

10.3 Save as .jpg/.png [Hulunbuir](https://dalnur.blog.csdn.net/)

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= r"C:\Users\33876\AppData\Roaming\Autodesk\AutoCAD 2014\R19.1\chs\Plotters"

print(ACADPref)

print(originalValue)

oplot = pyacad.ActiveDocument.PlotConfigurations.Add("PDF", acad.ActiveDocument.ActiveLayout.ModelType)

*# acad.ActiveDocument.SetVariable("sdi", 0)*

pyacad.ActiveDocument.ActiveLayout.ConfigName = "DWG To PDF.pc3" pyacad.ActiveDocument.SetVariable("Filedia", 0)

*# acad.ActiveDocument.SetVariable("RASTERPREVIEW", 1)*

pyacad.ActiveDocument.SetVariable("BACKGROUNDPLOT", 0) pyacad.ActiveDocument.Plot.QuietErrorMode = True

*# acad.ActiveDocument.Plot.PlotToFile("D:\\" + "123" + ".pdf", "Foxit Reader PDF Printer")*

pyacad.ActiveDocument.Plot.PlotToFile("D:\\" + "test" + ".pdf")

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oplot.Delete()

oplot = None

Thirteen, the end

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8. Color

Nine, important methods

* 1. SendCommad
  2. GetEntity
  3. SetXData/GetXData

X. Documents

* 1. Save as .dwg/.dxf
  2. Save as .pdf

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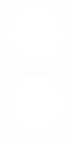
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36 doc.Plot.QuietErrorMode = True

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38 doc.Plot.PlotToFile("D:\\" + "test" + ".jpg")



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wincad = win32com.client.Dispatch("AutoCAD.Application")

doc = wincad.ActiveDocument

doc.Utility.Prompt("Hello! Autocad from pywin32com.\n") msp = doc.ModelSpace

print(doc.Name)

print(doc.ActiveLayout.ConfigName)

twent *#* 设置绘图仪管理器的工作目录

twent ACADPref = doc.Application.preferences.Files

twent

twent originalValue = ACADPref.PrinterConfigPath \

10.3 Save as .jpg/.png [Hulunbuir](https://dalnur.blog.csdn.net/)

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= r"C:\Users\33876\AppData\Roaming\Autodesk\AutoCAD 2014\R19.1\chs\Plotters"

print(ACADPref)

print(originalValue)

oplot = doc.PlotConfigurations.Add("JPG", doc.ActiveLayout.ModelType)

doc.ActiveLayout.ConfigName = "PublishToWeb JPG.pc3" doc.SetVariable("Filedia", 0)

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[124. 2](https://dalnur.blog.csdn.net/)Descr[i1p万tio+n](https://blog.csdn.net/rank/list/weekly)

Thirteen, the end

doc.SetVariable("BACKGROUNDPLOT", 0)

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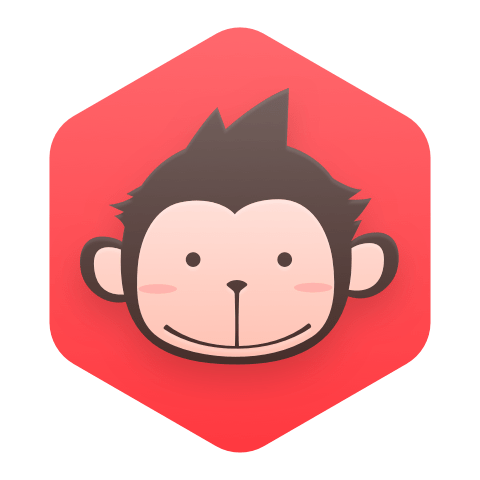
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  2. Save as .pdf

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[39](https://ac.csdn.net/?short_code=13271b93)

[40](https://ac.csdn.net/?short_code=13271b93) oplot.Delete()



### 41

oplot = None

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1. obj = doc.GetVariable("DBMOD")
2. print(obj)

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### [What should I do if the image is blurry after the CAD is converted to JPG](https://jingyan.baidu.com/article/154b46317246d328ca8f4105.html) ?

**11. Acknowledgements**

  特别感谢 [**ke1078**](https://blog.csdn.net/weixin_44126907) 同学提供的无私帮助，使得 Python 语言二次开发 AutoCAD 的许多高级功能得以顺利实现。

**十二、说明**

  2018年12月13日，该系列博客仅仅以一篇名为 【Python pyautocad库 使用简介】 的博客形式出现在 CSDN 上。为了清晰直观，2019年7月

20日左右，博主以博客【Python pyautocad库 使用简介】为基础，按部分将原文扩展成 9 篇博客，后续又陆续进行了修改和编辑，特此说明。这

9 篇博客以 AutoCAD 草图与注释 工作空间菜单栏内的功能区分为标准，较为详细地介绍了 Python 调用 AutoCAD 相关功能的实现。码字不易，

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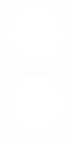
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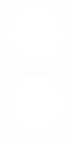
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[3]. [comtypes 1.1.3 documentation](https://pythonhosted.org/comtypes)

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2. Att = racku.GetDynamicBlockProperties

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[from pyautocad import Autocad # 自動連接上cad，只要cad是開着的，就創建了一個<pyautocad.api.Autocad> 對象。這個對象連接最近打開的cad文件。 # 如果此…](https://blog.csdn.net/weixin_30399797/article/details/98844157)

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[#by helix 94430966@qq.com frompyautocadimportAutocad, APoint importpyautocad importopenpyxl importsys importmath wb=openpyxl.load\_workbook('D:\\pyth…](https://blog.csdn.net/helixsky/article/details/82948368)

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[AutoCAD二次开发 C#,比较详细的教材](http://download.csdn.net/download/aidingdanli/7827887)

### [利用Python自动化操作AutoCAD的实现](http://download.csdn.net/download/weixin_38549327/12853657) 09-17

[主要介绍了利用Python自动化操作AutoCAD的实现,文中通过示例代码介绍的非常详细，对大家的学习或者工作具有一定的参考学习价值，需要的朋友们下面随着小…](http://download.csdn.net/download/weixin_38549327/12853657)

[Python AutoCAD 绘图 **热门推荐**](https://dalnur.blog.csdn.net/article/details/96589272)[Hulunbuir](https://blog.csdn.net/Hulunbuir) 2万+

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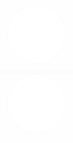
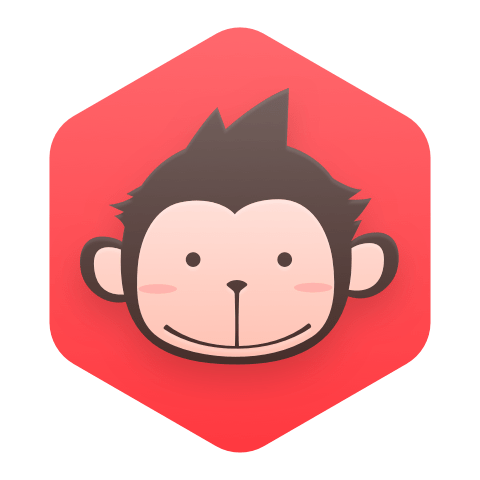
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14. References

## [Hulunbuir](https://dalnur.blog.csdn.net/)

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