

Combating Cybercrime using a Prototype PC Surveillance and Monitoring Software System

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ABSTRACT

Recent innovations in the world of cybersecurity have heightened the scope of knowledge of computer forensic specialists, internet solution providers and system administrators. Most of these key players have observed that PC surveillance and Monitoring software systems can be beneficial in troubleshooting and cyber-crime investigation by using screen capture and a key-logging utilities. A proposed software system uses the basic and extended features of a spyware for software administrative control, computer surveillance and monitoring for illegal or inappropriate usage, fraud prevention and detection. The proposed system can be configured to be invisible for unwanted users in order to record the logging and operating information such as keystrokes, screen activity, voice conversations and to track the trail of usage of system applications.

General Terms

Software systems, Cybercrime, Screen activity

Keywords

Cybersecurity, PC Surveillance and Monitoring, Spyware

1. INTRODUCTION

Computer security and privacy are key issues in our society today, which are very difficult to control as technology evolves [1]. With the rise in the number of malicious hackers, information seems insecure no matter where it is kept and in whatever form [2]. Many companies face the challenge of protecting their employees from hackers while increasing employees' work efficiency and quality assurance. Managers and business owners have the legal right to know how efficiently and effectively employees are using companies' facilities and resources. Record keeping and auditing is buttressed by the Sarbanes-Oxley (SOX) Act of 2002, Section 802 [3]. Another example is parents monitoring the computer activities of their children. The examples of dangers that children might encounter are violent content, graphic images and hate speech [4]. Social media such as Facebook, Instagram, Twitter and TikTok have become breeding grounds for sexual predators [5]. Studies have shown that about 43% of children have been bullied through the internet [6]. Children cannot be trusted for a responsible use of social media. They could post real names, home and school addresses, age or even credit card information. This has been exacerbated by the COVID-19 pandemic where quarantining of people has resulted in more internet and social media use [7]. In this paper, Spysoft PC surveillance and monitoring suite is proposed. It is a multi-

system logger and monitoring software which allows parents, guardians and supervisors to find out the activity of illegal or inappropriate users on an enterprise computer system in their absence. Spysoft can be configured to be invisible from the computer users. Spysoft PC surveillance and monitoring suite keeps records of all keystrokes, captures screenshots, logs all applications running and closed, logs all recorded voice conversations and takes screenshots of any user using your computer at your absence. Several monitoring software have been developed over the years, such as NetBull Keylogger and Spytch among many others. Most of these software have limitations such as complex user interfaces, no voice or camera loggers and the inability to restrict adult content on the internet. Our proposed PC surveillance and monitoring software solved all the monitoring needs for several categories of users such as parents, system administrators, business owners and more. The system can also enhance file and folder protection in the computer system.

2. METHODOLOGY

An agile methodology was adopted in this project which is an incremental development method. The agile approach is a project management methodology in which development of software product is divided into phases for faster delivery [8]. While other software development approaches use planning as a control mechanism, the agile methodology uses feedback [9]. Agile techniques have been shown to improve the quality of the software development process since it is more people than process-oriented [10]. The success of this methodology relied heavily on feedback from users, regular tests and evolution of different versions. This implies that the system evolved through a series of versions with each version adding functionality until the final version was attained. The software was designed using Microsoft Visual Studio IDE using VB.Net as a programming language. One of the primary reasons for choosing this language is because it offers a friendly drag and drop user interface for rapidly developing application forms. The software engineering agile methodology applied to the design and development is shown in Fig-1. This method encompasses the process of specification, development and evaluation. First of all, an initial version was developed which was swift, exposing it to user comments and it is then evolved through several versions until a final version has been developed. Each version of the system incorporates some of the functionalities needed by the users. Thus, specification, development and validation are done concurrently.



Fig 1: A block diagram summary of the agile methodology used in this paper.

3. MODE OF OPERATION

Spysoft is bundled as a setup application program with its easy and friendly user interface. The installation of this application is simple and usually takes about 3 minutes; simply as most regular software applications. All you have to do is choose the installation directory and click finish. At the end of the installation you will have the flexibility of deciding whether you want a shortcut icon for easy access or not. When starting the application for the first time, Spysoft guides you through an interactive guided tour where you will have the flexibility of setting up a secured password for the application and also selecting what kind of activity you will want to keep tabs on. Further advanced settings of Spysoft can be configured in the control panel section of the application. Spysoft is equipped with a quiver of surveillance features and detailed reporting features. It keeps and maintains logs of all keystrokes, websites visited, applications launched and more. These logs can give you an overview and help you determine if someone is using your computer appropriately or not. You can also decide to configure the application in a stealth mode where the application becomes completely invisible and undetectable to the user. This is achieved through complex programming algorithms where the software is hidden from the system processes as well as the taskbar. Spysoft also has a parental control utility which lets parents control and block websites which may be unsuitable for children. Spysoft captures snapshots with its VCR-like feature using your computer over specified time intervals.

3.1 Key Features

The Spysoft PC surveillance and monitoring suite comes with the following features:

A. Keylogger

This is a piece of surveillance program embedded in the application that captures all keystrokes made on the system. The timestamp of every word, phrase or key pressed is logged and stored safely in an encrypted file, which can be viewed anytime. In Spysoft software system, Key logger stands unique amongst other Key loggers because it captures special characters and also provides a user-friendly interface for the user to perform tasks such as searching and filtering of keywords. Finally, this Key logger can read aloud records of all keystrokes that have been captured.

B. Screenshot logger

The Screenshot logger is another unique feature of Spysoft. This logger takes pictures of every activity that the user performs. The screenshot logger provides hard evidence about if the computer is being used productively for work, entertainment or social activities. Analogous to the Key logger,

the timestamp of every snapshot is logged, the title of the active window and the user name. One interesting thing about the Screenshot logger user interface is that it is user-friendly, and you can actually play the captured images as a video, similar to a video surveillance tape.

C. Voice Logger

The Voice Logger records every conversation that might have occurred on the host computer. Spysoft achieves this by discretely activating the internal microphone on the host. However, this activity is limited if there is no internal or external microphone on the host. The duration of the conversation as well the timestamp is recorded in the Voice logger window.

D. Application Logger

The application logger keeps track of all opened and closed application on the host's computer. It stores the name of all applications, the name of the current user and the time duration in which the application was used.

E. Webcam Logger

The webcam logger in Spysoft captures the picture of whoever might have been using the PC at a particular time. Spysoft takes advantage of any webcam device attached to the computer. Spysoft PC surveillance and monitoring tool secretly activates the webcam on the host in a split of a second and captures a picture of the user. Similar to the screenshot logger, the application interface of the webcam logger provides the flexibility of playing all captured pictures as a video-like surveillance tape.

F. Report Sending

Spysoft can be used to easily and conveniently send periodic reports of all activities that took place on the computer remotely. The reports can either be sent to you via FTP or email.

G. Shutdown Manager

Spysoft PC Surveillance and Monitoring Suite has a functionality for managing when to shut down your computer and this is helpful in power management. This can be programmed for any time or different time patterns such as daily at 10pm or every Friday night at 2am. Apart from the shutdown mode, other modes such as standby, hibernate can also be selected based on the preference of the user.

H. Parental Control Manager

With Spysoft parental control manager, you can protect your child from the content on the web that your child should not be exposed to. It works as an adult website blocker. While your kids or family members are surfing the internet, Spysoft surfs pages for keywords which may contain adult content, and if one of the keywords is found, Spysoft immediately terminates the application. You can also configure the parental control feature to immediately shut down the PC and lock with a secure password or send you an SMS alert in case you are remote.

I. File Encryption

Spysoft comes with an easy-to-use and intuitive interface and can simplify things for you when it comes to protecting your file or folder with a password. With a 128/256-bit encryption

algorithm, the system provides strong security protection for your personal files and folders, which should thwart any intruders.

J. Application Blocker

The application blocker halts distracting or inappropriate applications on your child's computer. Simply select applications that may seem distracting, while you are doing important jobs.

3.2 Application Architecture

Fig. 2 summarizes the architecture of the software and Fig. 3 showcases screenshots of the software in operation.

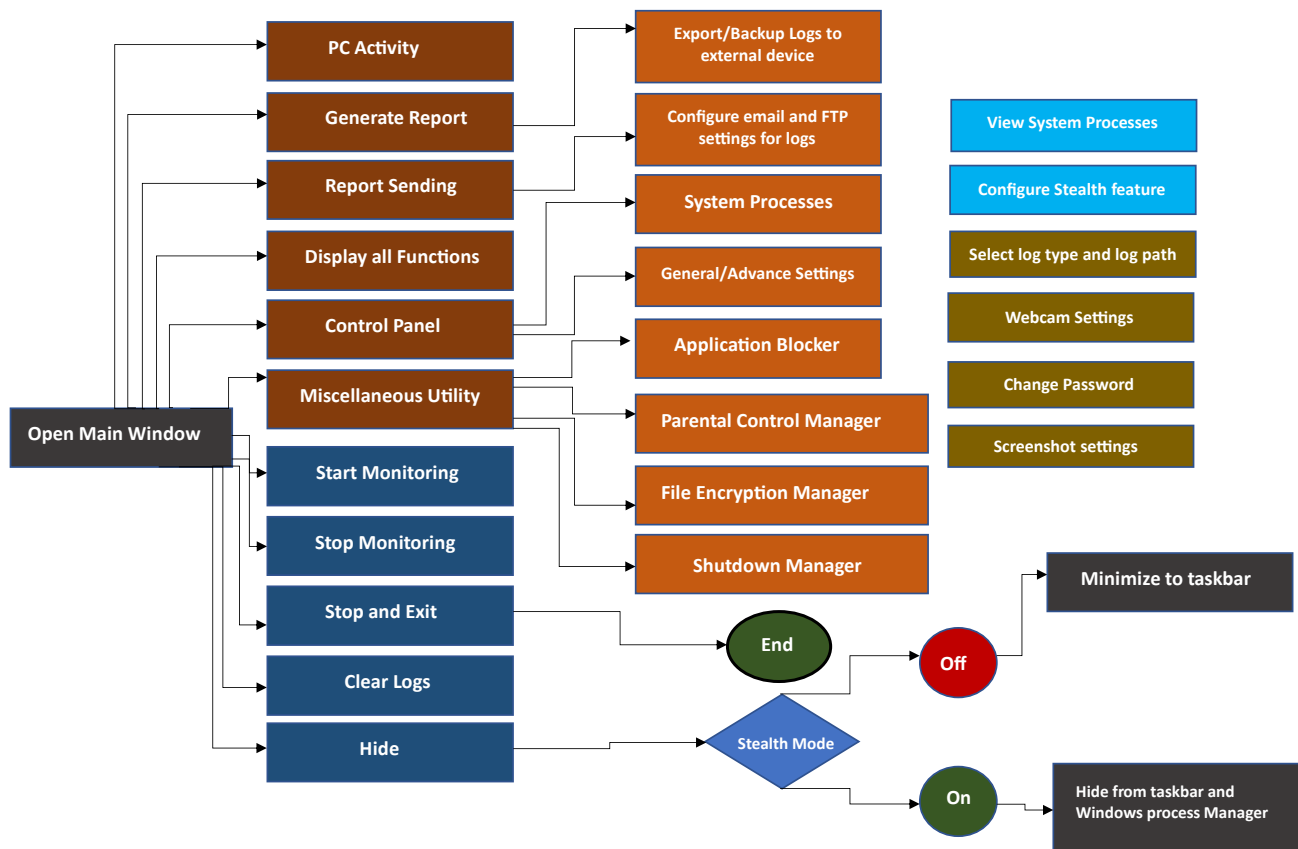


Fig 2a: Flowchart of the major functionalities of SpySoft

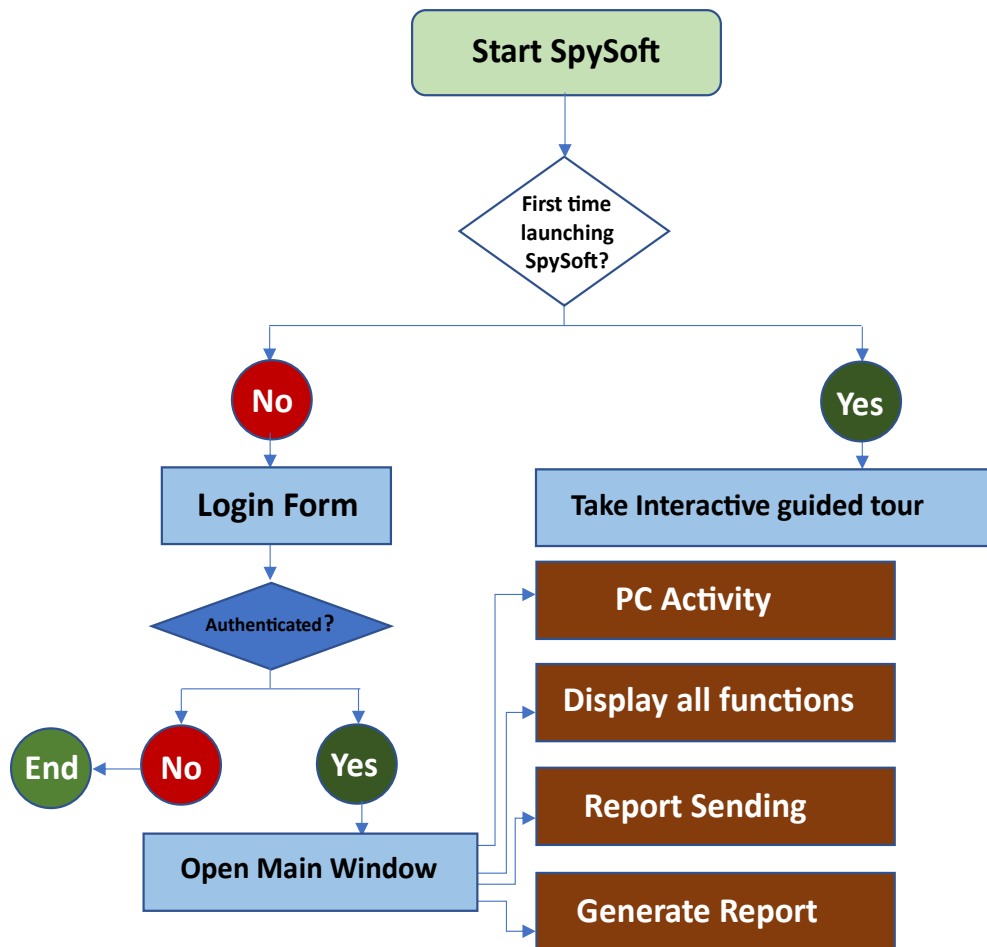


Fig. 2b: Flowchart of the switching functionalities



Fig. 3a: Screenshot of the interfaces of Spysoft - Settings



Fig. 3b: Screenshot of the interfaces of Spysoft – All functions



Fig. 3c: Screenshot of the interfaces of Spysoft – Internet Configuration

4. CONCLUSION AND FUTURE PERSPECTIVES

Monitoring systems have countless benefits, especially in fortifying privacy and promoting quality assurance in a computer network. Business owners and companies can be held liable for the activities of their employees and this matter is highlighted in the Sarbanes-Oxley Act which compels

companies and businesses to be concerned about how intellectual property and information technology systems are used. Spysoft offers an impressive set of toolkits for parental control, forensic investigation, employee internet abuse deterrence and more. This project was developed based on Software Engineering development protocol.

The future outlook of cybersecurity will encompass a stronger collaboration between individuals, software engineers, organizations and the government. This will ensure staying ahead of emerging threats and the menace posed by cybercriminals, especially with the expansion of Internet of Things (IoT) technology. The rate at which personal data is collected and stored online has heightened awareness for data privacy and protection. As a result, in the future development of this project, emphasis will be laid on cloud and big data computing. This project can also be extended to mobile platforms through software engineering.

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