

**Improve me....**

# **SkillCapture**



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# Why SkillCapture

## *Video in sports education?*

The learning of sports skills can be viewed as process of learning basal movements and combine those into more complex movements. This motor learning process can be illustrated as a motor control staircase where the child starts with crawling then moving to standing, walking, running, jumping and working further up the motor control ladder with more complex movements and skills.

The critical factors for an athlete to learn specific movement skills is that the basic movements which is the foundation of the skill is as optimal as possible before its tried and learned.

The reason for this is that the brain alone does not chose what basic movements are optimal and those who are not. If the inappropriate movement isn't optimized, the user might be limited in further skill learning later in the learning process. Another negative outcome of in-optimal basic movements is that the athlete might have to go several steps back in the learning process in order to break the automation obtained through the many repetitions. This can be very difficult and it can be hard to motivate athletes to do so. Thus its important to make sure that movements during learning is as optimal as possible and if not that they are corrected through verbal or visual feedback.

**REMEMBER:** *The automation of movement is just as effective for inappropriate movements as for optimal. Do you self and you athletes the favor and teach then the most optimal movements from the beginning, then it will get easier later on with more complex skills. A little more time spent in the beginning can have great effect later on in the learning process.*

Verbal feedback is the most common method for correcting mistakes in skill teaching in sports. Through explanation its attempted to make the user aware of the in-optimal movements. In many situations this feedback is sufficient and its easy for the athlete to connect the verbal language to the needed corrections. In skills with high complexity, great force, or high speed it might be more difficult for the athlete to connect the physical awareness with the verbal language. In these situations it might be of great benefit to use visual feedback in the form of video. If video feedback is combined with the instructors verbal feedback and corrections it has great effect.

Video feedback can also be used to improve motivation of athletes and students. If video sequences is stored for later retrieval its possible for the users to keep track of the progress and follow the improvements they do. Kids in young age work on the developing their identity and thus the feedback of improvements and progress give them and better understanding of their development process. The feedback on development process for student and athletes can have positive effect on the their self esteem and confidence.

Video has been applied in many sports disciplines and with good success. But until now it has been with great overhead for the actual training session. The problem of using video in training session might be to keep enough intensity due to the manual handling of filming, rewinding and playback. This is often with a risk of injuries due to the cool down of the athlete. SkillCapture is a software application developed for optimal use of video in sports education. SkillCapture is designed to automate and easy of use during training.

SkillCapture has all the typical video feedback functions built in and offers additional options to improve the learning of skills:

1. Filming/Capturing
2. Cutting
3. Playback (slow motion, frame/frame navigation, repeat, drawings)
4. Compression
5. Sorting, naming and association of video sequences.
6. Upload (FTP, HTTP, or copy)

SkillCapture has different setup features that can automate the video feedback and avoid the decrease of intensity during the class. With SkillCapture it's possible for the athlete to handle the use leaving the work with verbal feedback and support to the coach.

SkillCapture has an option for association of video sequences with the student or athlete that does the movement. This enables the students to get the video sequences on a memory stick or maybe download them from a server. SkillCapture can use SkillChip (RFID tags) in order to associate the video sequence to athlete.

### ***Practical implementation of video in training***

It's very different and individually from sport to sport how to implement the practical video feedback in training sessions. But never the less some basic considerations are the same no matter what type of sport you practice.

Here is a few questions that should be considered before implementing the instant video feedback during training:

1. Why do you want to implement instant feedback in training. Improve skill performance or motivation?
2. If it's skill performance what part of the skill are interesting and needs investigation?
3. If it's motivation how often do you want to use it?
4. How to setup the camera in order to view the movement in question?
5. How to start the capturing process (keyboard, remote, movement, SkillChip)?
6. How long time is the movement?
7. Need music during video recording?
8. How long time from movement to playback?
9. Do the athlete need the video after training?

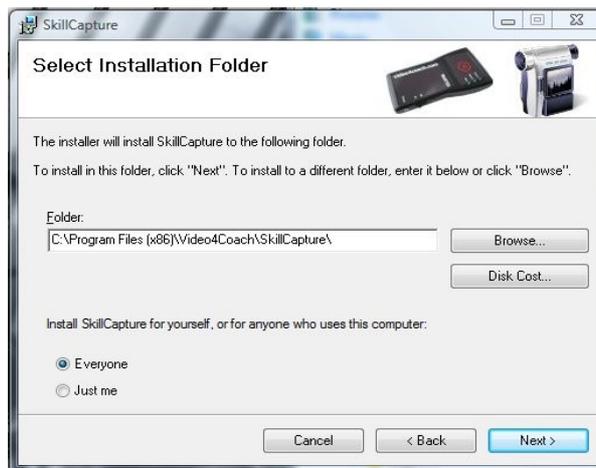
# SkillCapture installation

SkillCapture can be installed on both XP and Vista. Make sure to read the hardware requirements before installing SkillCapture on your system.

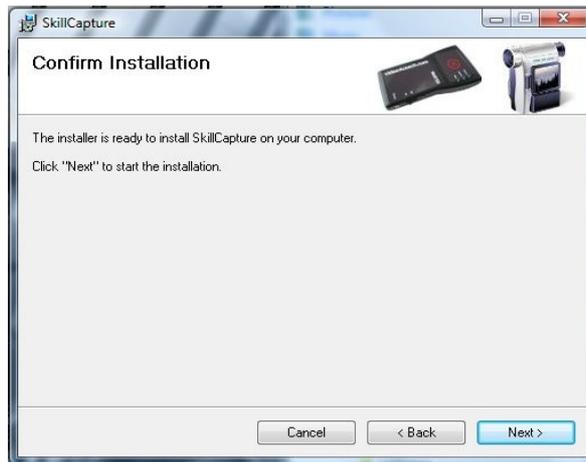
Download the latest version form [video4coach.com](http://video4coach.com) and start the installation.



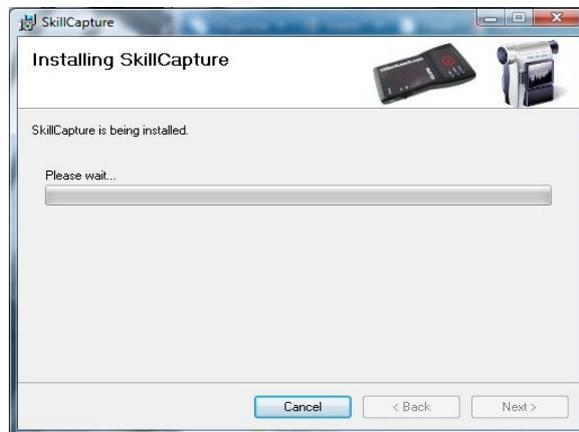
Hit "Next".



If SkillCapture is supposed to be installed in another place than the default change the setting here. If the computer is used by several users its important that you enable the Everyone option. Hit "Next".



The installer has collected all the information need and its ready to do the actually installation. Hit “Next” to start the actual installation.



Installation progress.....



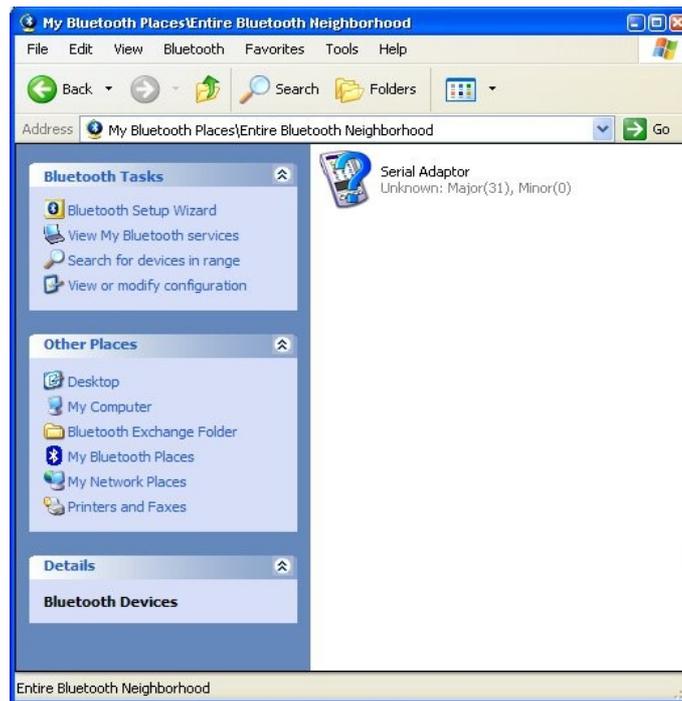
Installation is finished Hit “Close” to end the installer.

# Skill'ID

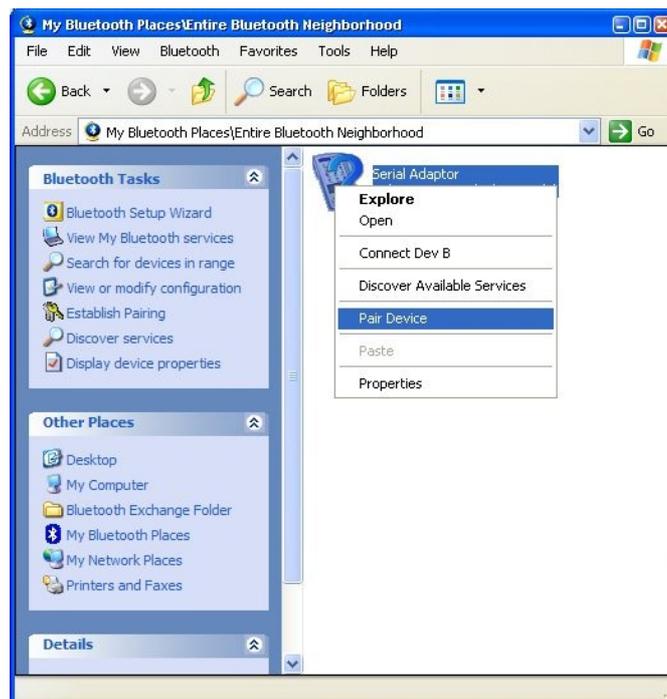
Before its possible to connect to the Skill'ID its important that its registered with the computers bluetooth system..

Turn on the Skill'ID. Make sure its fully recharged.

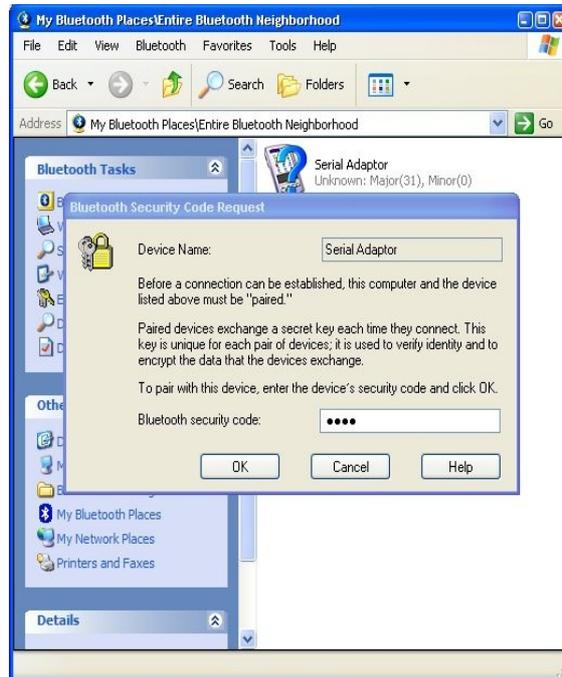
Open "My Bluetooth Places" and click "View devices in range".



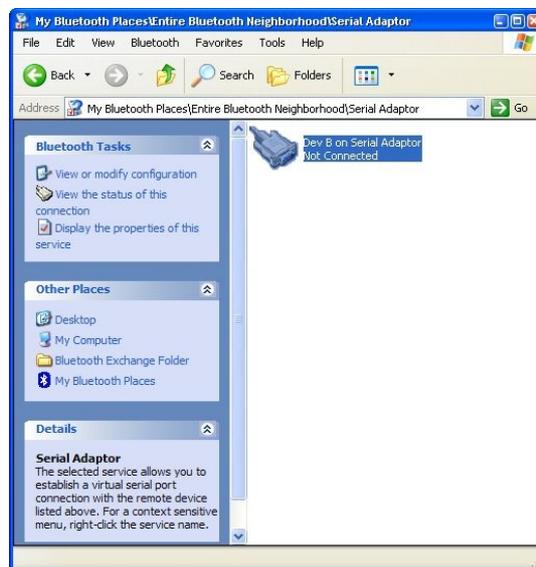
Right click on Serial Adaptor and choose from the menu "Pair".



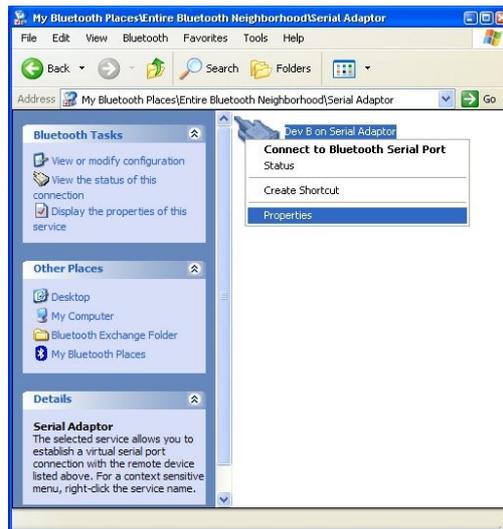
Type the security code 1234.



Click the "Serial Adapter" icon.



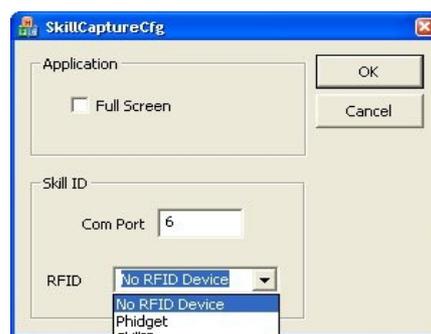
Right click "Dev B on Serial Adapter" and choose "Properties"



Remember the "COM Port" number. Its has to be entered into the SkillCapture configuration.



Start the SkillCaptureCfg application (Start->Video4coach->SkillCapture Config):



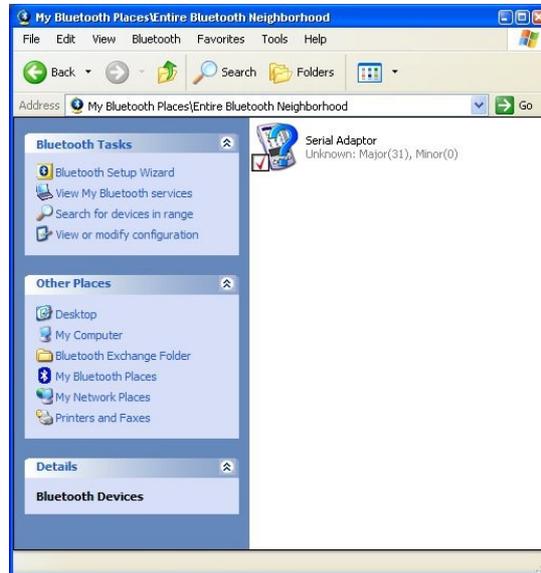
Type the "COM Port" number from the fra Skill'ID registration and choose the RFID device to be Skill'ID V2.

Click OK to accept the changes. If you choose Cancel the changes is not changed.

## ***Moving Skill'ID to another computer***

In some situation its necessary to move the Skill'ID reader to another computer. Before this its important to unregister (Unpair) the Skill'ID from the current computer.

Open “My Bluetooth places”, right click on the Serial Adapter icon.



Choose from the menu ”UnPair”

# SkillCapture

## Introduction

SkillCapture captures time limited video sequences for instant replay and upload.

*Important: SkillCapture use the ability of video streamed directly to the computer. It's not all camera models that has this ability but the MiniDV camera is a perfect camera type for many applications. For a discussion about various camera types and usability please read the Hardware requirements section.*

SkillCapture has been designed for easy use during training. SkillCapture has different features that makes it easy to apply to many different setups.

The workings of SkillCapture is best described as a sequence of events:

1. Start of Capture
2. Stop of Capture (Time)
3. Delay
4. Playback
5. Compression
6. Upload

SkillCapture captures video in full resolution non compressed format which gives the best quality playback. To save hard disk SkillCapture automatically compress videos and there is different options to delete or keep the raw files.

## Starting Video Capture

SkillCapture has 5 different methods to starting the video capture:

| Start capture activation                   | Running Mode | Go Button  | Stop Button  |
|--|--------------|--|--|
| Movement                                   | Continuous   | Start detecting movement in image                          | Stop capturing and detection   |
| Keyboard (Activate Go button or short cut) | Single shoot | Start capture  | Stop capture (if still in prepare mode no video will be captured)            |
| SkillChip                                  | Continuous   | Start waiting for SkillChip registrations from the SkillID | Stop capturing and stop waiting for SkillChip registrations from the SkillID |
| Remote (Presenter Play button)             | Single Shoot | The button on the remote has been activated                | Stop capturing   |

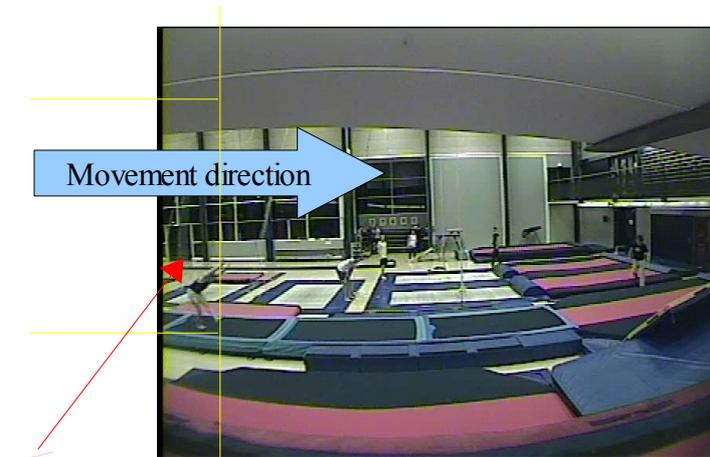
**Continuous running mode:** SkillCapture will continue to capture video until the stop button (the

Go button which toggles from Go to Stop) has been activated.

**Single shoot:** SkillCapture will only capture a single time limited video sequence. If the stop button is activated before the capture time end it will stop the capturing.

### **Using movement**

The video image is separated into a small detection area. In the movement area its possible for the coach to move freely without activating the video capture start.



Detection area: If a person moves in this area the capture is started.

Movement area: Its possible to move freely in this area without the start of capture.

In the above example the video image is separated into detection area at the left, leaving the option to start video capture with movement from left to the right.

One of the disadvantages with movement detection is that the detection area has to be “movement free”. This is a problem in certain setups where other athletes are training in the background. The movement detection in SkillCapture can not distinguish between the correct and incorrect athletes. If there are additional people in the detection area SkillCapture will capture sequences that are for no use. Thus its important for the use of movement to start capture that only one person is entering the detection area.

### **Using keyboard**

In the keyboard mode capturing can be started by activating the Go button or by activating the short cut (special key combination) defined for a user. Activating the short cut will associate the video with user automatically.

### **Using remote**

With some remote controls (Presenters like the TRENDnet TU2-P2W range ideal 30M) its possible to control SkillCapture from a distance.

Most Remote Presenters has the ability to Start/Stop the presentation and move Forward/Backward with in presentation. In SkillCapture the Presenter will work as follows:

| Power Point action | SkillCapture action          |
|--------------------|------------------------------|
| Play/Pause         | Start/Stop capturing         |
| Forward            | Increase capture time 1 sec. |

|          |                              |
|----------|------------------------------|
| Backward | Decrease capture time 1 sec. |
|----------|------------------------------|

### ***Using SkillChip***

The SkillChip (wristband with ID chip) is an RFID tag which is assigned to a user profile. When registering the SkillChip at the SkillID reader (Bluetooth RFID reader) the athlete can start video capturing and have the video automatically associated with his profile.

### ***Instant video playback/feedback***

Even though SkillCapture can playback the video just after finishing the capture in most situations there is a need for a small delay before the athlete is ready to view the video. In addition it's possible to playback the video in either faster or slower than actual captured.

When capturing video in continuous mode the videos are put into a playback queue enabling the constant playback of all videos captured.

### ***Video compression***

After playback of the video SkillCapture will automatically compress the video in order to save hard drive space and to improve upload time. After compression the large non compressed video can be deleted by selecting the feature in the configuration. SkillCapture can also ask by closing of the program if the raw video is to be deleted or not.

SkillCapture capture video in full non compressed and as long as the good quality video is available it will be selected for playback.

### ***Sorting and user association of videos***

There is multiple ways to create user association of the videos. Depending on the method of starting the capturing naming it's either automatically or manually.

### ***Automatically***

#### ***Short cut (Keyboard start)***

When using a short cut (keyboard key press combination) this will be assigned to a specific user and thus automatically name the video correctly.

#### ***SkillID***

If the SkillID is assigned to a user it will automatically assign the video.

### ***Manual***

When start capturing is either motion detection, remote control and the Go button (keyboard) no user will be assigned to the video. In this case association between user and video must be done manually.

To associate video manually select the video from the video list and activate the user button in the toolbar. A dialog will show in order to select the owner of the video.

## ***Video upload***

When compression is done it's possible to either do uploading manually or automatically.

### **General or user specific**

Uploading video can either be general or user specific. The upload configuration in the menu is used to define how video files in general is upload. This means that if no user is associated with the video or the user has no individual upload configuration (Upload set to Default in the user profile) the video files will be uploaded to the general defined location.

### **Automatically after capturing**

The automated uploading is used in the situation where there is network access directly while capturing. SkillCapture can either upload all files or selected files.

### **Manually in training**

In some situations it's required to control the upload process. The upload it started by activating the Upload button in the toolbar.

### **Manually after training**

In the situation where no network access is available it's possible to manually uploading video files after training. When network access is available it's possible to Open the session again select the video files to upload and then start the upload.

### ***Sound synchronizing***

In dance, aerobic and rhythmical gymnastics the music is important. But sometimes its also important to capture video in order to view options for skill improvements but also creative improvements. For this purpose its possible to add music (.mp3 and .wma) to the capturing process. Thus its possible to synchronize music playback and video capture with the single touch on the keyboard. Even though its possible to synchronize using both SkillChip and movement its recommended to use the keyboard for simplicity.

### ***Training session***

Video files in SkillCapture is organized using the concept of training session or just session. When SkillCapture is started a new session folder is created where all the video files is stored. If the video captured is identified with a specific user the video files will be put in a sub folder with the person name. If the video is not associated with a user it will reside in the root of the session folder.

### **Session file**

For each session SkillCapture creates a session file which holds the information about the captured video files.

### **Video file destination for video not associated with user**

Source folder/Session/

## **Video file destination for video associated with user**

Source folder/Session/Name

Source folder is configured in the Upload dialog. Session is defined as time\_date. Example: 0141\_16062009.

## **Video file naming convention**

The video files is named in the following way:

cap UserID \_ FileNumberInSession.avi

Example: Cap000092A38B15000104E05CD5\_1.avi

or

cap UserID \_ FileNumberInSession c.avi

Example: Cap000092A38B15000104E05CD5\_1c.avi

## ***Upload video naming convention***

When video is copied to another server the video sequences is organized using the following prescription:

Users/Name of User/Session start date and time/video sequence .avi

## SkillCapture interface

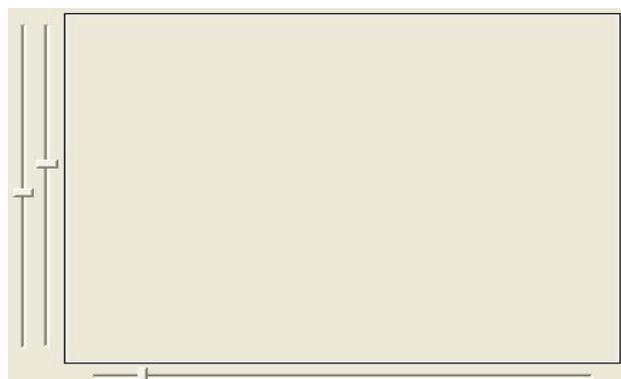


### Video Input/Camera Selection



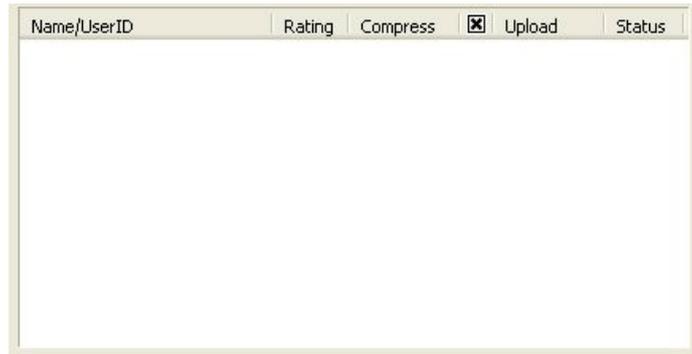
In the video input section it's possible to select the camera from which SkillCapture is capturing.

### Preview window



Placed in the left side of the application. The preview window show the current camera selected.

## Capture List



The Capture List is placed in the lower left corner of the application. The capture list is used to show all the captured video sequences from the current session. If a certain video is to be seen again just double click on the entry. Its important that the capturing isn't running while trying the re-play a video sequence.

## Toolbar



### ***Magic wand***

Start new session. This also re-connects to the SkillID reader.

### ***Open Session***

Open previously saved session.

### ***Play***

Play selected video from the video list.

### ***Upload***

Start uploading the selected video files.

### ***Save User***

Save video files from selected user to other location than source folder.

### ***Assign User***

Manually assign owner of video file.

### ***Edit User profile***

Select user and edit user profile.

## **Audio playback Dialog**

Open the audio playback dialog. The audio playback dialog it's possible to select MP3 music files to be played while capturing video.

### **Prepare time +/-**



Use prepare time to postpone capture. This enables single user activation of Capture and prepare of activity to be recorded.

### **Capture time +/-**

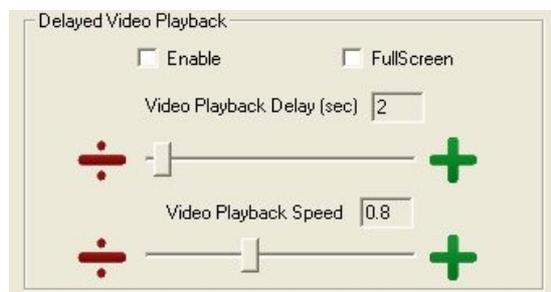


The video sequence capture time. Use the slider or activate the +/- to adjust the time.

### **Beep on Start**

If this option is selected SkillCapture will signal a sound just before starting actual capturing.

## **Delayed Video Playback**



### **Enable**

If Enable is selected SkillCapture will automatically play video sequence after (based on the time selected) the capture is finished.

### **FullScreen**

If FullScreen is selected SkillCapture will display the video in full screen.

### **Video Playback Delay**

Adjusting the time from capture finish until playback of video file.

### **Video Playback Speed**

Adjusting the playback speed of the video sequence. 1.0 means same speed as recorded, 0.5 is half the speed recorded, 2.0 is double the speed recorded.

## Go button and Status



Used to start and stop capturing.

### **Status**

Show status of SkillCapture and display the latest registered SkillChip ID.

### **Upload**

Show progress of uploading.

### **Exit**

End application.

### **Shutdown..**

Shutdown the computer.

## **Music Play**

### ***Sync Audio***

Enable/disable synchronization of music playback during video capture.

### ***Load Track***

Click to load music in format mp3 or wma.

### ***Artist***

Show artist for mp3 music.

### ***Track***

Show title for mp3 music.

### ***Start***

Show time start of music playback.

### ***Slider***

Adjustment of music start time.

### ***Play***

Start music playback.

## ***SkillCapture menu***

### **File**

#### ***New session***

Start new session. Thus new folder to store video sequences.

#### ***Open Session***

Open previously saved session.

#### ***Standby***

Put the computer in standby mode.

#### ***Shutdown***

Shutdown the computer.

#### ***Exit***

End application.

### **Config**

#### ***Upload***

Video upload and compression parameters.

#### ***Video Delay***

Video delay playback options.

#### ***Capture Options***

Video camera device selection. Detection selection and setup of audio capture.

### **Users**

#### ***Add Profile***

Add another user profile.

#### ***Edit Profile***

Change already existing user profile.

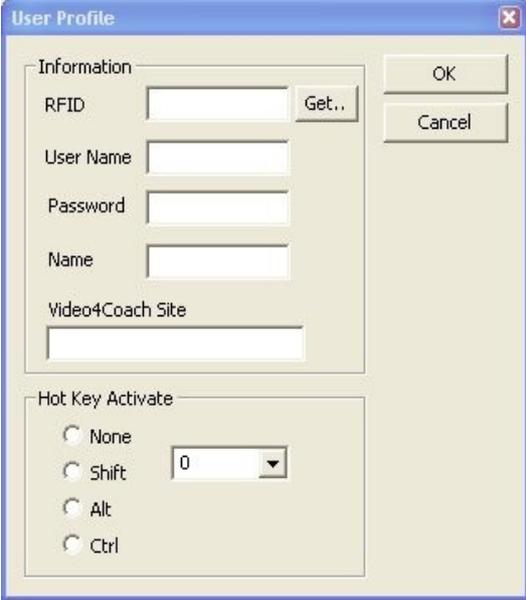
## **Help**

### ***About***

Show information about SkillCapture version.

## **User profile**

Add and change of user profile is done through the menu Users.



## **Add new Profile**

Adding a new user profile to the SkillCapture system select from the menu Users->Add Profile.

### **User Name**

Type the user name of the user. This is not the actually name. If video is supposed to be uploaded to an external server using HTTP its important that this is the correct username of the user at the external system.

### **Password**

User password.

### **Name**

Display name of the user.

### **RFID**

If the SkillCapture system uses Skill'ID tags its possible to use the "Get" button. Activating "Get" starts the Skill'ID so that a SkillChip can be registered.

### **Hot Key Activate**

The short cut key that can start video capture for the user profile.

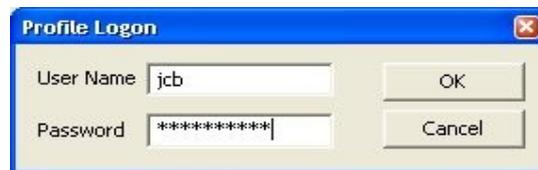
### **Video4coach Site**

The external web site to receive the user profiles video sequences.

## Change existing profile

Choose from the Menu User->Edit Profile

Type the username and password for the user in the Profile login dialog.



Choose “OK”



Change the various options and hit “OK” when finished

## User profiles on multiple computers

If the same user profiles is supposed to be used on several computers its possible to create the user profiles on one computer and replicate the v4cuser.txt file on all other computers. The v4cuser.txt file can be found in the SkillCapture application data folder for the user installing SkillCapture

XP

C:\Documents and Settings\”username”\Application Data\video4coach

Vista

## Advanced user profiles

The v4cuser.txt is a standard text file that contains the user profile information. The file can be created in many other programs than SkillCapture if just the file format is followed:

ID:username:MD5 password:Name:Http upload server:Short cut key:short cut special key

ID: Unique id of the user. When using SkillChip its the id from the RFID tag.

Username: A short name of the user. Could be initials. If video is supposed to be uploaded to

external HTTP server its important that the username is the user's login name at the web site.

**Encrypted Password:** Encrypted password. As default its possible to use V6282b874f76983fe which is "password" encrypted.

**Name:** Users full display name.

**Http upload server:** HTTP external upload server.

**Short cut key:** The key to be used to start video capture for the user profile.

Short cut special key: Possible special key to be used with the short cut key. 0 no special key, 1 Shift key, 2 Alt key, 3 Ctrl key.

**Delay:**

**Upload Type:** 0 Default upload, 1 Copy, 2 Http, 3 YouTube, 4 FTP

Example:

```
1:usr0:5f4dcc3b5aa765d61d8327deb882cf99:User 0:www.video4coach.com:0:0:-1:0
2:usr1:5f4dcc3b5aa765d61d8327deb882cf99:User 1:www.video4coach.com:1:0:-1:0
3:usr2:5f4dcc3b5aa765d61d8327deb882cf99:User 2:www.video4coach.com:2:0:-1:0
4:usr3:5f4dcc3b5aa765d61d8327deb882cf99:User 3:www.video4coach.com:3:0:-1:0
5:usr4:5f4dcc3b5aa765d61d8327deb882cf99:User 4:www.video4coach.com:4:0:-1:0
6:usr5:5f4dcc3b5aa765d61d8327deb882cf99:User 5:www.video4coach.com:5:0:-1:0
```

## **SkillCaptureUserAdm**

SkillCaptureUserAdm can be used for advanced administration of the user profiles on the SkillCapture system. The application is built to simplify the task of bringing the SkillChip id with the user profile information. Most of the time the information about students is received from the school office in an Excel sheet and the problem is how in easy steps to add the SkillChip id and user information together.

When SkillCaptureUserAdm is started the current v4cuser.txt information is loaded.

There is two ways to create a user list with SkillChip ID's. Either the list of user names are added first and then SkillChip ID's, or the list of SkillChip ID's are added and then after the user names added.

### ***Adding new SkillChip ID***

Select the position where a new SkillChip ID is supposed to be inserted. Register the SkillChip tag on the SkillID reader.

### ***Creating new user list***

Click on the button "New" to remove all the users from the current list and create a new.

### ***Create new user list from Excel***

If a new list is not created before you insert new users they will be appended to the current.

Open Microsoft Excel and find the list (single column) of user names (full name and surname).

Select the list of users to be added. Copy the list (Either Ctrl-C or from the menu Edit->Copy)  
Select in SkillCaptureUserAdm the “Paste User List”.

### **Create new list with new SkillChip ID's**

1. Click ”New” in order to create new list..
2. Find the number of SkillChip and write down a unique number (example from 1 to the number of tags to be used) on each tag.
3. Register SkillChip #1 at the Skill'ID reader.
4. Click OK in the dialog box if the ID is accepted.
5. Go to step 3 and repeat it until all SkillChip is registered.

### **Add new SkillChip ID to users profile**

1. Select (click on the RFID number in the first column) the user that has to get the new SkillChip ID.
1. Register SkillChip on the Skill'ID reader.

### **Change single user profile information**

2. Select (click on the RFID number in the first column) the user that has to get the new SkillChip ID.
3. Click the Edit button.

### **Change user profile password**

4. Select (click on the RFID number in the first column) the user that has to get the new SkillChip ID.
1. Select ”Set Password”
2. Type the old password
3. Type new password

## Configuration

### Video Capture options



### Video

Configuration of the four buttons on the SkillCapture main application window.

#### Camera 1

Selecting video source for Camera button 1.

#### Automatically select Camera 1 on Startup

If this option is selected the first camera will be selected on the startup of SkillCapture. Make sure the video source is available when this option is selected and starting up SkillCapture.

#### Camera 2

Selecting video source for Camera button 2.

#### Camera 3

Selecting video source for Camera button 3.

#### Camera 4

Selecting video source for Camera button 4.

### Audio

If sound is needed in the video files it can be added in this section. The sound can be recorded from different inputs.

No Audio – No sound added to the video.

From DV Camera – Sound is recorded from the DV camera.

PC Audio – The sound from the computers sound system is added to the video. This could be for example the microphone or stereo mix where its possible to add music directly from the mp3 playback.

## ***Motion Detection***

### **Threshold**

The relative area that has to be covered to trigger capture start. Default is 30 which starts capturing if more than 30% of the defined area is covered.

### ***Raw files***

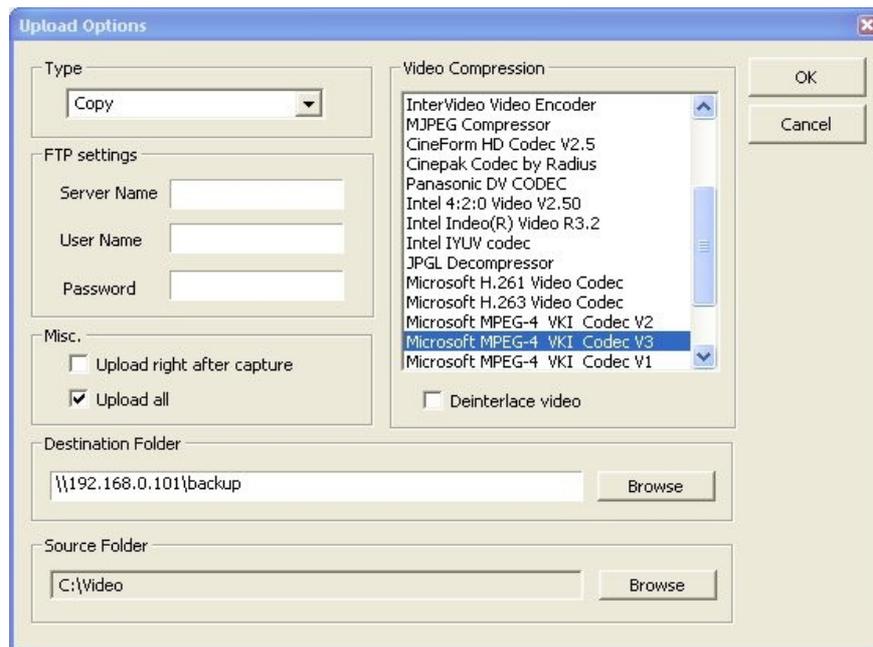
#### **Always ask if raw video files should be deleted**

If this options is enabled SkillCapture will at application exit ask if the raw video sequences is to be deleted.

#### **Remove raw video right after display**

If this option is enabled all raw video sequences is deleted right after video playback.

# Upload



## **Type**

Configures the method by which the video sequence is uploaded.

### *Copy*

Standard copy method. This option enables copy of the video sequence to a local place on the computer (memory stick also) or to another external server.

### *FTP*

FTP (file transfer protocol) option uses the FTP internet protocol to transfer the video sequences to an external server. There is a lot web hotels that offer this option to transfer files to the server.

### *V4C Site*

This option enables to transfer video sequences to an external server using the HTTP internet protocol.

## **FTP settings**

### *Server Name*

Server name of the server to receive the video files.

### *User Name*

Username of the FTP access.

### *Password*

Password of the FTP access.

## ***Misc.***

### **Upload right after capture**

Enable this option if all video sequences is supposed to the uploaded right after video sequence has been compressed. Its important if this option is supposed to be used that the Internet connection is stable. Its recommended to use wired connection over wireless. Wireless can be unstable and cause problems for SkillCapture.

### **Upload all**

Enable this option if all video sequences is supposed to be uploaded, no matter what.

### ***Destination folder***

Type the location where the video sequences is supposed to be stored.

### ***Source Folder***

The location where the video sequences is stored locally.

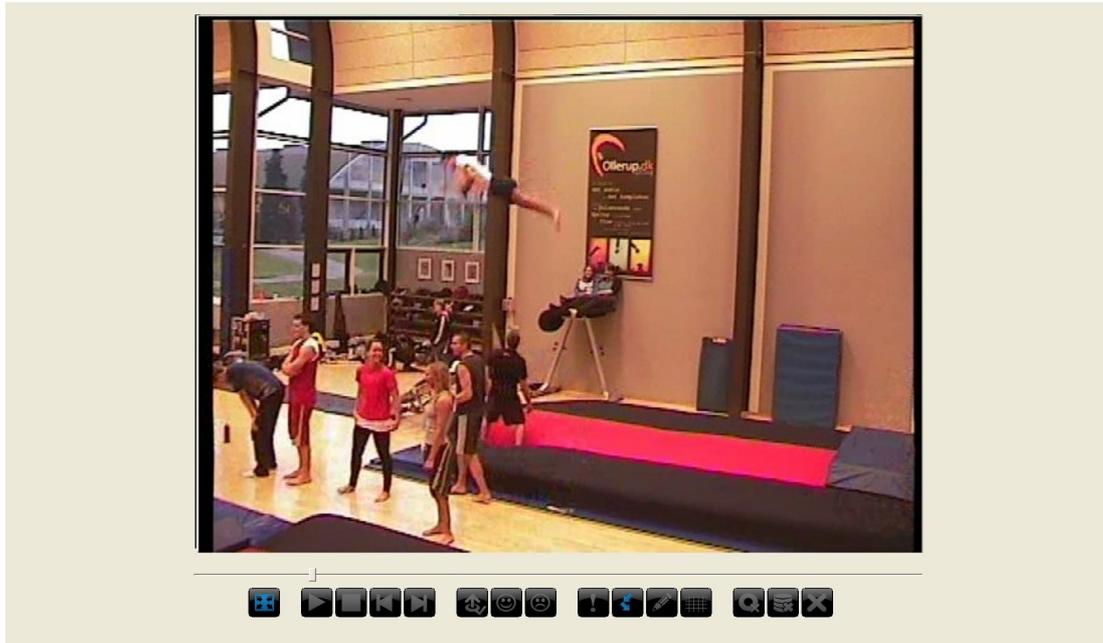
### ***Video Compression***

Selection of video compression. There is a lot of different video compression algorithms but its recommended to use the Microsoft Mpeg4 VKI V3 which is installed with SkillCapture. This compression algorithm enables good frame by frame navigation. Other algorithms can be chosen.

### **De-interlace video**

Remove interlace from video before compression. This is only supposed to be used with DV cameras. It will improve video quality considerably.

## Video playback



The buttons on the video playback dialog explained from left to right:

### **Resize**

Toggle between 1:1 video image size and maximum stretched video image.

### **Pause/Play**

Play or pause the video sequence.

### **Stop**

Stop playback.

### **Step fwd**

Next frame.

### **Step back**

Previous frame.

### **Select video for upload**

Select the current video sequence for upload.

### **Increase rating**

Increase movement performance rating (max is 5).

## **Decrease rating**

Decrease movement performance rating (min is 1).

## **Clear drawing**

Erase drawing.

## **Select angle drawing**

Enable drawing angles on video image.

## **Select free hand drawing**

Enable free hand drawing on video image.

## **Toggle grid**

Toggle between 5 different grids.

## **Stop Capturing**

Stop video capturing

## **Select all videos in playback list as displayed**

After video has been captured it enters a playback queue if the “Delayed playback” option has been selected. If the queue gets to long this button can be used to clear the playback queue.

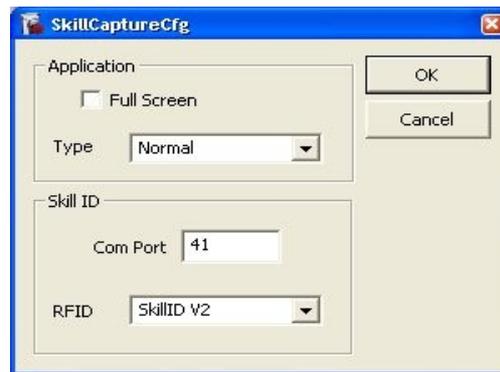
## **Close**

Close the video playback dialog.

## **Advanced functions**

There is a few advanced options that is not accessible from the SkillCapture interface. The options can be configured using the SkillCapture Cfg software installed with SkillCapture.

Find the SkillCaptureCfg software in SkillCaptures instal folder, or under the video4coach program group found in the "Start" menu.



## **Application**

### **Full Screen**

In some applications it might be necessary to run SkillCapture as a fullScreen Application.

### **Type**

Selecting the right screen resolution. SkillCapture will try to fit into the possible screen sizes.

## **Skill'ID**

### **Com Port**

Com port for the Skill'ID

### **RFID**

The RFID equipment type that is connected.

# Hardware requirements

## **Computer**

In order to run SkillCapture it necessary with a computer system with the following specification:

### **General**

Operating system: Windows XP (Service Pack 3) or Vista (Service Pack 1)

CPU: 1.4GHz Intel or AMD processor

RAM: Min. 512Mb

Input: Firewire, iLink, IEEE1394 or USB

Harddrive: Min. 3Gb free space

Windows has to be configured to download and install the latest updates from Microsoft. The latest version of DirectX (as min 9.0c) has to be installed.

### **Touch Screen**

Its possible to configure SkillCapture to use Touch Screens. Look under Advanced configuration.

### **Video equipment**

The camera that is supposed to be used with SkillCapture has to be able to stream video directly to the computer. Typical all Mini DV camera has this option through firewire (1394, iLink). There is a lot of other cameras with streaming option.

Before buying a camera for use with SkillCapture its important to consider the following parameters:

#### **Frame speed**

Its important that there is enough images to describe the movement if the user or athlete should be capable of viewing the possible corrections needed. In fast movements (like golf swing, or somersault with and without twists) important detail might be missing due to lack of enough images. For most movements the use of DV camera with 60 or 50 (interlaced) images is enough.

#### **Image resolution**

The standard resolution of PAL (Euro standard) video is 720x567 (and NTSC 640x480), typical for most web cams is 640x480, where as HD (High Definition video) has a resolution of 1920x1080.

All these cameras has sufficient resolution for most movements.

For some web cameras with lower resolution like 320x240 might be insufficient for analyzing movements with small detail. It has to be noted that some DV cameras has an option for streaming video using USB, but for some cameras the resolution is only 320x240.

#### **Shutter time**

Its important use a short shutter time with the camera in order to have clear image. For most DV cameras there is a program called "Sports", which gives a short shutter time. When using a short shutter time its important to have sufficient light.

#### **DV Camera**

The DV camera is a relatively cheap camera. The lowest price is around 300USD, and it can be

bought in many variants. The DV camera can easily be connected to the computer using firewire and there is no need to install anything for it to work. For those cameras that uses a USB connection its important to install a device driver before the connection. The DV camera fulfill all the requirements to both shutter time, resolution, image frequency.

Examples of cheap DV cameras: Sony DCR HC27E, Samsung VP D371, Canon MD110, JVC GR D720.

<http://sony.com>

<http://samsung.com>

<http://jvc.com>

<http://canon.com>

## **HDV Camera**

Compared to the normal DV camera the HDV has an increased resolution. Its possible to use this type of camera to stream video to the computer but only in DV standard mode.

## **DVD Camera**

DVD cameras does not typically have a firewire (iLink, IEEE 1394) connection and the option to stream the video directly using the USB is normally not possible. An option to use the camera is to insert some AV capture hardware to enable streaming over the analog composite signal.

## **Hard drive/Memory Card Camera**

As with the DVD camera the hard drive camera does not have the option to stream video directly into the computer. But there is still the option to stream the composite signal to some AV capture hardware that does the job.

## **USB Web Camera**

A lot of USB web cameras specify that its possible to capture using 30 frames/sec. The problem is that the bandwidth of USB (even version 2.0) is not enough to transport the raw video through to the computer. Normally its possible to have an approximately 10 frames/sec. This is normally not sufficient enough to handle complex movement.

## **Wide angle camera lens**

In some situation it ca be an advantage to use a wide angle lens. This means that the camera can get close to the movement as possible. The only problem with this type of lens is that it distorts the image so that it can not be use for biomechanical analysis in SkillSpector. SkillSpector can display the video but its not possible to accurate results.

## **Zoom and motor positioning**

For some cameras its possible to adjust zoom, position and focus with a remote control. This is nice feature if the camera is supposed to be mounted on a wall. This gives good usage of one single camera for multiple stations. The only disadvantage with this camera is normally the price, which is normally approximately 8-9 time more expensive than the normal DV camera.

## **Surveillance cameras**

There is a lot of camera types and especially with surveillance. Its important to check the option to control the shutter time before you invest in this type of camera. A good surveillance camera is the

Monacor TVCCD-1622COL.

## **AV Capture hardware**

For those camera types that does not have digital video streaming to the computer there is an option to use external av capture hardware.

Canopus ADVC 55 is a AV capture unit that can be used with either composite or SVHS signals. This unit is quite good with surveillance cameras, hard drive cameras and DVD cameras.

<http://www.canopus.com>

## **Firewire cables**

Firewire can be found in length of up to 10 meters.

## **RFID**

One of the special features of SkillCapture is the use of SkillID (RFID) tags. Before the user or athlete starts his skill its possible to remotely start the capturing. This feature also associate user with video.

This feature requires special RFID reader hardware and RFID tags. This special equipment cab be purchased through [video4coach.com](http://video4coach.com).

## **Network**

If the video sequences is to be uploaded to a local or external server its important to have a good network connection.

SkillCapture is capable of using wireless connection but if SkillCapture is supposed to capture and upload at the same time its best to use a wired connection to the network.

## **Server**

When storing video on local or external server its important to consider the amount of data that is stored during a certain period. Its not possible to store all video sequences from several years performed on a school with 200 students. Thus some kind of clean up must take place. But to estimate the possible storage capacity and when to start cleanup view the following example:

Example of storage need estimation:

If for example you buy a 500Gb hard drive to store all video sequences of your school over a period of half a year. How many video sequences can be stored with 5 sec. sequences?

5 seconds takes up approximately 500Kbytes

There is 180 student at the school

There is 21 weeks of classes during a half years semester and thus approximately 105 days of classes.

$$(500Gb * 1024 * 1024) / (500Kb * 180 * 105) = 55 \text{ sequences each day for each student}$$

Considering that its not in every class that the SkillCapture is used the amount of sequences that ca be stored is more than sufficient.

## ***External server***

Its possible with SkillCapture to upload to an external server through FTP or HTTP. If HTTP is supposed to be used its important to install a small script on the server to accept the copy of the video sequences to the servers hard drive. The following is posted in the server call:

username – User name of the athlete

password – Password of the athlete

MAX\_FILE\_SIZE – Max. file size.

name – Name of the video sequence file

upload – The video sequence.

## **FAQ**

### ***What's RFID?***

RFID is the abbreviation for Radio Frequency Identification. RFID is a technology that is used more and more in different setups. A good example is the lifts at alpine skiing where you have to register yourself, but also marathon running where a small tag is inserted in the shoe for recording running time. SkillCapture uses RFID for automated association of video sequences to individual users.

### ***What's video compression?***

Video captured with the computer takes up considerable amount of space. 4-5 seconds of video take up approximately 15Mb in raw format. In order not to fill up the hard drive with just a single training session its important to compress the video. A good compression to use is the Microsoft VKI Mpeg4 V3, but its easy to choose another. The reason for choosing Microsoft VKI Mpeg4 V3 compression is that it offers good quality compression but also offers frame by frame navigation which is needed in the analysis of movement.

### ***Hard disk recorder versus SkillCapture?***

In the last few years the video harddrive recorders has been in great development. The harddrive recorder looks like standard VHS recorder just that the media to which the video gets stored is different. The advantage with the harddrive recorder is many, but one of the more interesting features is the option to start the video playback at any time. This can be used for feedback in sports where you start the recording and after 15 (adjustable) seconds start the playback. This enables the user to do the skill and right after view the skill result on the TV. The disadvantage with this approach is that if you want to watch the video in slow motion you need to stop the recording, and limit the usage to a single person. So if this tool has to be an efficient tool in the training session the slow motion is not a possible option. The viewing of performed skills in realtime is also somewhat problematic. You need to be a skilled coach but also a skilled athlete to catch the possible errors in movements.