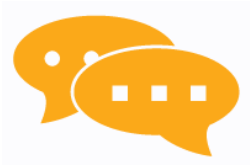


Assistive Context-Aware Toolkit (ACAT)

User Guide

Version 3.00

Table of Contents

Overview and Requirements

General overview of functionality and application of this software

What is ACAT?

Basic features of ACAT

Assistive Context-Aware Toolkit (ACAT) is an open-source platform developed at Intel Labs to enable people with limited ability to speak and type, to communicate easily through keyboard simulation, word/sentence prediction and speech synthesis.

Key features

- Switch Scanning Interface for Augmentative and Alternative Communication (AAC)
- Range of input modalities to support varying user physiological constraints
- Predictive language model to reduce typing effort
- Extensible platform for engaging developer community

ACAT was originally developed by researchers in Intel Labs for Professor Stephen Hawking. Professor Hawking was instrumental to the design process and was a key contributor to the project design and validation. After Intel deployed the system to Professor Hawking, we turned our attention to the larger community and continued to make ACAT more configurable to support a larger set of users.

By open sourcing this configurable platform, we intend for developers to continue to expand its capabilities by adding new user interfaces, new sensing modalities, language prediction and other features.

Who is it designed to help?

Is ACAT right for you or your loved one?

We understand that all disabilities and individuals are different. In our journey building this software and working with many kinds of disabilities, we have found that disability manifests differently in all individuals. Everyone has a different set of skills and abilities associated with their disability. We've tried to address as many of these as possible so that ACAT works for the broadest range of people.

Note: There is only one requirement. You must be able to read and write.

Some AAC software is designed for people who are too young to read, illiterate or cognitive impairment limiting their ability to read and write, we have difficulty using ACAT. If you find that your loved one is in this group, there are software packages available that use pictures instead of words to help communication.

ACAT can help with both degenerative and stable/chronic diseases. We have tried to address the widest range of these conditions. If you find that our software does not address your specific needs, please contact us. We are always looking for new opportunities to expand our capabilities. This is the reason why we have made our software open source. It allows developers to make changes to the software that can address solutions that we may not have thought of. Please reach out to us and we will add your specific needs to the list of ideas that we are reviewing. This kind of information helps us when we are developing the next version of our software.

Degenerative diseases

ALS, MS, are some common degenerative diseases, that often see people losing their ability to speak, or speak clearly. Often their condition worsens, and their speech degrades over time. If you or your loved one have some other condition, not listed here, ACAT may still be a good solution. Diseases that have cognitive deficits as well as physical deficits, like, Frontotemporal dementia, and aphasia can affect a person's ability to construct sentences. This is where ACAT is extremely helpful. Giving a list of sentences and a list of words can be a starting point to build a phrase or thought. Helping bridge the communication gap.

Stable/chronic diseases

Sometimes physical injury might impair somebody's ability to speak. An accident or a stroke for instance. In the case of a stroke, a person may have the ability to understand language, and even be able to move, but might not have the ability to speak.

The Interface

Getting familiar with the different sections of the Typing User Interface (UI)

Here's a quick explanation of the different sections (referred to as boxes) on the UI:

1. Mode box : shows current active mode
2. predictive sentence completion box
3. predictive words box : shows next word predictions or word completions
4. talk window box : this is where the selections/typing show up
5. keyboard-left box
6. keyboard-right box

For details refer to the chapter "Using ACAT".

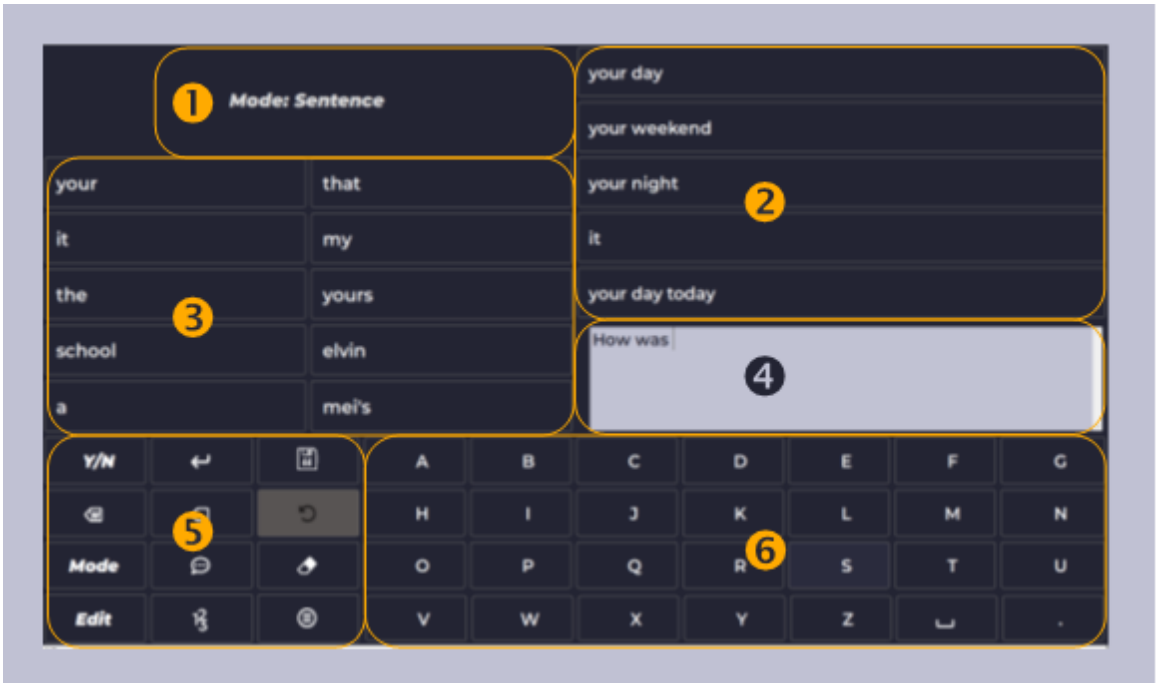


Figure 1 ACAT layout with interactive spaces

Switch Scanning?

How to interact with a computer using only a switch

Switch scanning is a method of selecting an item from an interface that "scans" across all UI elements that a user can select. When the desired element is highlighted, it can be selected by activating a switch (refer to switch options to see what switches ACAT supports). In this way, a person can interact with a visual based Interface using a single switch.

Here is a static example of the animation you would see with switch scanning in ACAT's interface. Imagine the highlighted area moving (scanning) from left to right and back again highlighting the two sections in the top half until a switch is activated that selects the highlighted item.

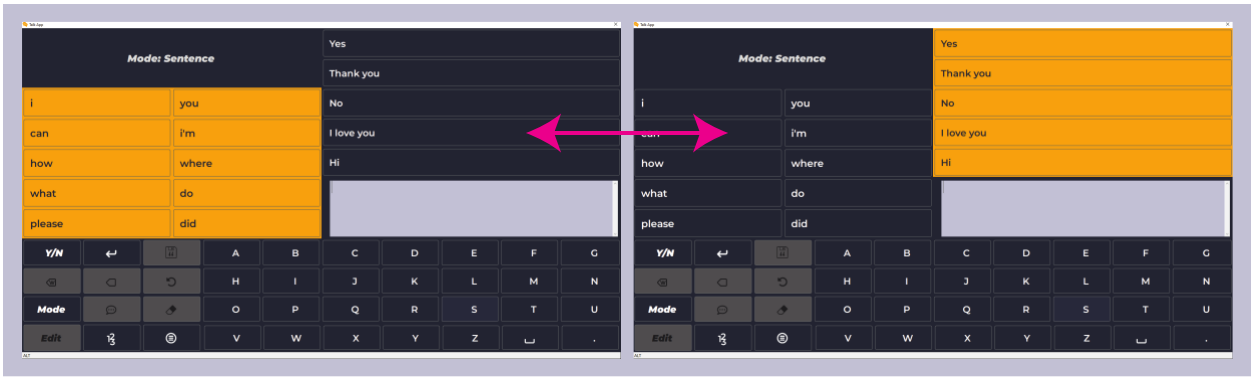


Figure 2 Example of switch scanning on top half of ACAT. Scanning between predictive words and predictive sentences

After selection is made between the two top sections, in this case the “predictive sentence” section on the right, you can now see that it begins to scan through the buttons in the selected section.

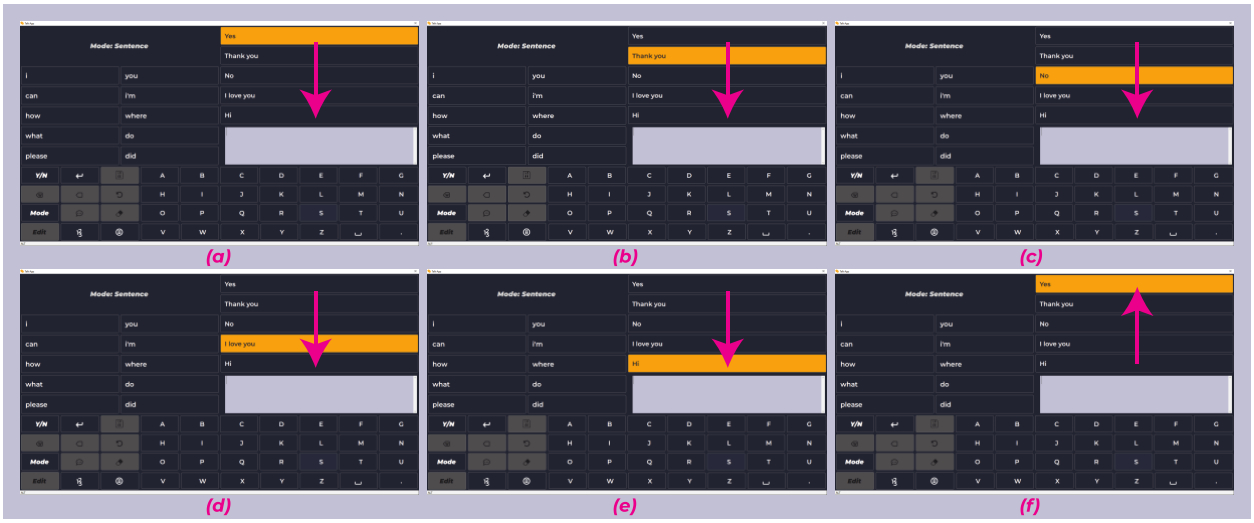


Figure 3 Switch scanning through predictive sentences

Activating the switch to select the sentence “thank you” Figure 4 (g) populates the talk window with “thank you” Figure 4 (h). The sentence can now be spoken by ACAT.

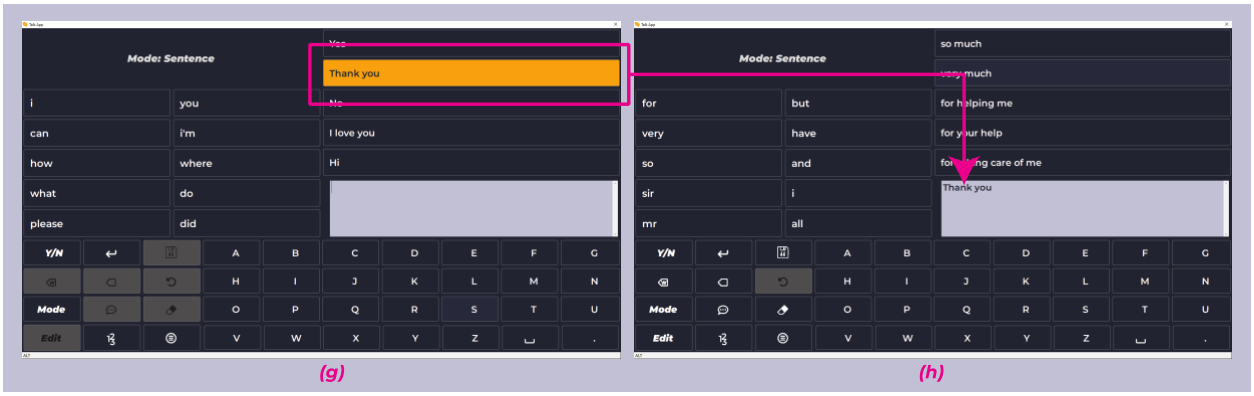


Figure 4 Selecting "thank you" placing it in the talk window

Hardware / Software

Making sure your hardware and software are compatible with ACAT

The minimum hardware requirements to run ACAT.

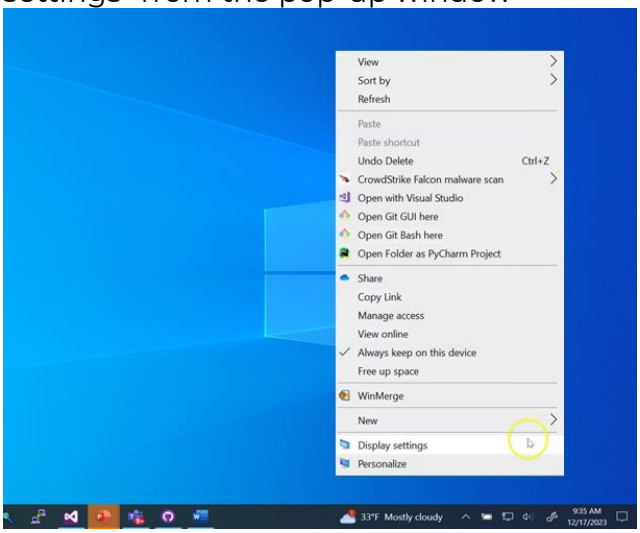
- Preferred Processor I5 and above.
- Memory 8GB minimum 16 GB recommended.

ACAT runs on Microsoft Windows and requires that you have:

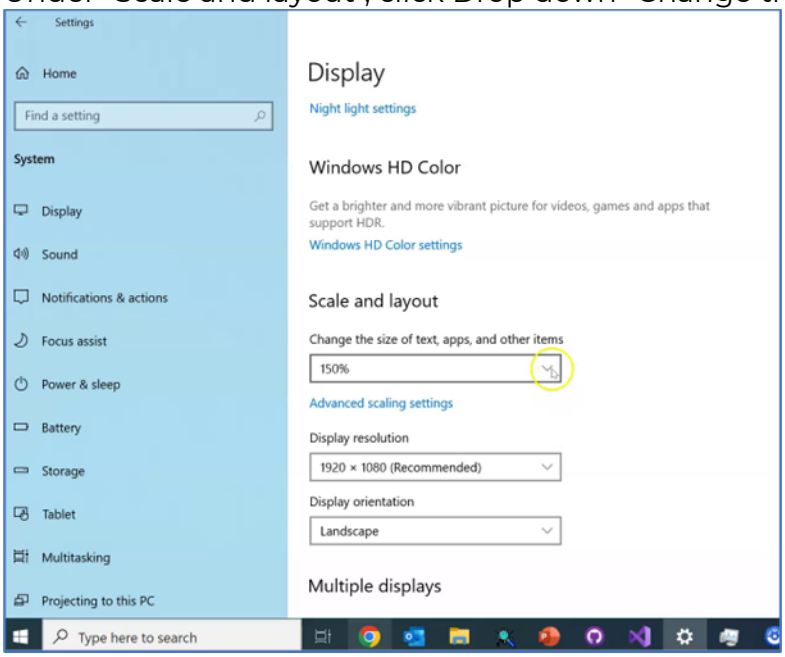
- Windows 10 Version 20H2 or higher or Windows 11
- Preferred Screen resolution 1920x1080 with a scaling of 100% or 125%. The UI may not appear correctly at other screen scaling. See Troubleshooting section on a step-by-step guide on how to set the scaling of your display.

How to set the scaling of your display

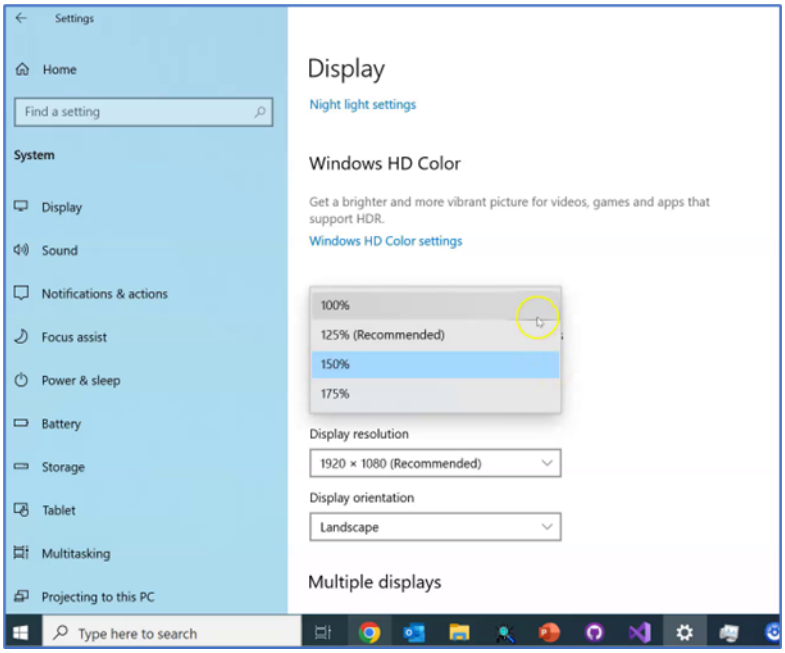
1. Right-click on any empty part of your Windows screen. Select "Display settings" from the pop-up window



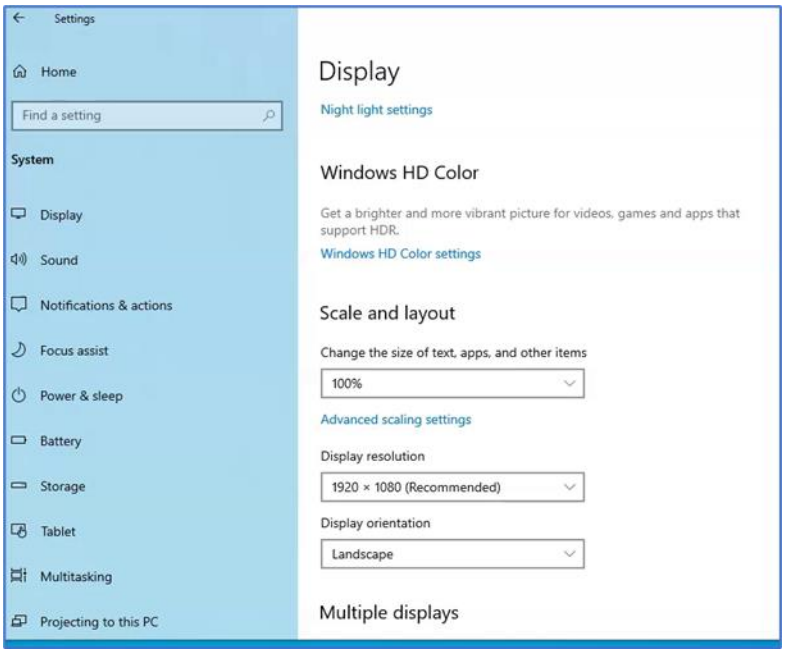
2. Under "Scale and layout", click Drop down “Change the size of text…”



3. Change display settings to 100% (recommended). If this is too small, you can select 125%.



4. After making the changes, you can close the display settings screen and relaunch ACAT


Settings
Home
Find a setting
System
Display
Sound
Notifications & actions
Focus assist
Power & sleep
Battery
Storage
Tablet
Multitasking
Projecting to this PC
Display
Night light settings
Windows HD Color
Get a brighter and more vibrant picture for videos, games and apps that support HDR.
Windows HD Color settings
Scale and layout
Change the size of text, apps, and other items
100%
Advanced scaling settings
Display resolution
1920 × 1080 (Recommended)
Display orientation
Landscape
Multiple displays

Switches

Description of the supported switches

Types of Switches

Description of the many different types of switches that can be used with ACAT

The keyboard

The keyboard is a very simple way of interacting with ACAT. A single dedicated key on the keyboard can act as a switch to select the highlighted item on the scanning interface. The default key is set to “F 12” but can be re-assigned to any of the function keys F1, F2... F12.

External switches

There are many kinds of switches. Everyone’s abilities are unique. Some people can easily push a button while others might need a paddle or even a foot switch. We’ve seen some users use proximity sensors and muscle conductivity switches. If you have some voluntary muscle movement, anywhere in your body, there is a chance to detect that movement with a switch or sensor. Here is a link to a hardware supplier that sells switches for accessibility needs.

Most of the switches require an interface to the computer. Here is an example of that hardware. This simple piece of hardware converts the switch signal into something your computer will understand.

Camera

Nearly all laptops come with a camera in the bezel of the screen. ACAT can use this camera, or any external camera/webcam connected to your computer, to act as a switch. Ideally a person who uses the camera as a “switch” would be someone who does not have much muscle movement in their body but can move their facial muscles. The camera “switch” is designed to detect, facial muscle movement. If you or your loved one can voluntarily move your cheek or raise their eyebrows, the camera might be a good switch to use with ACAT. Watch this video for an example of how the camera can control switch scanning on ACAT’s user interface.

Brain Computer Interface (BCI)

BCI is best for people with the most extreme communication needs, often called locked in. This is where an individual is cognitively aware, but physically can't move. For details on using BCI, refer the ACAT BCI User Guide. The guide can be found in C:\Program Files (x86)\ACAT\Docs\en or through a shortcut on your Desktop, after you have installed ACAT.

Detailed instructions about how to set up these switches can be found in, "Setup - choosing the right switch" section of this document.

Installation

How to download and install

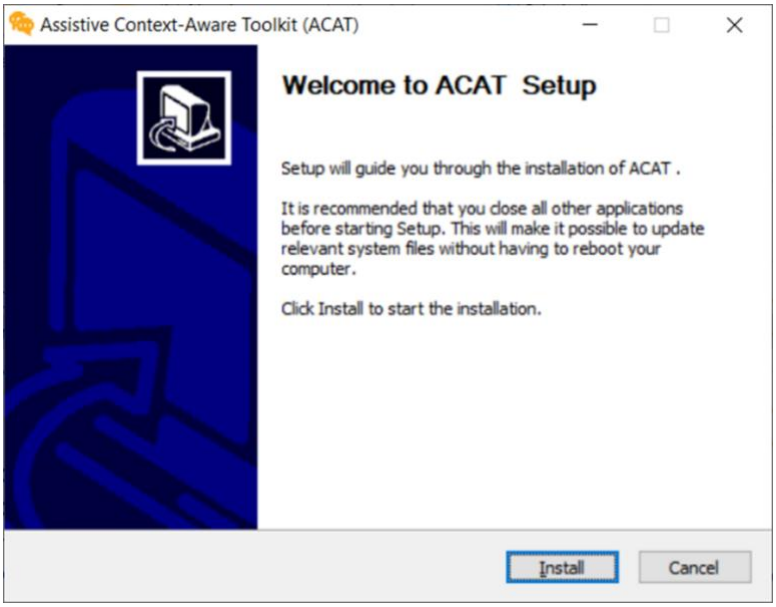
Step-by-step

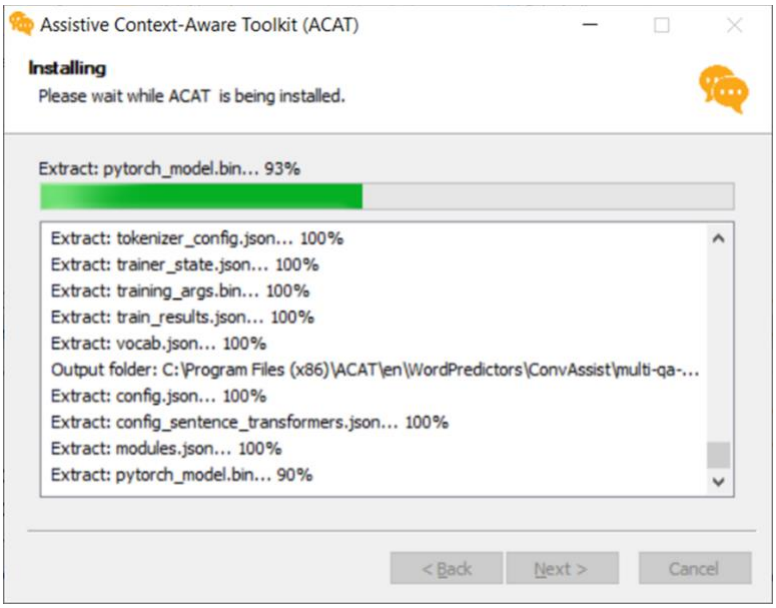
A walk-through of the installation application

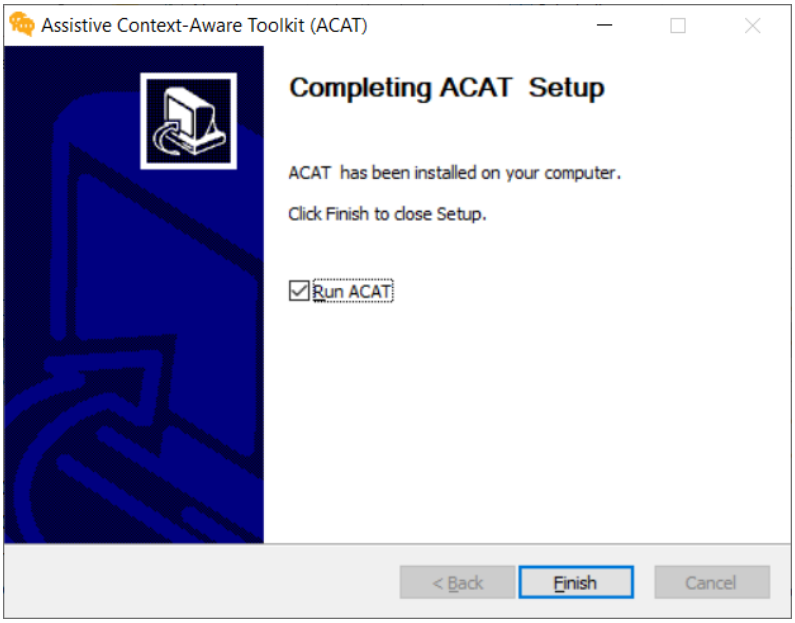
First time installation

Double-click on ACATSetup.exe to start the installation.

Note: if you've already installed ACAT on your system before, please skip to [re-installation]

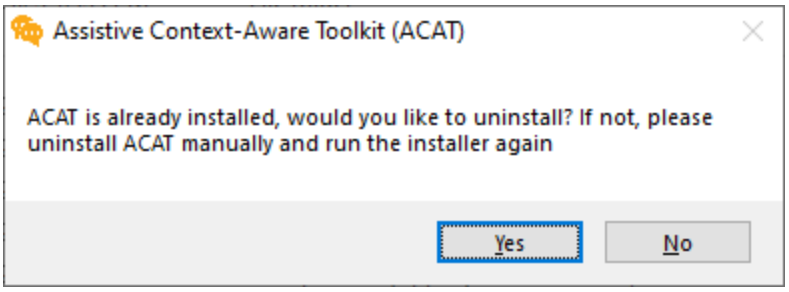


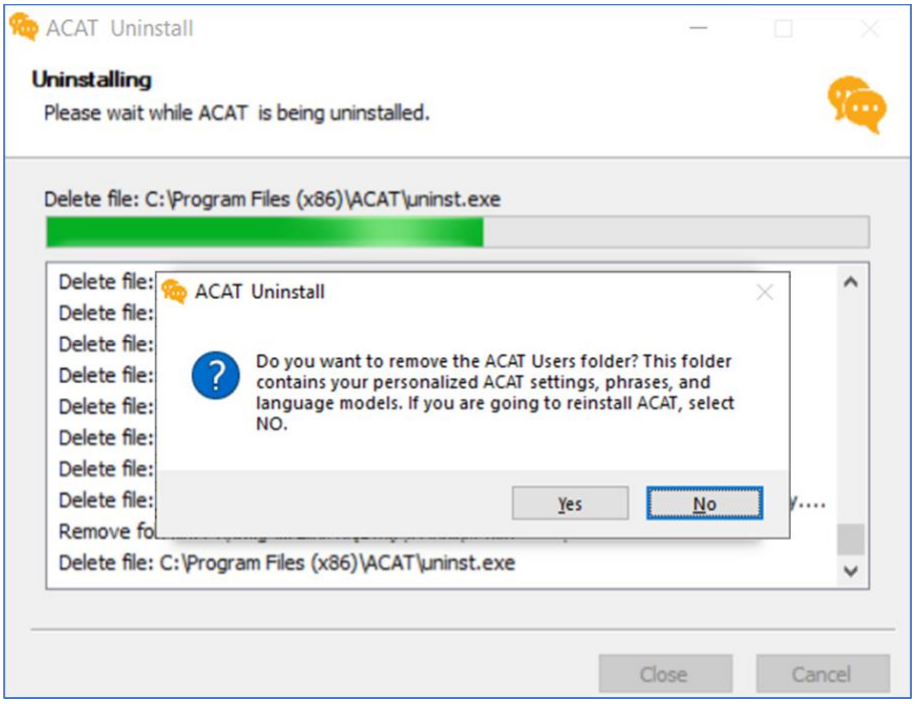




Re-installation

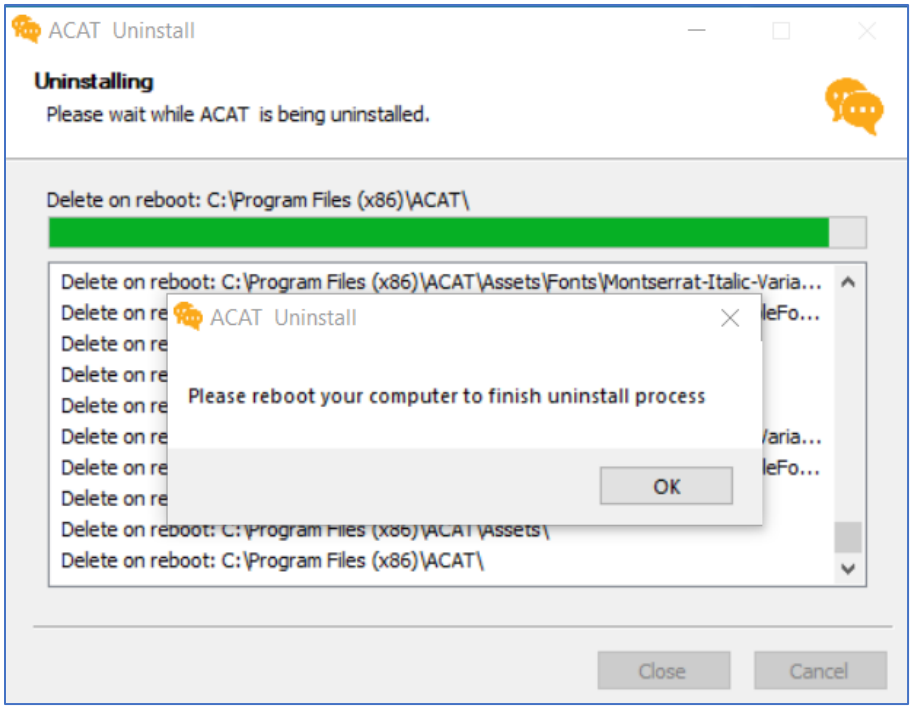
If you already have ACAT installed on your system and are reinstalling it, you will be guided through the following screens.



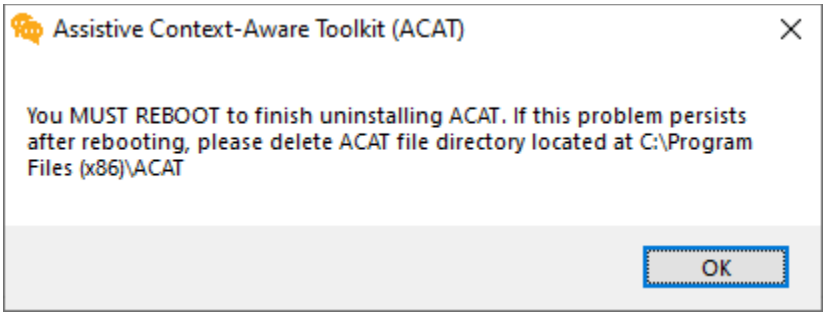


Note: if you choose to remove the Users folder (by selecting 'Yes' on the above prompt), you will lose any personalized settings you have configured thus far. This could include settings such as

- ***scan-time for the switch scanning interface,***
- ***function-key and hold time settings for the switch interface,***
- ***facial gesture settings for the camera switch,***
- ***your language model preferences, etc.***



Note: Please reboot after uninstalling ACAT and then rerun ACATSetup.exe. If you do not reboot, the application may not run correctly.



Setup

Guided set up to help you choose and configure a switch

ACAT supports many different types of switches and configurations for each one of those switches. ACAT will walk you through the choices you can make when you are setting up your switch. This part of ACAT installation will also train you how to use your switch before you go on, to the main application.

Getting Started

Overview of the set-up process.

Selecting the right “Switch” and configuring, it can be challenging. ACAT will Guide you through a series of questions to help you set up the system to work well for you or your loved one.

Launching ACAT

ACAT can be launched by double-clicking the ACAT Talk icon on the desktop.

- First-time launch: If this is the first time you are launching ACAT, start by clicking “Configure”

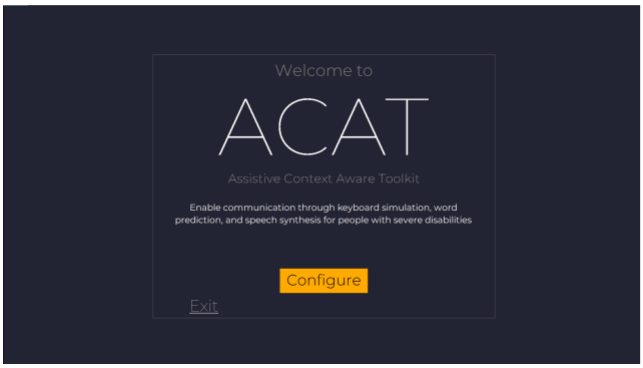


Figure 5 First screen of

- If you have previously launched ACAT and configured a switch to use with it, ACAT will start with the switch and configuration you last configured. If
- If you would like to change any settings of the configured switch, press Configure before the countdown completes.

Choosing a switch type

Switch Types section of this manual describes the three kinds of switches that are compatible with ACAT.

First choose the switch type.

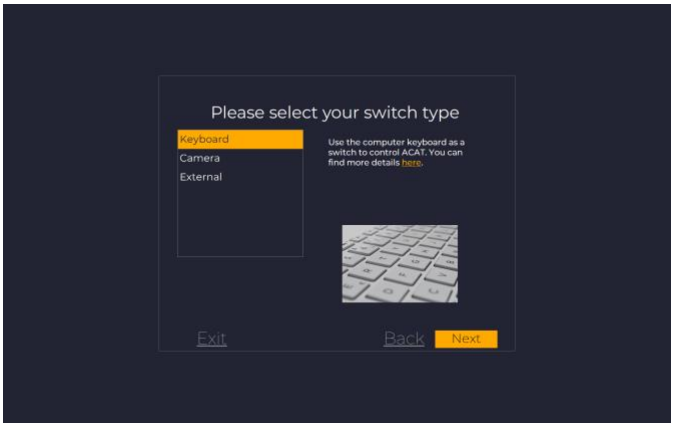


Figure 6 Switch type selection page

Keyboard

ACAT uses the function key F12 as the default hotkey for selecting from the scanning interface. With this, every time you press F12 on the keyboard, the current selection on the scanning interface will get selected. However, you can select any one of the twelve function keys to operate as a switch instead.

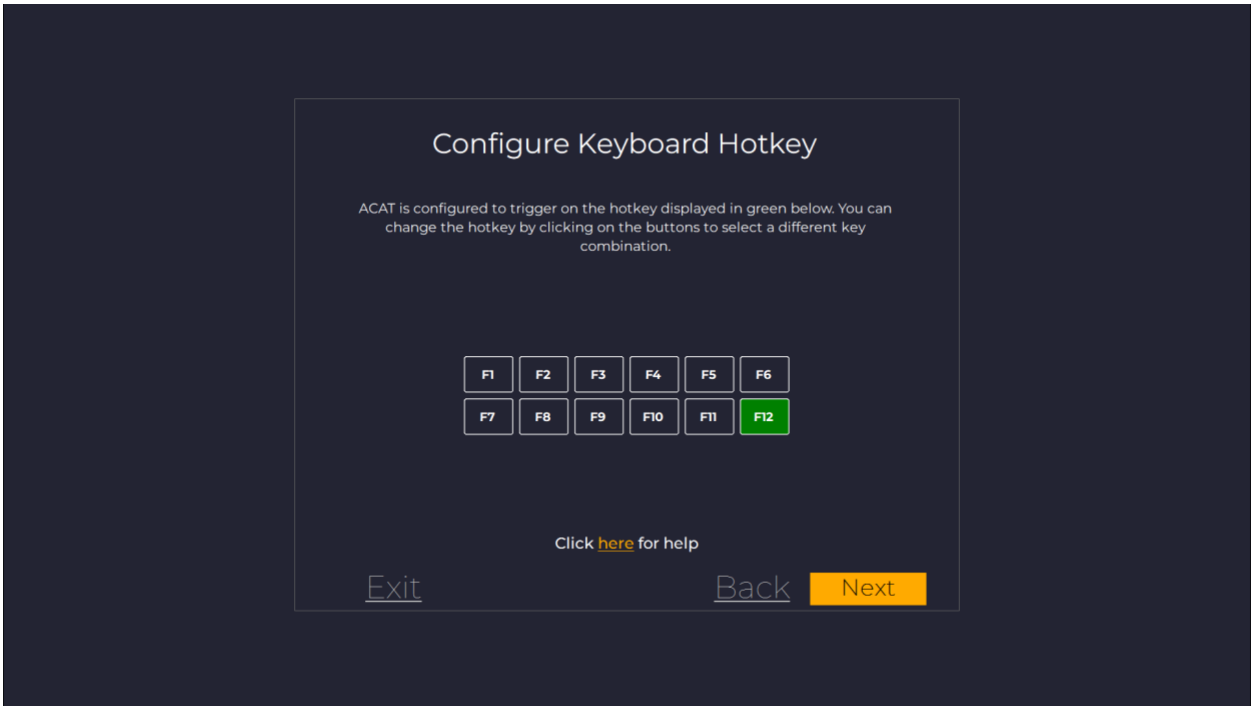


Figure 7 Configuring keyboard hot key. Shown here in the white box as F12.

Changing keyboard hotkey

- Choose a different function key by clicking on the corresponding button shown on the screen (Fig 7)

External Switch

1. To use a programmable switch interface, select “External” option from the screen, as shown in the figure below and click Next.

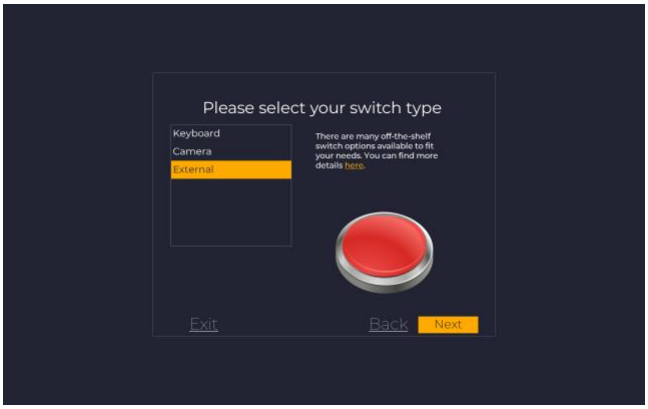


Figure 8 Switch type selection page

2. A programmable hardware switch typically needs to be configured for the keyboard button it will represent.

Note: You should have pre-configured your switch based on manufacturer instructions prior to configuring it in ACAT.

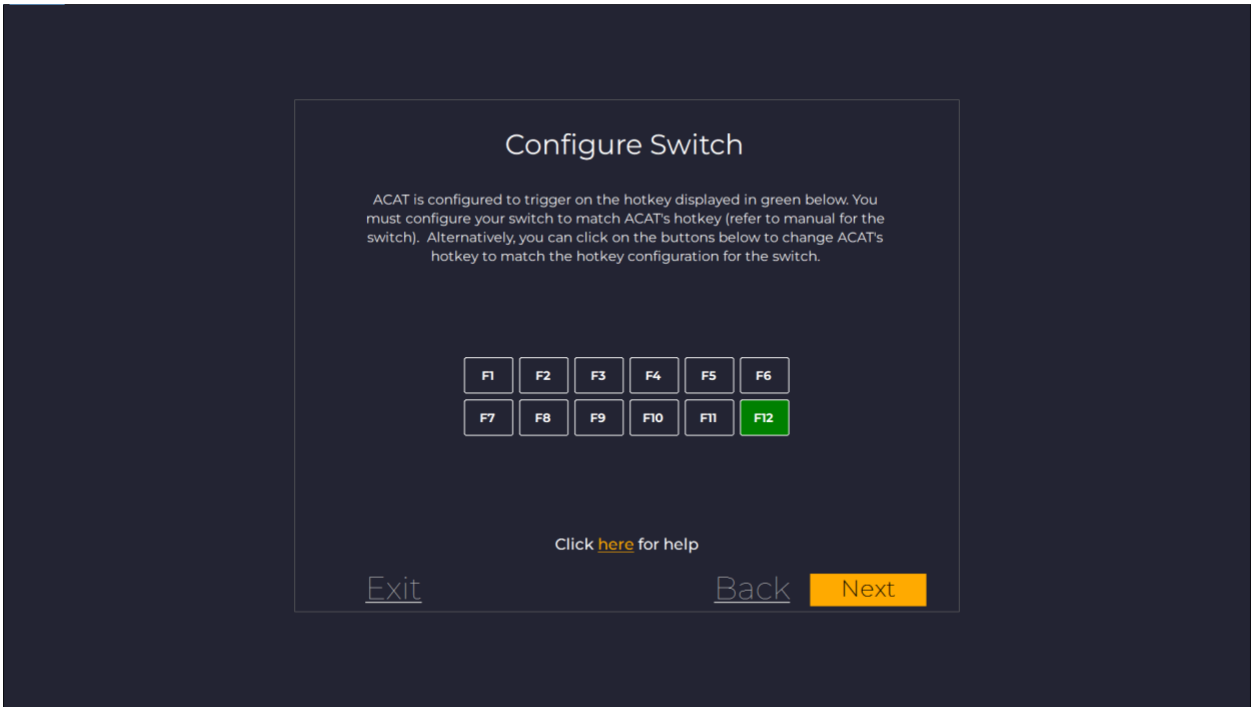


Figure 9 Configuring keyboard hot key. Shown here in the white box as F11.

a. Referring to your switch manual, you need to configure your hardware switch to one of the 12 functions keys, F1-F12. If you have not configured your hardware switch prior to reaching this screen, please Exit ACAT and configure it following the manufacturer's instructions.
b. Once you have done that, launch ACAT, navigate to this screen and select the same function key that you have programmed your switch with. The figure above shows F12 as the programmed key.

3. Test if the switch is configured correctly. **It is recommended to test the switch at least the first time you are configuring it.** Press the switch and if it is correctly configured the white box (Fig 10) will momentarily turn green and display "Switch Activated". If it does not turn green,
    a. Check whether the Function key that you have selected on the previous screen is the same that you or the manufacturer has preconfigured the actual hardware switch with.
    b. If the function key matches, set the Hold time to 0 and test again.
    c. Gradually increase the hold time and keep testing until you reach a value that works with your switch.
    d. Note that the "Hold time" setting is intended to be set such that it does not get triggered by unintentional user movement (for e.g., jitter when user activates the switch). However, some hardware switches might work only for hold time setting of 0ms. This will be a hardware limitation.

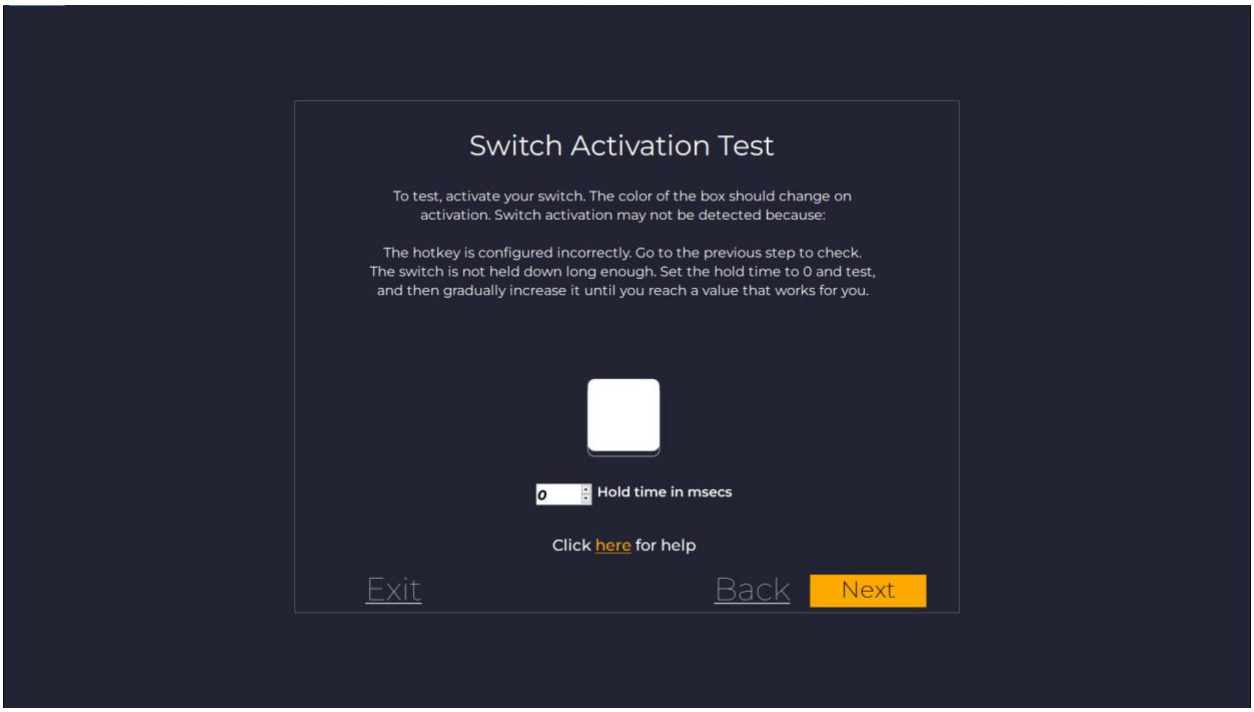


Figure 10 Test, activation key

Camera

The camera switch enables controlling ACAT with your face. The camera on your laptop is used as default by ACAT to control the switch scanning. The camera can detect movement in two different areas:

- Cheeks/mouth (preferred)
- Eyebrows

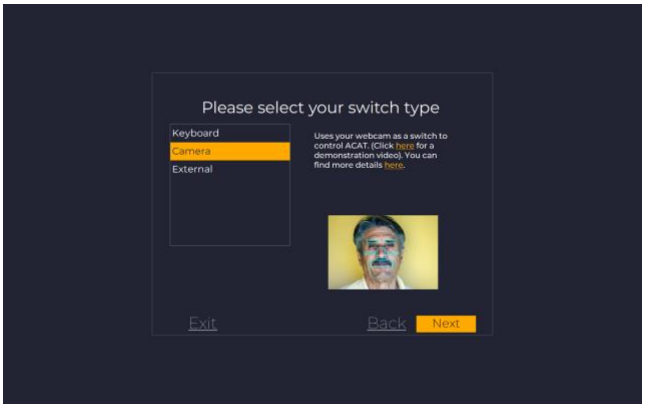


Figure 11 Select and camera as your switch

Clicking Next will bring up the Camera Calibration screen shown in Fig 8 below.

Note: the camera is best used with people who can keep their heads relatively still while doing facial gestures

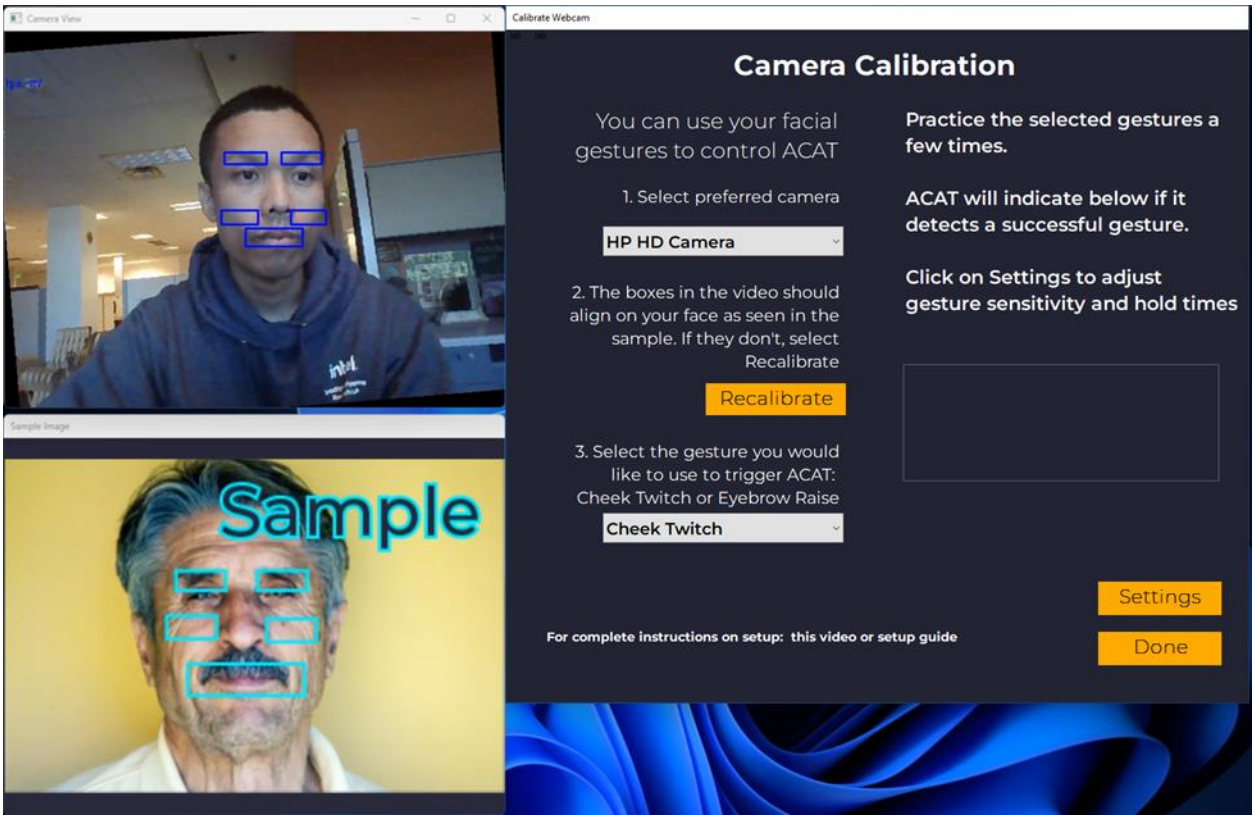


Figure 12 Example of setting up the camera

The upper left box is a view from your camera. ACAT will find a face, if it is in view, and highlight the eyebrows, cheeks and mouth regions.

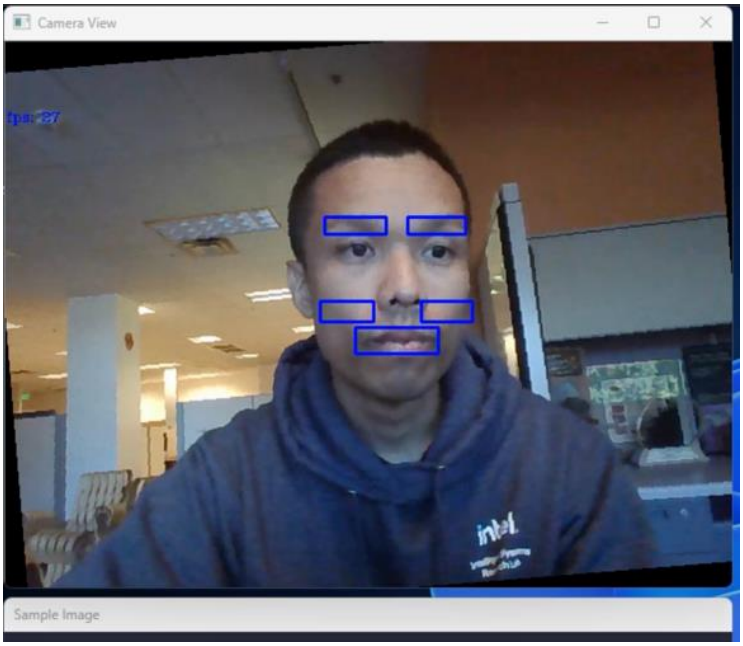


Figure 13 Example of what you will see from your camera view

Note: User's face should be centered in the camera view and positioned within 1.5 feet of the camera. It's important to have good front lighting as well. See example below in Figure 14

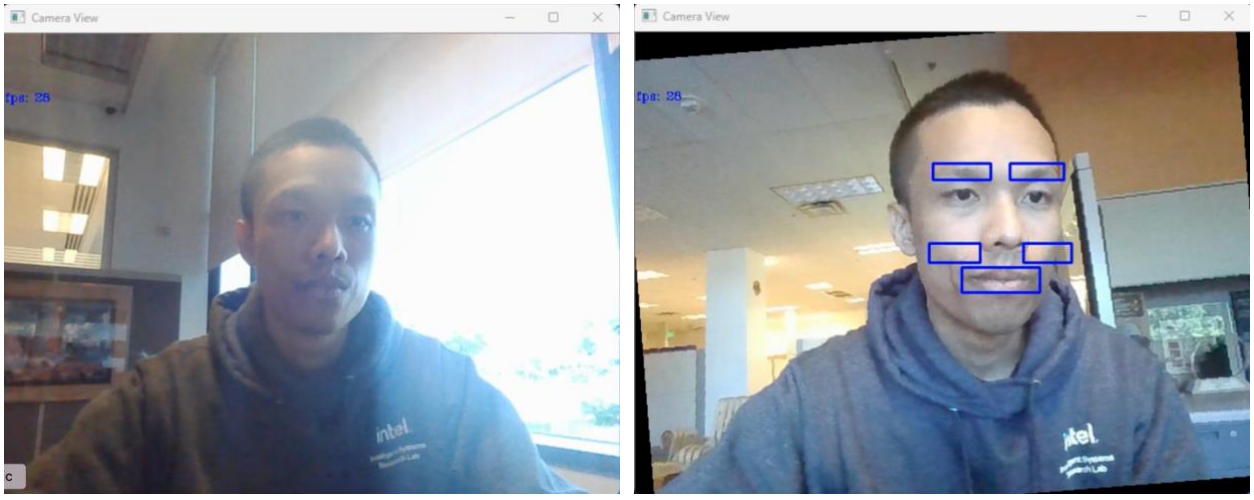


Figure 14. Bad lighting. With light source behind in the in the left picture, and good lighting in the right picture

Note: If you move your cheek or eyebrows, you will see the message "cheek twitch detected" or "eyebrow raise detected" pop up in the box on the right hand side of the camera calibration window above the "Settings" and "Done" buttons (as shown in Figure 15 below).

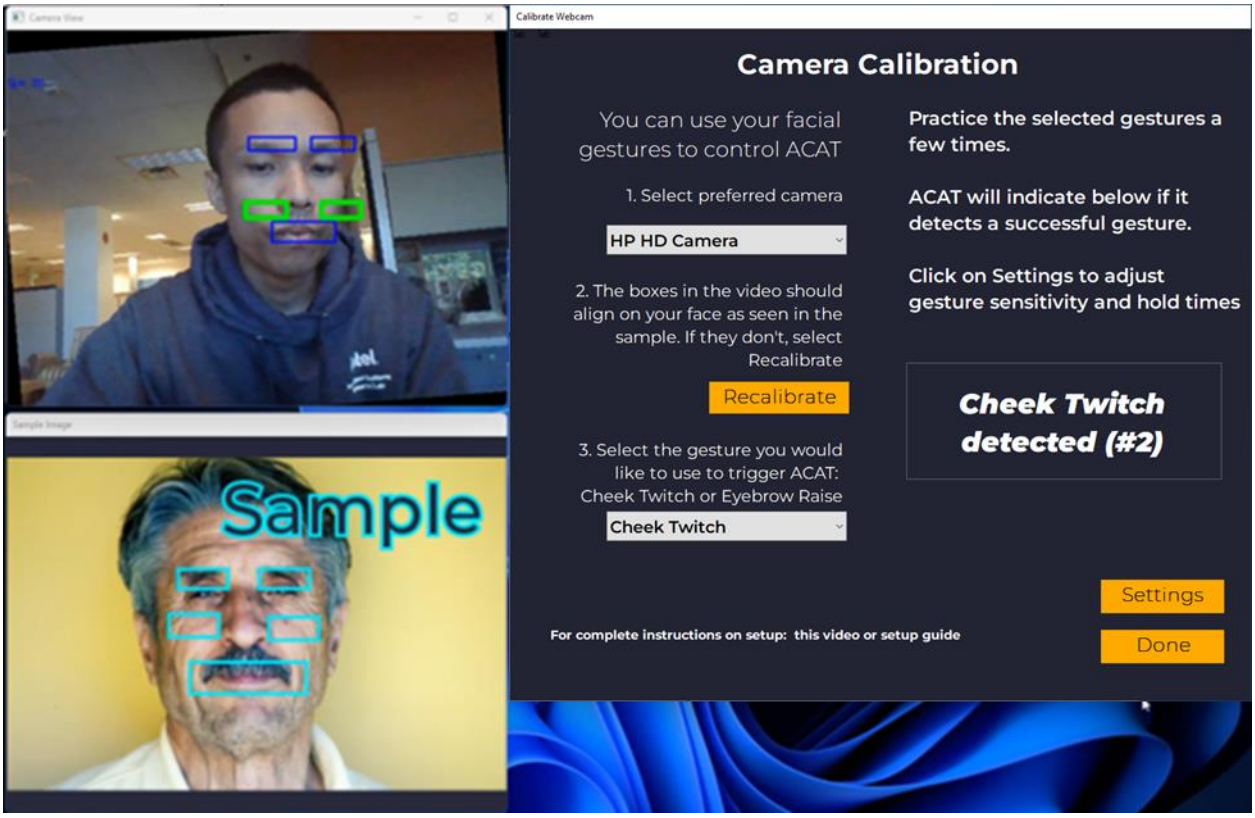


Figure 15 "Cheek twitch, detected" is shown on the right column, indicating the detection of movement in the cheek, along with green boxes, appearing on the face

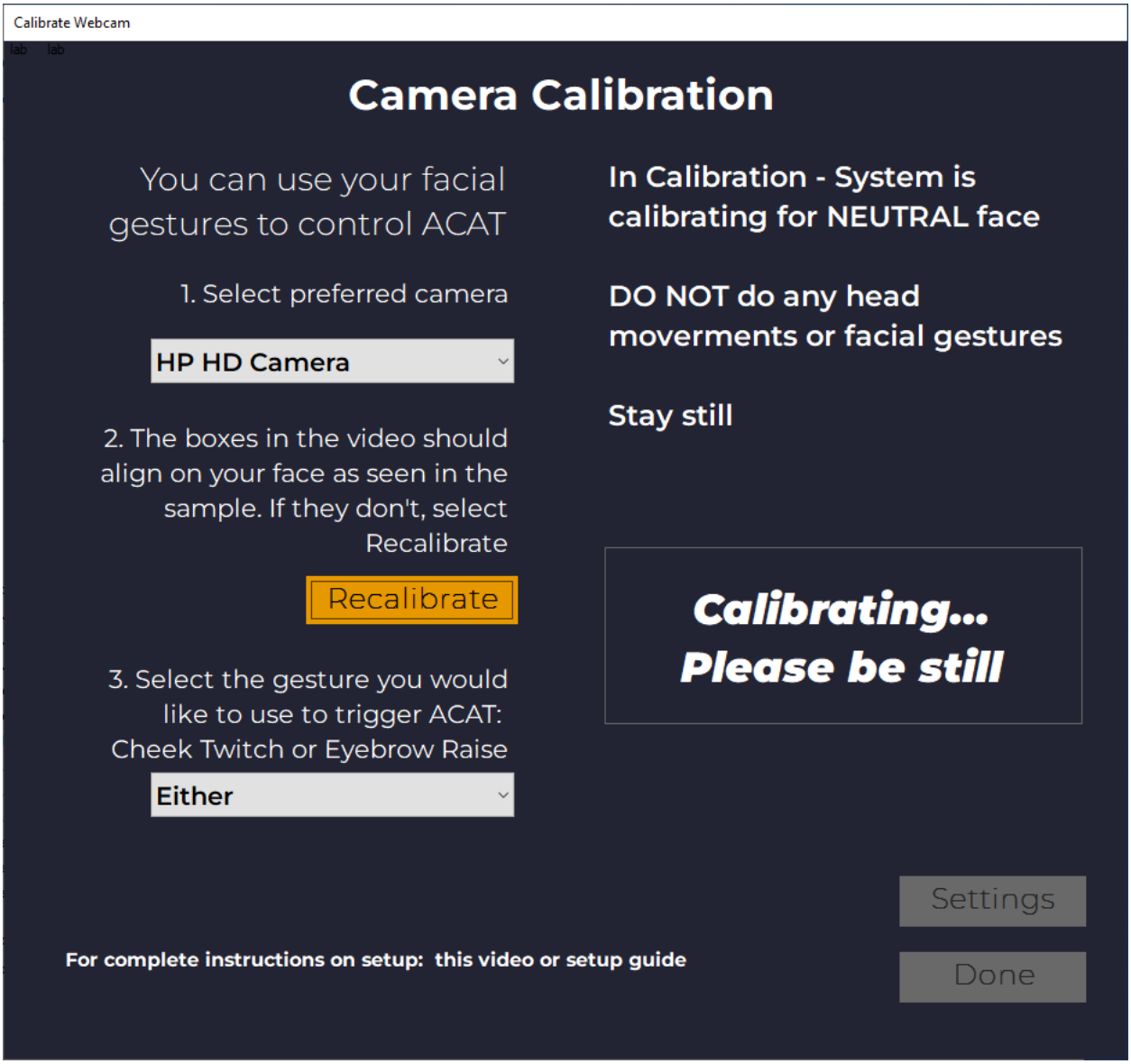


Figure 16 Example of recalibration that you might see pop up periodically when you move.

Note: if you see the message "Calibrating... Please be still" pop up, it indicates that the system is trying to auto-calibrate. Remain still and <u>Do Not</u> make any head movements or facial gestures until the calibration is complete.

When you're in the proper position you can proceed. The default settings will cover most peoples needs. If it seems to work properly for you, you can click done.

1. Most people have one camera on their computer. If you have more than one camera, and would prefer using the other camera, you can change your camera selection from the drop-down list during this step (Figure 17)
2. If the boxes aren't lining up on your face properly, and the system hasn't automatically re-calibrated you can start the recalibration by pushing the "Re-calibrate" button. Otherwise disregard this step.

3. There are three options for controlling ACAT (Figure 18). You can use your cheeks/mouth, or you could use your eyebrows. If you can move both and would like to use either for controlling ACAT, select “Either” from the drop-down selection.
4. "Settings”: If you were not able to successfully see a detection of your selected gesture after calibration, you may want to select “Settings”. Figure 19
5. Click “Done” when you’re happy with your choices.

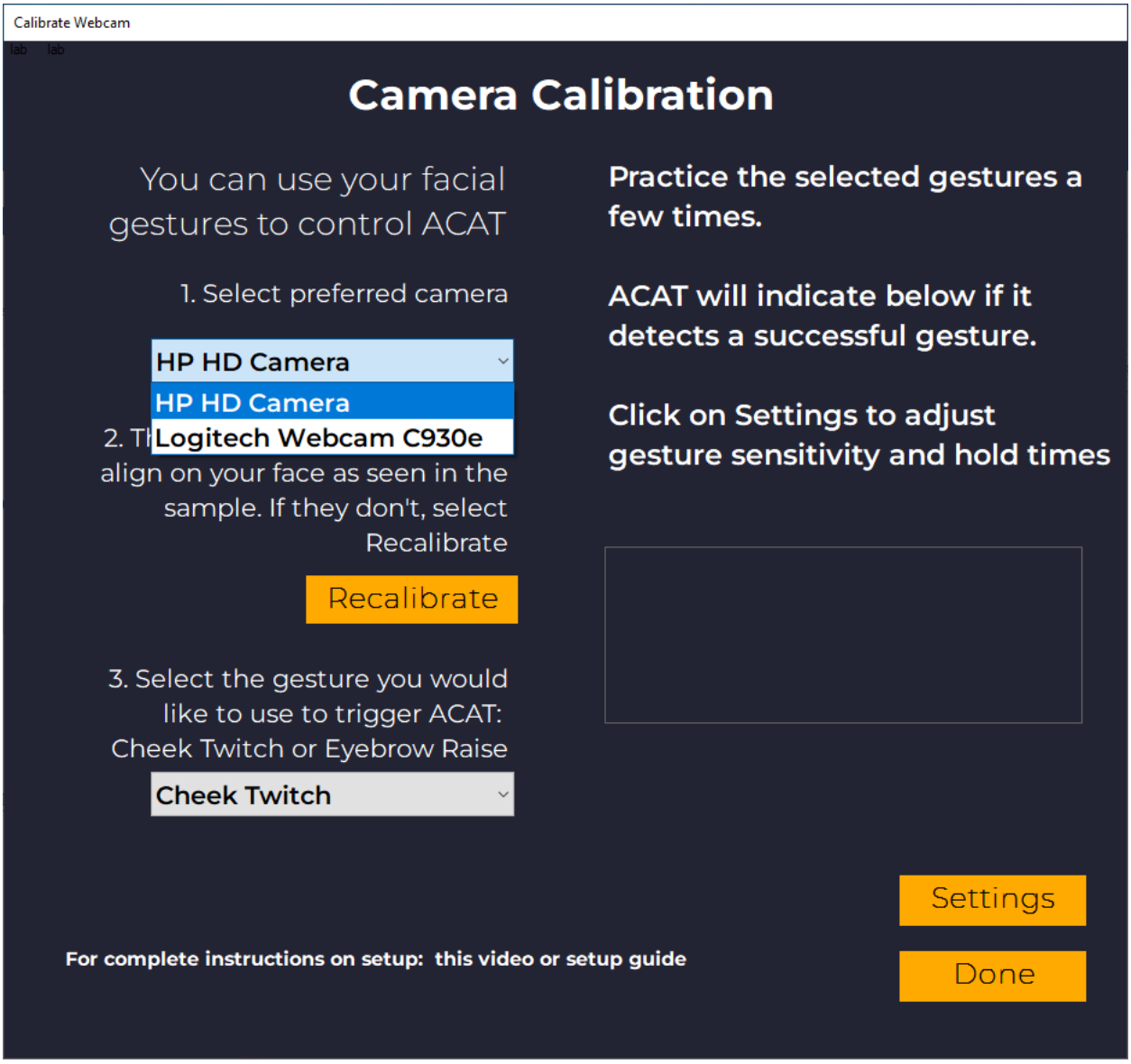


Figure 17 Changing camera

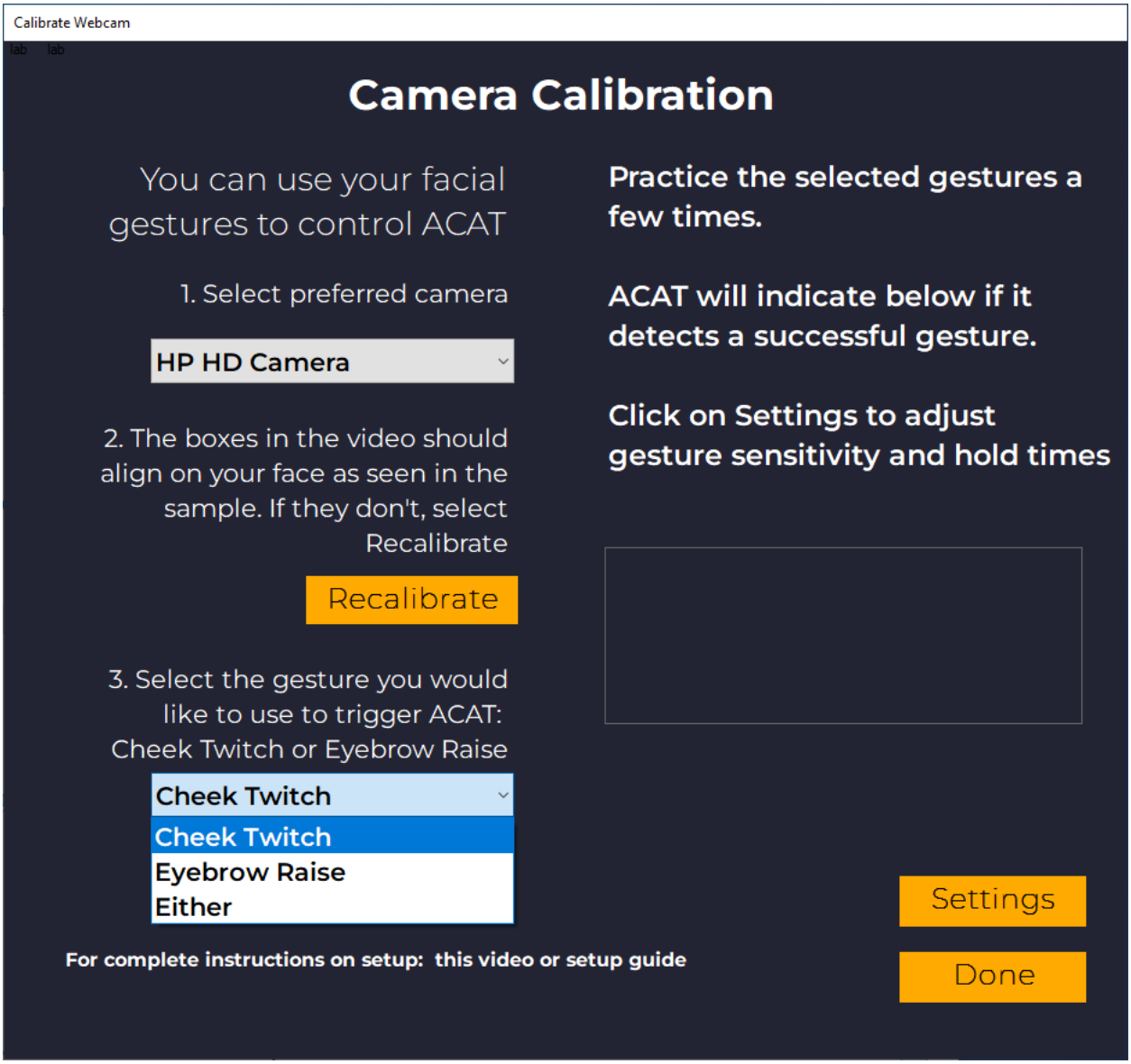


Figure 18 Changing gesture to activate switch

Settings

Settings allows you to adjust the fine details of the camera switch that can help the selected gesture detection work more reliably for your movement.

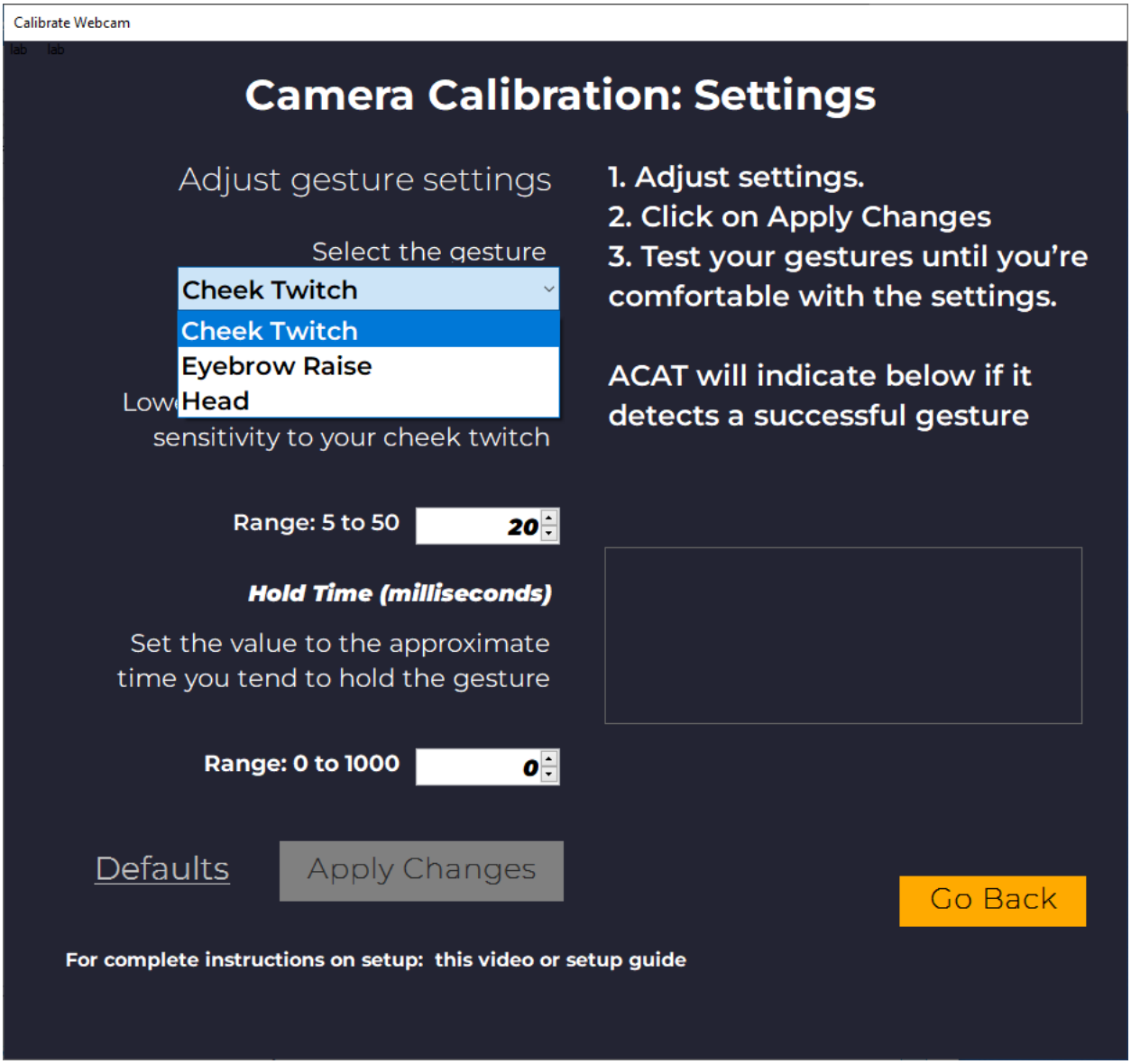


Figure 19 Adjusting the details of camera switch

You can adjust settings for the "Cheek Twitch" and "Eyebrow Raise" Gestures, and recalibration sensitivity to "Head" movements.

Select the gesture you would like to modify using the drop-down list in the top left labelled "Select the gesture" Figure 19

The following describes the settings available for each gesture and when you should consider changing each setting.

- Cheek Twitch / Eyebrow Raise
    - Sensitivity - Controls camera sensitivity of the selected gesture. Lower values will make it easier to trigger ACAT with the gesture and higher values will do the opposite. Consider lowering the value if your intentional movement is not triggering the selected gesture. Consider

increasing the value if the selected gesture is getting triggered by unintentional movement.
    - Hold Time (Milliseconds) - Controls the approximate time you tend to hold the corresponding gesture. A complete gesture corresponds to starting from no-movement (neutral) position → twitching cheek or raising eyebrow → coming back to neutral position. This complete gesture should correspond to one detected gesture in ACAT.
        - If your one complete gesture is triggering 2 gestures in ACAT (one on movement up and the other on movement back to the neutral position, consider increasing this value to approximately correspond to the time you tend to stay in the non-neutral position while performing the gesture.
        - This is especially true for the eyebrow raise gesture.
- Head
    - Sensitivity - Controls how much head movement causes the facial regions/boxes, as seen in the camera view, to adjust. For reliable gesture detection the box position should not change when you are doing the gesture. Increase the value, if you notice the box position changing (jitter in boxes) when you are performing the gesture. Lower the value if the box position does not change if you intentionally move your head.

After you are done modifying the settings, select the highlighted "Apply Changes". Use the "Defaults" button to go back to the default values for each setting, if needed.

Before returning to the main camera calibration screen, practice performing gesture and refining the settings until you're comfortable.

Select "Go Back" to return to the main webcam calibration screen.

Switch Tryout

Now that you have selected your switch, time to test your ability to use it

The Switch Tryout screen allows you to practice using your switch to type simple words. This practice screen will appear after you made your switch choice and before you begin using ACAT for Communications.

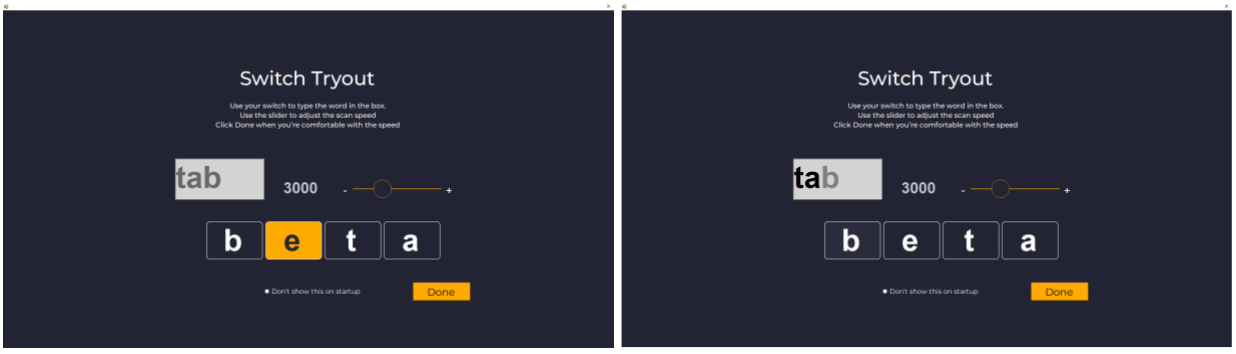


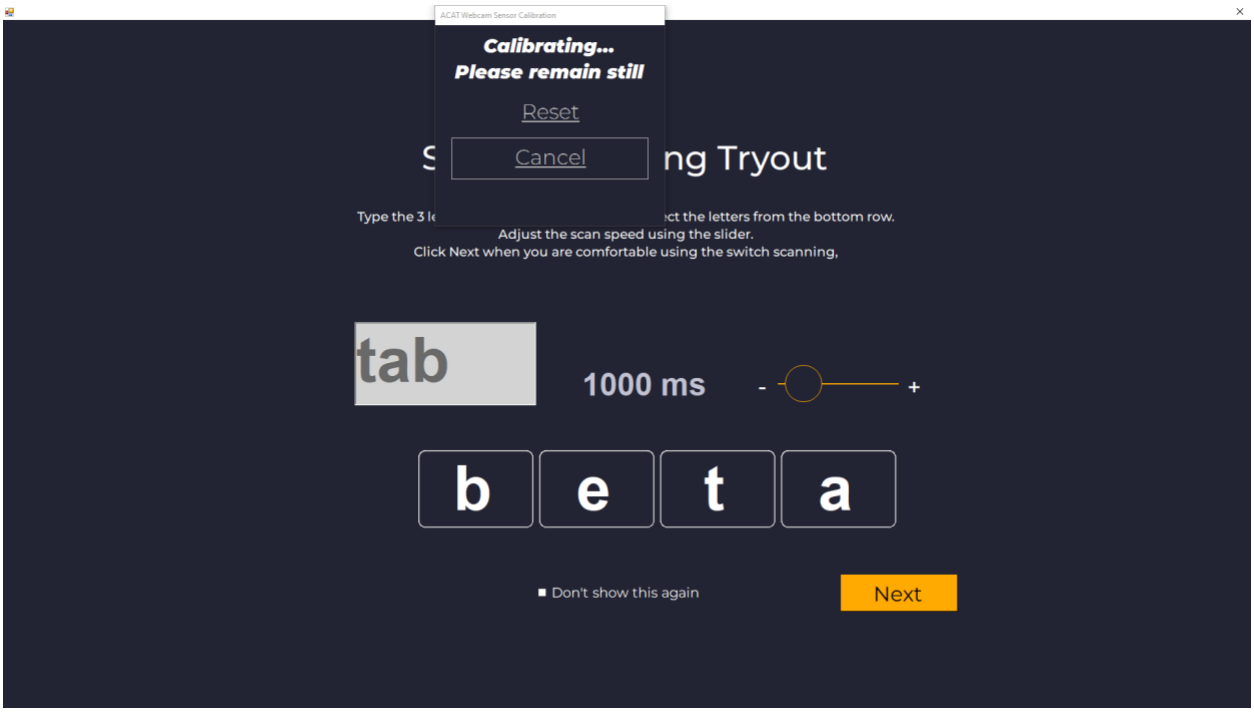
Figure 20 Practicing with your switch. Correctly, selected letters appear in the window, replacing the gray letters

How it works

This is an example of switch scanning. The orange highlight will move from left to right through the letters, at the speed (in milliseconds) indicated by the scroll bar and repeats until a letter is selected. Figure 20

- The goal is to type the word in the gray box, by using the configured switch, to stop the scanning and select a letter. In this example, the word is “tab”.
    - The gray box will continuously populate with new words each time you successfully complete the word.
    - The letter starts out as light gray and turns black when a letter is successfully selected. In this example Figure 20, the first letter you will select is “t” followed by selecting the letter “a” then “b”
- Adjust the speed as needed to make the scanning move at the speed that’s most comfortable for you to use with your switch.
- When you’re comfortable using your switch to select the letters, click “Next”.
- You can check the box ‘Don’t show this again’, if you do not want to tryout the next time you launch ACAT. This can be reenabled through the ACATConfig application by enabling the settings parameter “ShowSwitchTryoutOnStartup” (refer to Section Settings (add link) for details).

Note: if you are using the Camera switch, a “Calibrating …” message might pop-up as seen in Fig ?. Please stay still and do not make any head movements or facial gestures until this message disappears.



Choosing a Keyboard

Choosing the onscreen keyboard layout for you

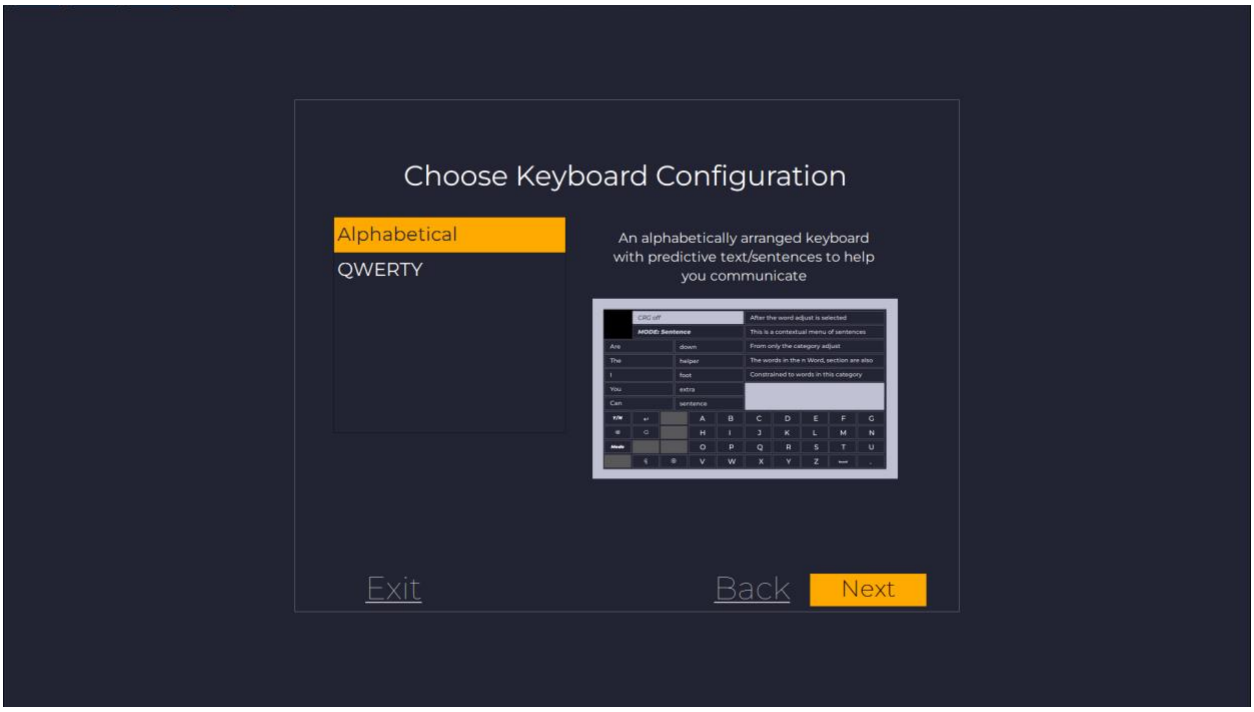
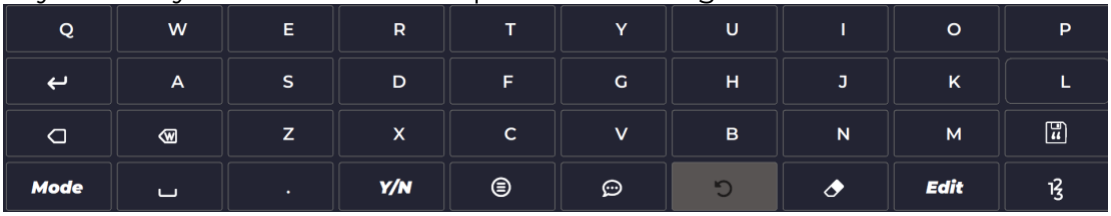


Figure 21 Keyboard selection

We currently offer two keyboards.

- QWERTY keyboard: this is good for most people who have used keyboards before. it is the standard keyboard layout that can be found on 90% of the world's keyboards. It was designed when keyboards were first in use so most people with knowledge of keyboards, have a built-in understanding of this layout.

- Alphabetic keyboard: might be better for a user who is unfamiliar with the keyboard layout. It follows the alphabet A through Z.



Using ACAT

Description of the features

Introduction

Augmented, alternative communication, software (AAC)

ACAT is a software package that is designed specifically for people who have difficulty communicating using speech and using a typical keyboard and mouse. Our software uses a combination of technologies to give people a voice.

- Word prediction: Choosing from a list of words is easier than typing the entire word.
- Sentence prediction: looking at sentences used frequently with the words that have already typed so far.

We try to give these suggestions in context. Striving to predict what someone is trying to communicate so we can cut down on the effort it takes to create that message.

We also have three different modes for you to communicate with hopefully reducing the effort needed to communicate. These modes include:

- Sentence
- Canned phrases
- Short hand

Details about their functionality are in the "Typing Modes"

ACAT Main Screen

Description of all the sections in the main window

The ACAT main screen is the primary interface that lets you communicate by typing text and converting it to speech so others can hear what you want to say.

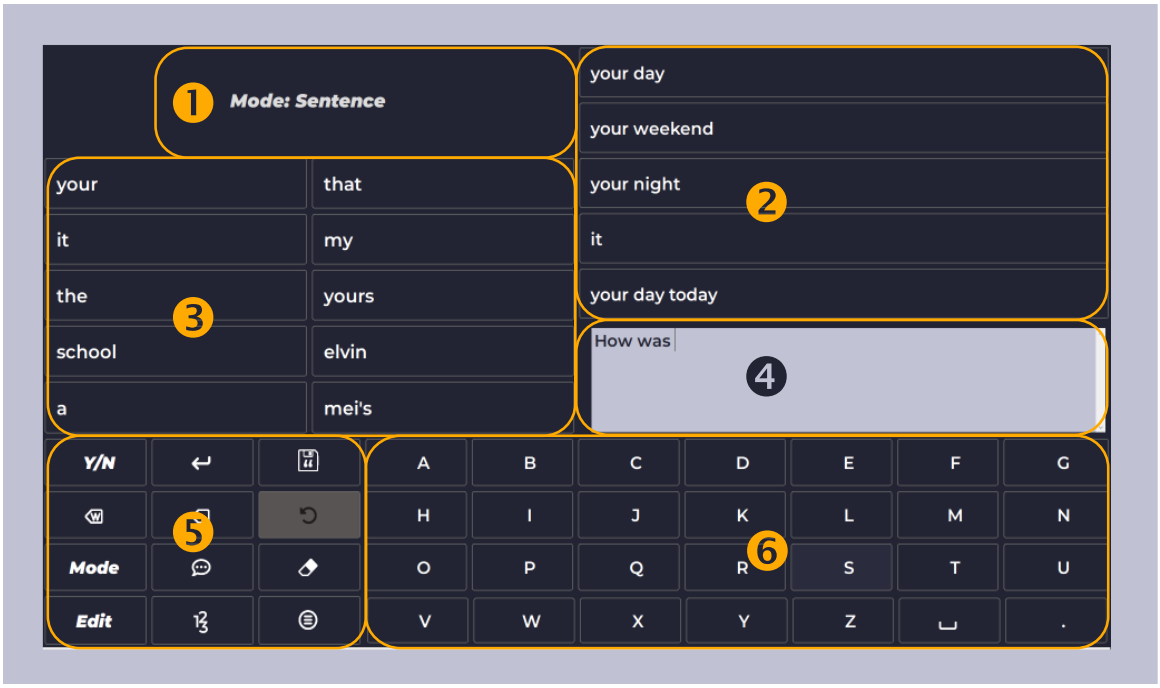


Figure 22: The ACAT Main Screen

1. Current Mode

This block displays the current typing mode.

- Sentence
- Canned Phrase
- Shorthand

2. Phrases

This block has suggestions on possible ways you can complete the sentence you are currently typing based on the words you have entered so far.

3. Predicted Words

Displays a list of the top ten suggested words to either complete the word you are typing or the probable word that would likely follow the word you just typed.

4. Talk Window

This is a text box which displays the text you enter by using the keyboard, the Word Prediction block, or the Phrases block.

5. 5 and 6 Keyboard

ACAT supports two variations of the keyboard:

- QWERTY in which the keys are arranged like a traditional QWERTY keyboard
- Alphabetical in which keys are arranged alphabetically.

Interaction

ACAT uses switch scanning. If you are not familiar with switch scanning and how to use your switch to select, please refer to "Switch, Scanning".

ACAT scans (or highlights) the four main blocks - Predicted Words, Phrases, Keyboard Left and Keyboard Right in sequence. Activate your switch when the desired block is highlighted. For instance, if you want to select a word from the Predicted Words list, actuate your switch when the "Predicted Words" block is highlighted. ACAT will then begin to scan the words within that block. Activate your switch when the desired word is highlighted and ACAT will type the word into the Talk Window.

Note: ACAT scans the four main blocks four times. If you have not activated your switch during these scans, it stops scanning. To resume scanning, simply activate the switch.

Example

Let's type the sentence "Nice to see you" using letters, word predictions and sentence completions. Follow the steps below.

Note: If ACAT is not already scanning. Activate your switch to begin scanning

1. Type the letter "N"
    a. Wait for the Keyboard block to get highlighted.
    b. When the "Letters" keyboard is highlighted click your switch
    c. The rows will begin to highlight, starting at the top and going down. When the row with the letter N is highlighted click your switch.

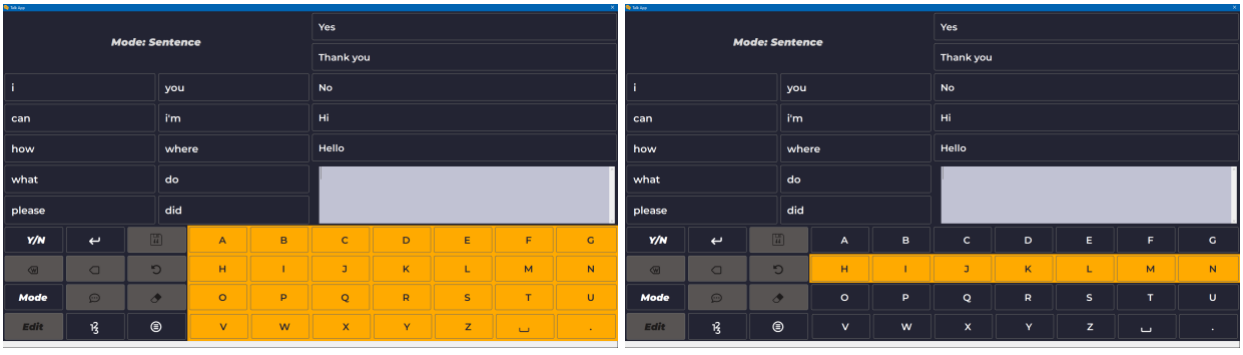


Figure 23 Selecting keyboard section - selecting the row with the letter "N"

    d. The letters in this row will now begin to highlight. When it reaches the letter N. Click your switch.
    e. The letter will populate into the talk window, and the predictive words will update in relation to your letter selection.

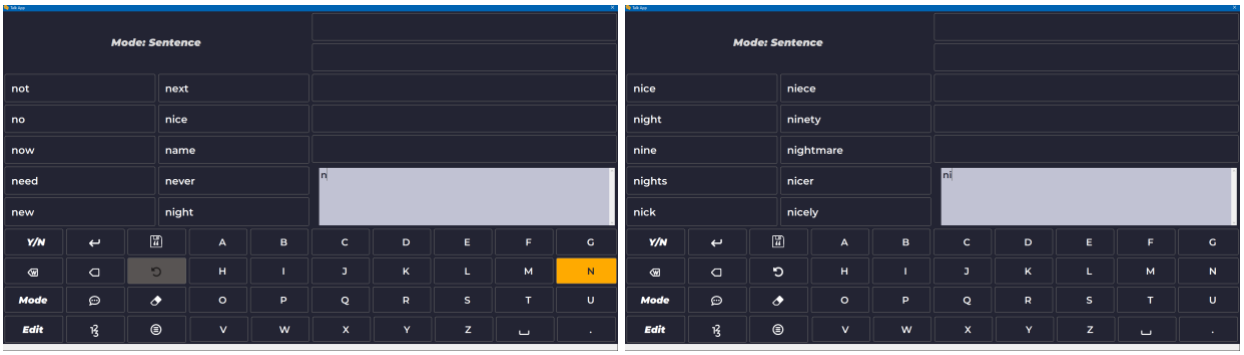


Figure 24: selecting the correct letter. The letter N is added to the talk window

2. Now let's select the word "nice"
    a. The highlighted section will begin to move through all four blocks of the screen. When it reaches the "predictive words" block, click your switch.
    b. The scanning will now begin to highlight each word, starting in the upper left and ending in the bottom, right. The word you need is "nice" and it is in the very first position. If you miss it the first time, don't worry click it the second time it goes by.
    c. The word "nice" will populate into the talk window replacing the letters that are currently there.

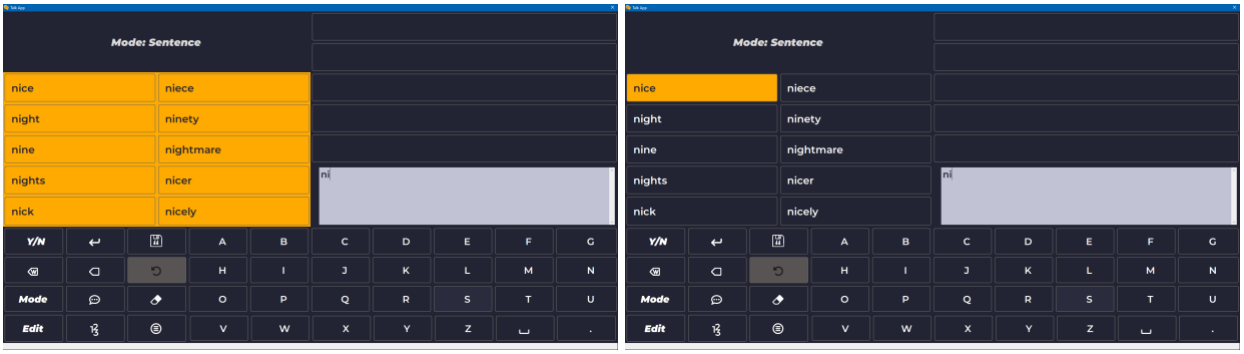


Figure 25: highlighting the predictive text. - Scanning begins for the individual words

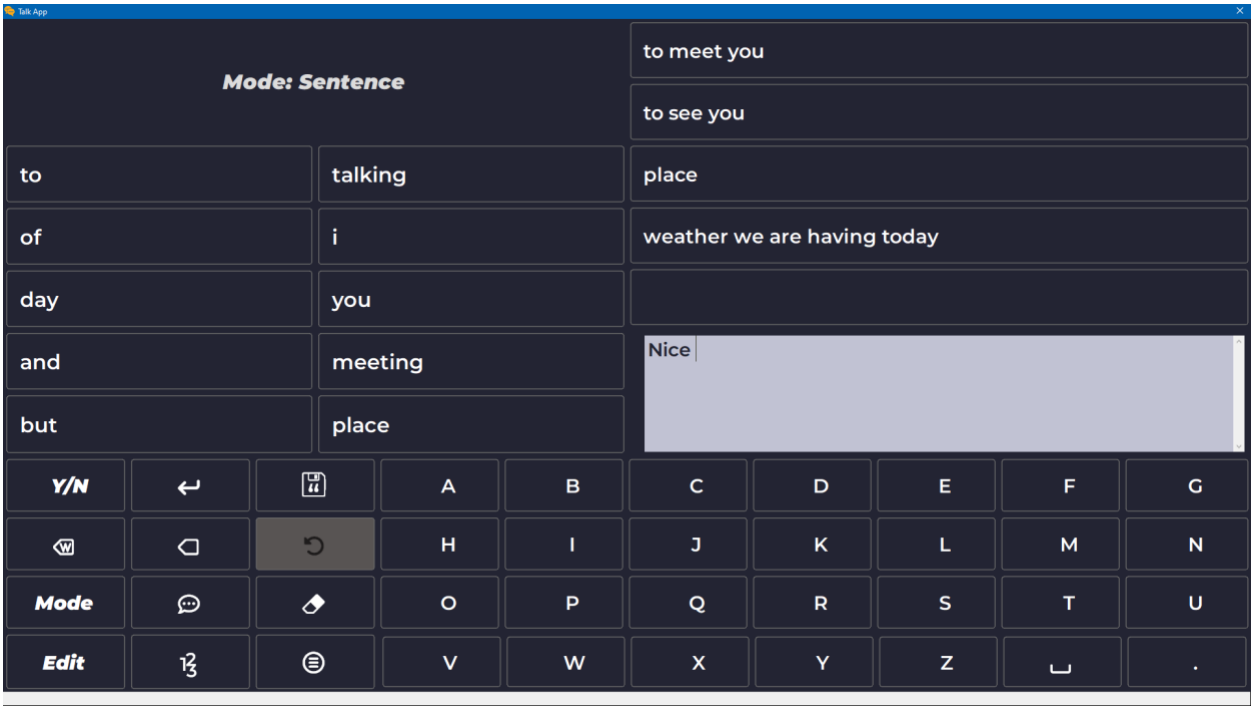


Figure 26: "nice" replaces "ni" in the talk window.

3. Sentence completion is now possible. You can see possible completions to the sentence beginning with the word "nice"
    a. The switch scanning will begin again going through all four blocks of the screen. When the predictive phrases section is highlighted, click your switch.
    b. The sentence completions will now begin to highlight, starting at the top and going down. When it reaches "to meet you" click your switch.
    c. The talk window now reads "nice to meet you"

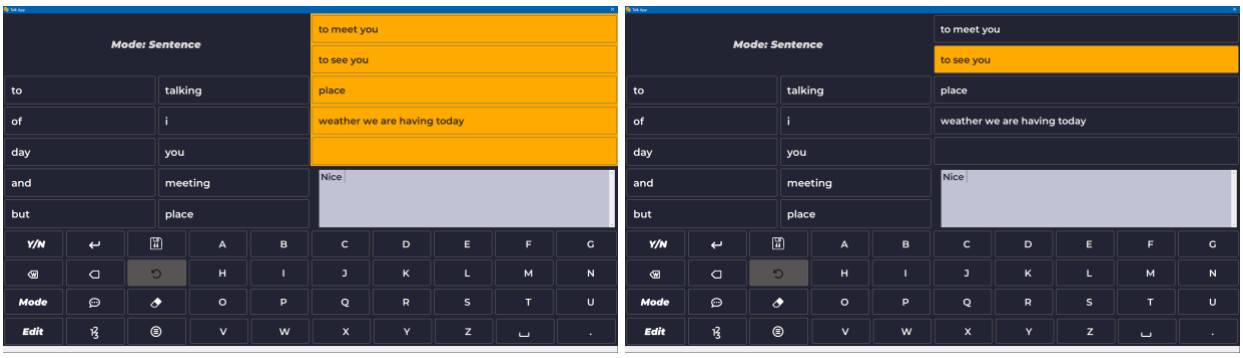


Figure 27: Select the predictive Sentence section. - Select the end of the sentence

Note: When you are in the middle of typing a word, only the predictive words are displayed – the predictive phrases block is empty. The predictive phrases block gets populated only at the end of a word (indicated by a space, period or new line).

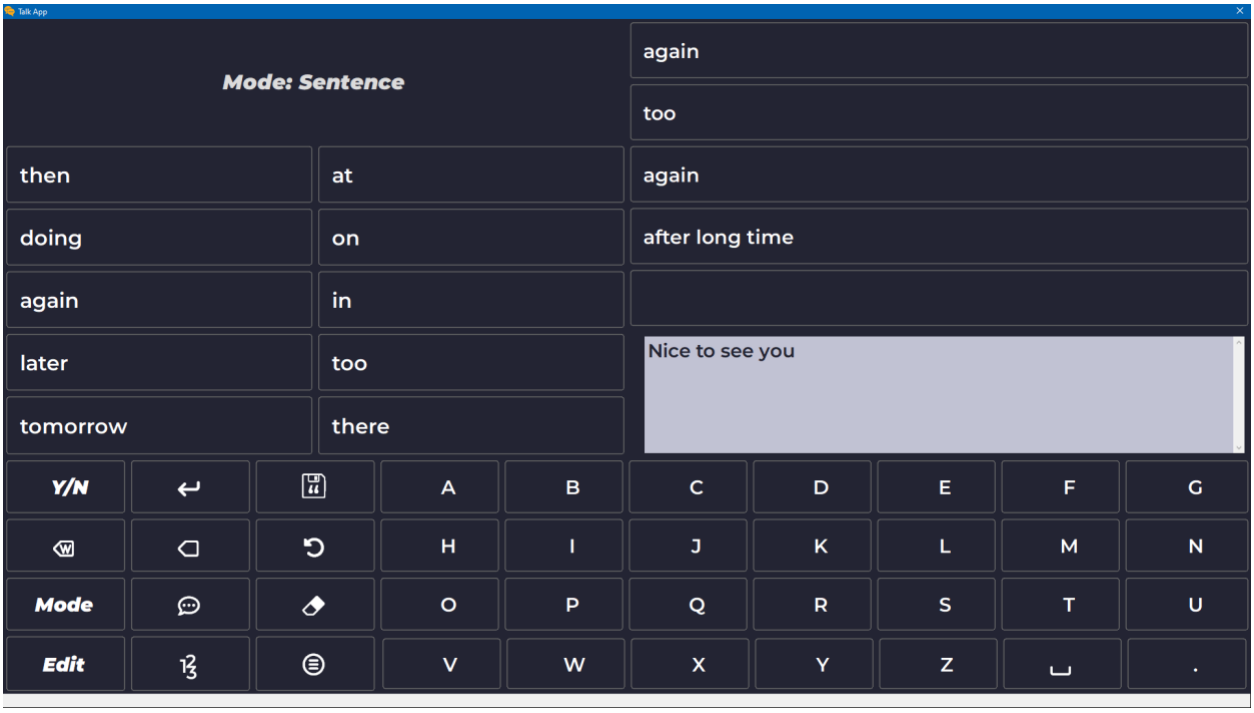


Figure 28: the sentence is now complete and can be spoken

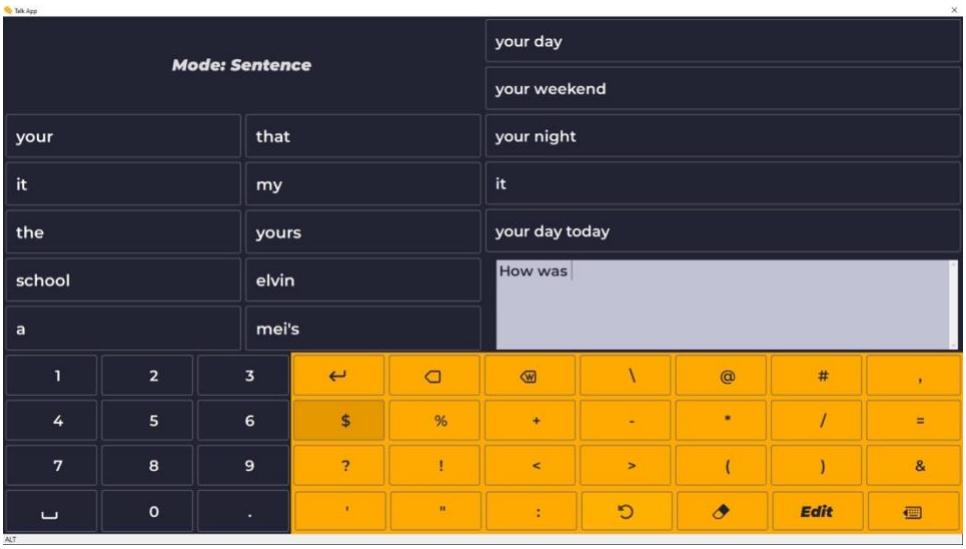
4. To speak your sentence "Nice to see you"
    a. There are two buttons in the main keyboard that will begin speaking anything in the talk window.
        i. The ENTER button 
        ii. The Speak button 
    b. Activate either of these buttons to have the text in the talk window read out aloud.

Sentence Mode

This mode prioritizes sentence completion.

One of the three typing modes. This mode does its best to elevate sentences that you may use frequently and fits in context to what you have already written. Review the Disclaimer, prior to using this mode.

Note: it's important to remember that sentences may not always appear complete in the sentence completion area. This is because it is attempting to complete the sentence that you have already started typing.



For example, when you type “How was”, completions of the sentence appear in the phrases block – such as, “your day”, “your weekend”... Once you find and select the phrase that you want to say, you can click on the  or  to speak the phrase.

Note: Phrases/completions that you have used often in the past, are more likely to show up in the list.

User-control of sentence completions

ACAT enables the user to control the phrases that show up in the sentence completions block in two ways.

Personalize the list of allowed words

The sentence completions are generated by a combination of database retrieval and an AI model. The AI model that was originally trained on large amount of internet data has been adapted to this use-case. We have put in a lot of effort to make generated text less toxic and hurtful, by filtering out a large set of pre-defined toxic words. For example, the word “hell” exists in the toxic words list and will by default not show up in the sentence completions. However, we do not want to limit user’s expression and personality in usage of words that they are used to in their conversations. To enable this, we personalize the toxicity levels for the user. This can be done in two ways:

1. If a user uses a toxic word in the Sentence Mode by typing and uses the  or  button, the word gets saved into the “personalized_allowed_toxicwords.txt” file in the ACAT personalized folder automatically.

2. We also allow users/care-givers to configure words that they DO NOT want filtered out. To do this, follow the below steps:
    A) Navigate to the personalized folder (for e.g., C:\Users\userid\Documents\ACAT\Users\DefaultUser\en\WordPredictors\ConvAssist\Database)
    B) You will find the file named “personalized_allowed_toxicwords.txt”. Open the file and add each word that the system is filtering out by default, but you want to allow the system to show in sentence completions, one word per line. For reference, the list of words that are getting filtered out by default can be found in the file C:\Program Files (x86)\ACAT\en\WordPredictors\ConvAssist\filter_words.txt
    C) Save and close the file.

Next time, when the model generates suggestions containing the allowed toxic words based on the typed input, the suggestions will not get filtered out, and will be shown in the phrases block.

Limited vocabulary sentence completions

A user can enable limited vocabulary sentence completion by enabling the “EnableSmallVocabularySenetncePrediction” parameter in the ACATConfig application. This will only use the completions from the database containing user’s past utterances and the AAC dataset (and not use the AI model based completions).

Disable sentence completions

A user can disable the predictive sentence completion completely. This can be done through the ACATConfig application by disabling the settings parameter “UseSentencePrediction” (refer to Section Settings (add link) for details).

Canned Phrase Mode

Our predictions are reduced to phrases that you have saved and use frequently

There are often phrases that a user might be using frequently, for example, “Can you get me some coffee”. Such phrases can be easily saved and retrieved in this mode.

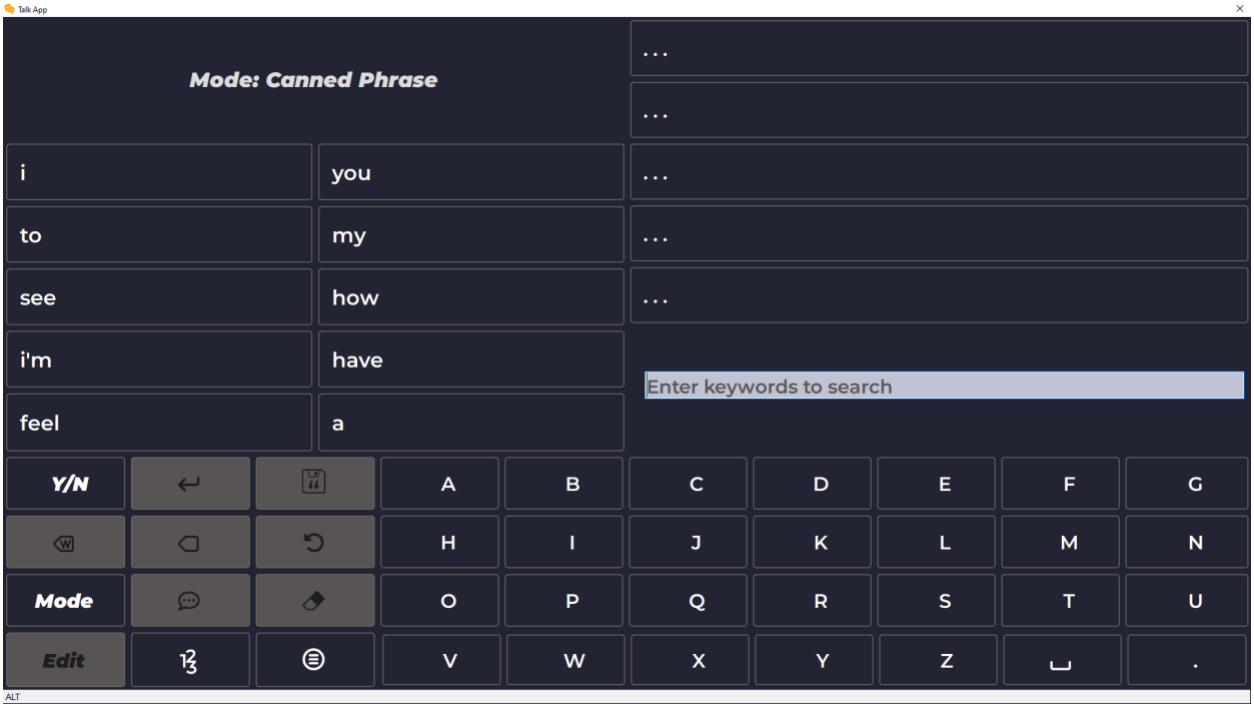


Figure 29

Searching for a phrase

Simply type in the talk window. As you type the letters, the predicted words and phrases will update. After a search word is entered, the phrases corresponding to the word appear in the phrases window.

Adding a new phrase

You can also add new phrases to the canned phrases list. This can be done by following the steps below:

A) Navigate to the sentence mode
B) Type the new phrase in the talk window
C) Click  on the Left Keyboard pane to save the phrase

Adding new phrases outside of ACAT

If you already know a set of phrases that you frequently use, instead of adding one phrase at a time via ACAT (as described above), a loved one can quickly add these outside of the ACAT application through a notepad application. To do this:

A) Navigate to the user's personalized files folder
B) Open the file "personalizedCannedPhrases.txt"
C) Add one phrase per line
D) Save and close the file.

These newly added phrases will be updated to appear on ACAT the next time you restart the application.

Shorthand Mode

Designed for quick interactions

This mode is designed for quick communication, especially with caregiver or loved ones without worrying about being grammatically correct. In this way, users can create short messages that are meaningful and quick. For instance, just the word “window” would be enough context for a caregiver to understand that you might need help with opening or closing the window.

Note that in this mode, no phrase completions are shown.

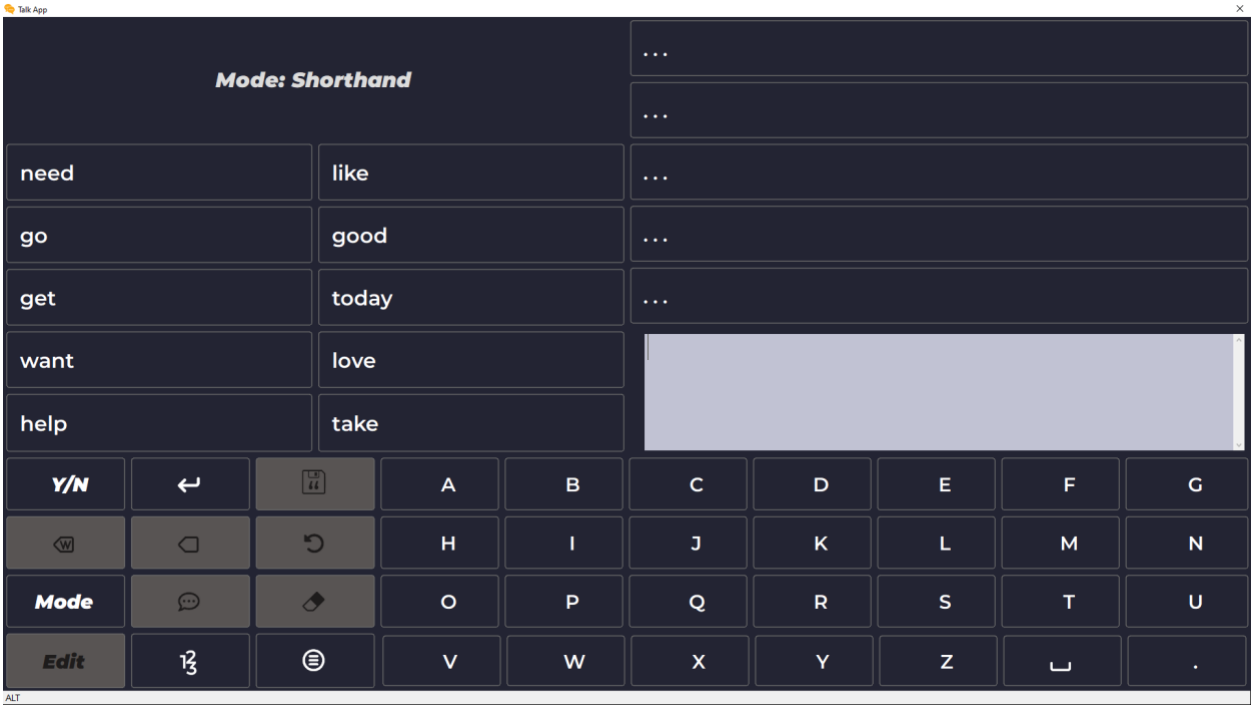


Figure 30

The Main Keyboard

We offer two keyboard options - QWERTY and Alphabetical.

Figure 31: The alphabetical keyboard

Figure 32: The QWERTY Keyboard

The table below lists all the buttons on the main keyboard, and what they mean.

Button	Function	Description
Y/N	Display Yes/No Dialog	Displays a dialog with buttons for "Yes" and “No". Selecting a button speaks a "Yes" or a "No". Useful for giving quick Yes/No
↵	ENTER	The ENTER key, Speaks any typing that has been entered in the talk window
	Save to Canned Phrases	Save the current sentence as a Canned Phrase. Refer to section
	Delete previous word	If the cursor is in the middle of a word, deletes the word. Otherwise deletes the previous word.
	Backspace	Deletes the previous character.
	Undo last action	Undoes the last edit change. If you typed a letter, deletes it. If you completed a word or inserted a new word from the word prediction list, deletes the word. If you inserted a phrase, deletes it. **Note: ACAT does not support multiple levels of undo.**

Button	Function	Description
Mode	Change typing mode	Displays a dialog that allows you to select the typing mode: Sentence, Phrase or Shorthand.
	Speak	Speaks whatever has been written in the talk window.
	Clear Talk Window	Clears the text in the Talk Window.
Edit	Display Edit keyboard	Open the new keyboard that allows you to edit anything written in the talk window.
	Display Numeric/Punctuations keyboard	Displays a keyboard with numbers, punctuations, and non-alphanumeric characters.
	Display Main Menu	The Main Menu has options to change settings, calibrate the switch and exiting the application.

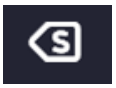
The Edit Keyboard

The Edit keyboard is displayed when you select Edit from the main keyboard. It allows you to move the cursor in the Talk Window and modify the text.

Figure 33: The Edit Keyboard

The table below lists all the buttons in the Edit keyboard, and what they mean.

Button	Function	Description
	Left	Moves the cursor one character to the left.
	Right	Moves the cursor one character to the right.
	Up	Moves the cursor one line up.
	Down	Moves the cursor one line down.
	Page Up	Moves the cursor one page up.
	Page Down	Moves the cursor one page down.
	Previous Word	Moves the cursor to the beginning of the previous word.
	Next Word	Moves the cursor to the beginning of the next word.
	Previous Sentence	Moves the cursor to the beginning of the previous sentence.
	Next Sentence	Moves the cursor to the beginning of the next sentence.

Button	Function	Description
	Previous Paragraph	Moves the cursor to the beginning of the previous paragraph.
	Next Paragraph	Moves the cursor to the beginning of the next paragraph.
	Backspace	Deletes the previous character.
	Del	Deletes the next character.
	Delete Previous Word	Deletes the previous word. If the cursor is inside a word, deletes the word.
	Delete Next Word	Deletes the next word. If the cursor is inside a word, deletes the word.
	Delete Previous Sentence	Deletes the previous sentence. If the cursor is inside a sentence, deletes the sentence.
	Delete Next Sentence	Deletes the next sentence. If the cursor is inside a sentence, deletes the sentence.
	Home	Moves the cursor to the beginning of the line the cursor is in.
	End	Moves the cursor to the end of the line the cursor is in.

Button	Function	Description
	Undo Last Action	Undoes the last edit change. If you typed a letter, deletes it. If you completed a word or inserted a new word from the word prediction list, deletes the word. If you inserted a phrase, deletes it. Note: ACAT does not support multiple levels of undo.
	Top	Moves the cursor to the top of the Talk Window.
	Bottom	Moves the cursor to the bottom of the Talk Window.
	Go Back	Goes back to the main keyboard.

The Numeric/Punctuations Keyboard

The Numeric/Punctuations keyboard can be used to enter numbers, punctuations and non-alphanumeric characters such as @, $, (,), etc.

Figure 34: numeric/punctuation keyboard

The Yes/No Dialog

Use the Yes/No dialog to respond to questions with a Yes or a No answer quickly. You can display this dialog by selecting the  button from the main keyboard.

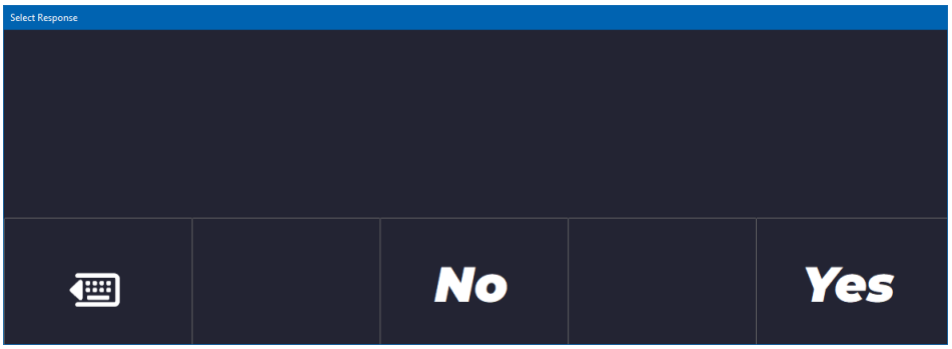


Figure 35: Yes/No Dialog

Note: The blank buttons give you extra time to select Yes or No. Selecting the blank buttons has no effect.

The following table lists the buttons in the dialog and what they mean.

Button	Function	Description
	Close	Closes the dialog
	Respond "No"	Displays the word "No" at the top of the dialog and speaks the word "No"
	Respond "Yes"	Displays the word "Yes" at the top of the dialog and speaks the word "Yes"
Blank	None	Selecting the blank buttons has no effect.

Interaction

ACAT scans the five buttons in sequence. To select "No", wait for the button to highlight.

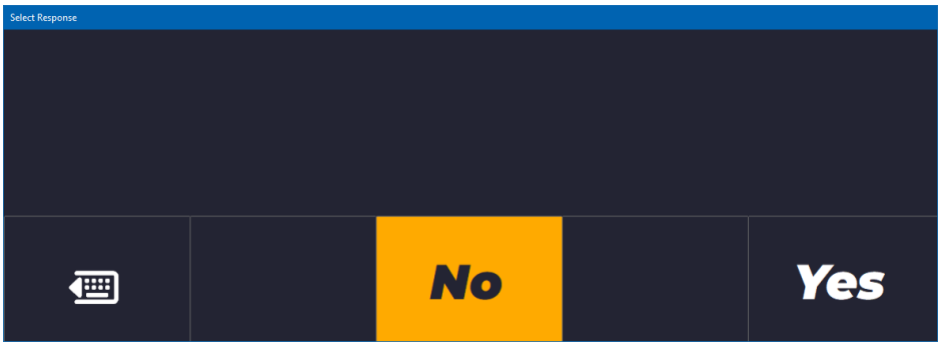


Figure 36: select “no”

While the "No" button is highlighted, activate your switch. ACAT will display the word "No" at the top of the dialog and will also speak the word "No".

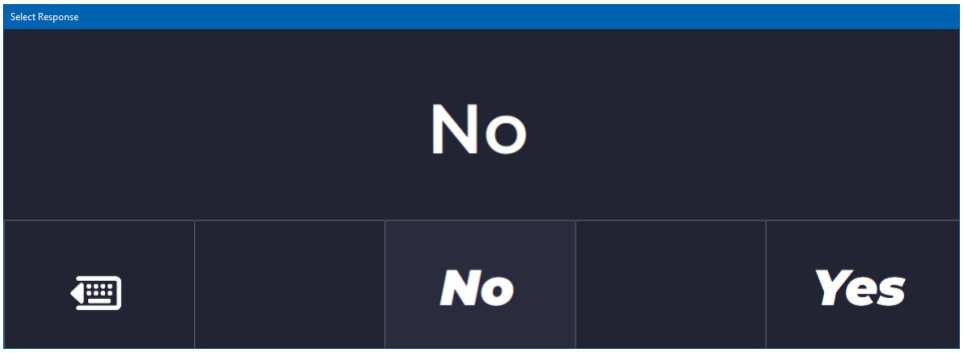


Figure 37: “no” is spoken.

Similarly, you can select the "Yes" button as well.

To close the dialog, select the  button.

Select Typing Mode Dialog

You can change the typing mode through the Select Typing Mode dialog. Select the **Mode** button from the main keyboard

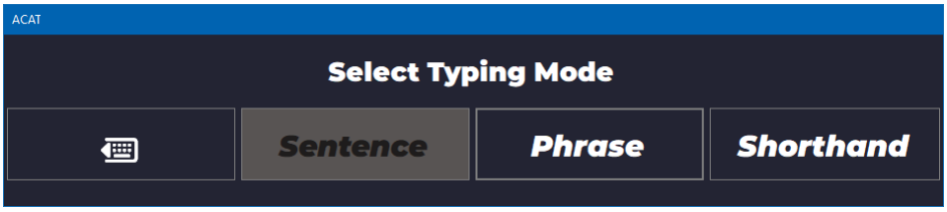


Figure 38: The Select Typing Mode dialog.

The following table lists the buttons in the dialog and what they mean.

Button	Function	Description
	Close	Closes the dialog
	Sentence Mode	Changes the typing mode to “Sentence”.
	Phrase Mode	Changes the typing mode to “Canned Phrase”
	Shorthand Mode	Changes the typing mode to “Shorthand”.

Interaction

Note: The button corresponding to the current typing mode is grayed out.

ACAT scans the four buttons in sequence. To change the typing mode to “Canned Phrase” for instance, wait for the “Phrase” button to be highlighted. Activate your switch.

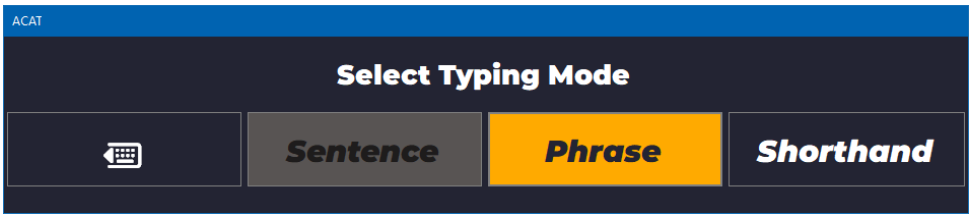


Figure 39: typing mode dialogue, box

ACAT will prompt you to confirm your mode change selection

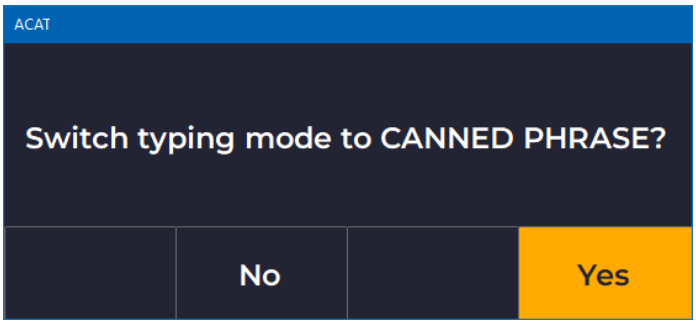


Figure 40: confirmation dialog box

Select “Yes”. This will close the dialog and take you back to the main screen. You will see the selected mode will be displayed at the top left of the window.

The Main Menu

You can go to the ACAT Main Menu by selecting  from the main keyboard.

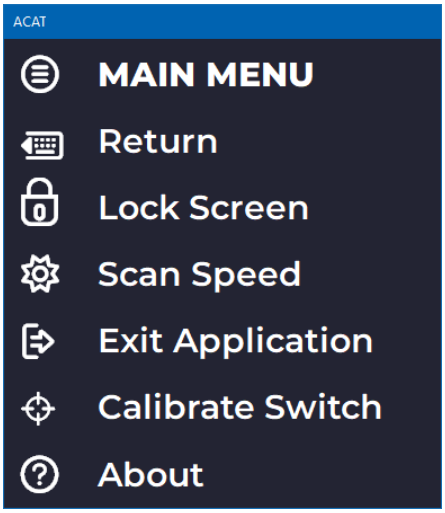


Figure 41: The Main Menu dialogue box

Note that the Calibrate Switch menu option is enabled only for the Camera switch and can be accessed only using a mouse. It is intended for use with the assistance of a caregiver/helper when user is having trouble using the facial gestures reliably.

The following table describes the options in the menu.

Button	Function	Description
	Return	Closes the menu.
	Lock Screen	Displays a dialog with a numeric pin which must be entered to unlock the screen.
	Display Scan Speed Dialog	Displays a dialog to adjust the scanning speed.

Button	Function	Description
	Exit Application	Exits the ACAT application.
	Calibrate Switch	Adjust settings for the input switch you are currently using. ***Note: This option is selectable only for the Camera switch*** ***Note: This option is not a part of the scanning sequence since it requires the use of a mouse and keyboard. The caregiver can select this button.***
	About	Displays the About box for the application.

Lock Screen

ACAT Lock Screen generates a random 4 digit numeric pin you must enter with your input switch to unlock the screen.

You can lock the screen by selecting "Lock Screen" from the Main Menu

The following confirmation dialog is displayed. Using your input switch, select "Yes" to lock the screen.

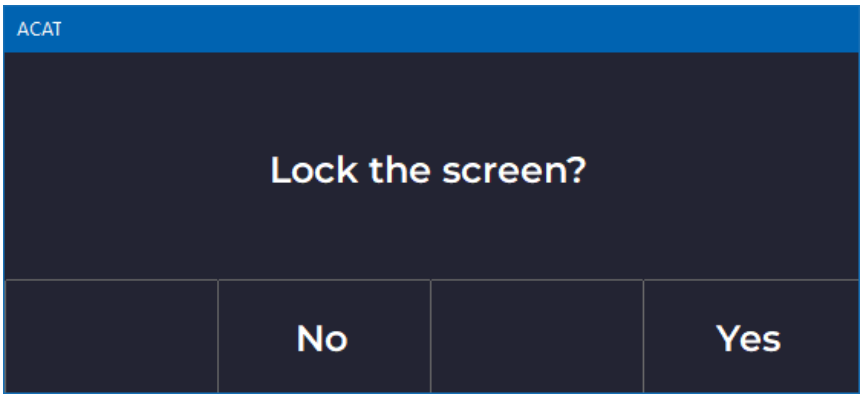


Figure 42: Lock screen, confirmation dialog box

The lock screen dialog displays a random 4-digit pin.

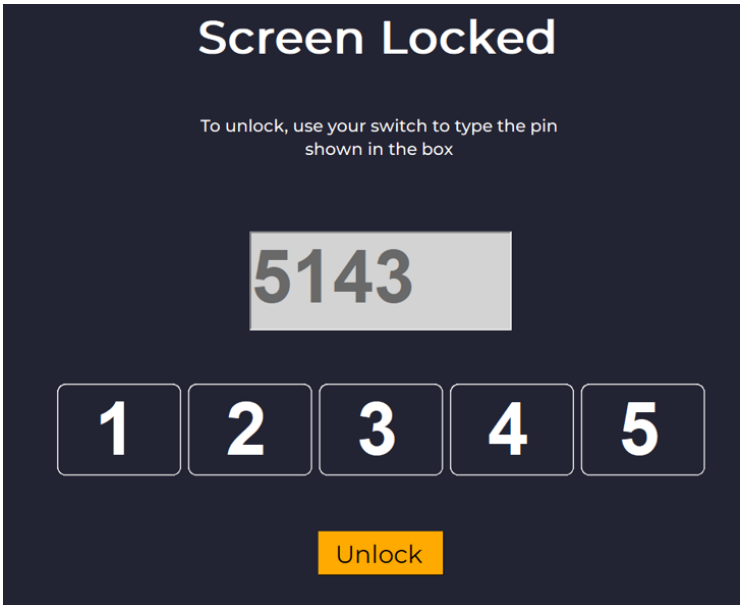


Figure 43: The Lock Screen Dialog

The gray box displays the pin you must type using your input switch.

ACAT scans the five buttons. When the desired number is highlighted, activate your switch and the selected number will be displayed replacing the gray number. Continue this until you have entered all four digits of the pins correctly and ACAT will close the dialog.

Note: If at any point you select the wrong digit, you will have to start all over again. This is to avoid accidental unlocking due to unintentional activations of the switch.

The screen can also be unlocked by typing the pin using the physical keyboard, or by clicking the "Unlock" button with a mouse.

Adjust Scanning Speed

The speed in different selectable UI elements (blocks or buttons) are highlighted is referred to as “scanning speed”. The speed and accuracy of typing using a switch depends on how quickly and reliably you can actuate your switch.

If the scan time is set too low, the target stays highlighted for a shorter duration and you may not be able to react quickly enough to select it. If the scan time is too high, you will have enough time to react and select the target with greater accuracy, but your typing speed will be slower.

You can adjust the scanning speed using the Adjust Scanning Speed dialog from the Main Menu.

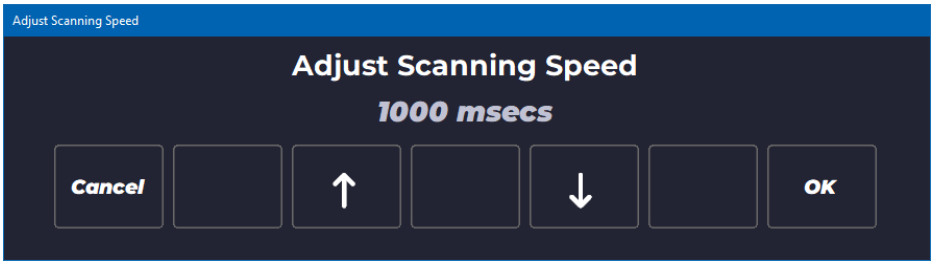


Figure 44: The Adjust Scanning Speed Dialog

The following table lists the buttons in the dialog and what they mean.

Button	Function	Description
Cancel	Close	Closes the dialog. Any changes to the scan speed are not saved.
↑	Faster	Increase the scanning speed. Reduces scan time in steps of 50 milliseconds.
↓	Slower	Reduce the scanning speed. Increases scan time in steps of 50 milliseconds.
OK	Save and close	Saves the scan time setting and closes the dialog.

About

This displays the version information of ACAT. In addition, it provides information on 'Licenses' of third-party software that ACAT uses. It also displays disclaimers associated with the use of ACAT.

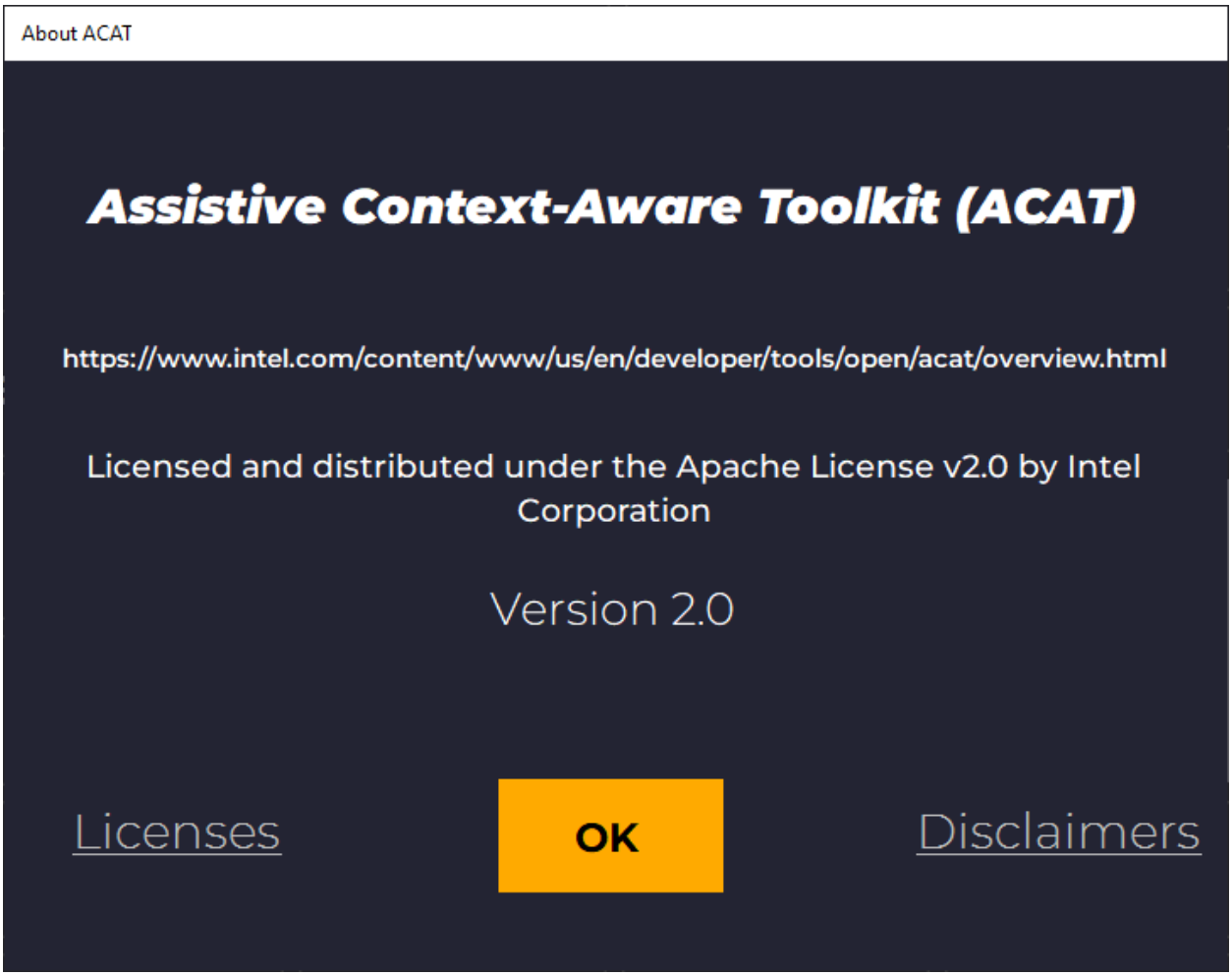
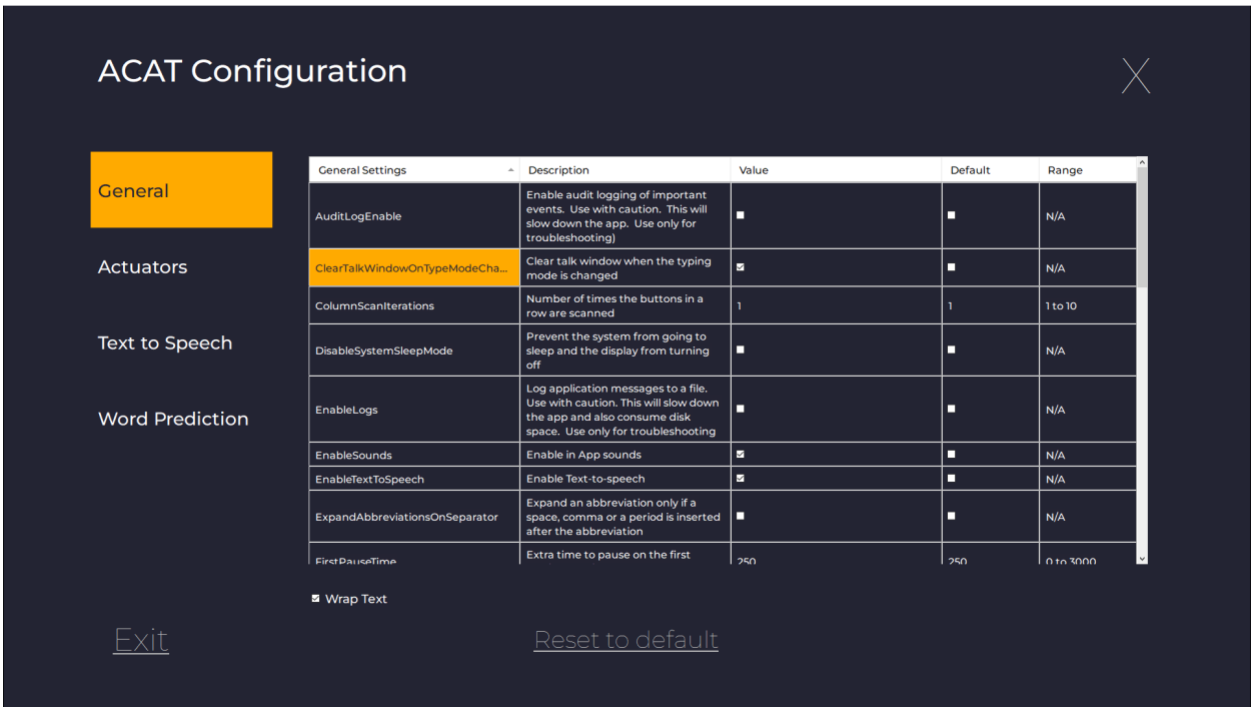


Figure 45

Settings (ACATConfig Application)

How to get to and use the settings section

ACAT enables users to control certain aspects of ACAT's features through a separate application, ACATConfig. This application can be accessed from the ACAT installation on the "desktop" folder or here .



There are several parameters and settings that can be configured through this application. But the most relevant ones are -

Settings Name	Description	Default
SpeakOnEnterKey	Speak the text in the Talk window every time the ↵ key is	Enabled. If disabled, user will need to select the 💬 button to have the text spoken
UseSentencePrediction	Enable predictive sentences	Enabled. If disabled, no sentence completions will be shown to the user
EnableLogs	Log application messages to a file.	Disabled. Use with caution. This will slow down the app and also consume disk space. Use only for troubleshooting
AuditLogEnable	Enable audit logging of important events.	Use with caution. This will slow down the app. Use only for troubleshooting)

ShowSwitchTryoutOnStartup	Display the Switch Scanning Tryout screen every time ACAT is launched.	Enabled

Support

Contacting support and resources

Frequently Asked Questions

This FAQ cover some of the issues you might run into

This FAQ cover some of the issues you might run into

Display Scaling Error

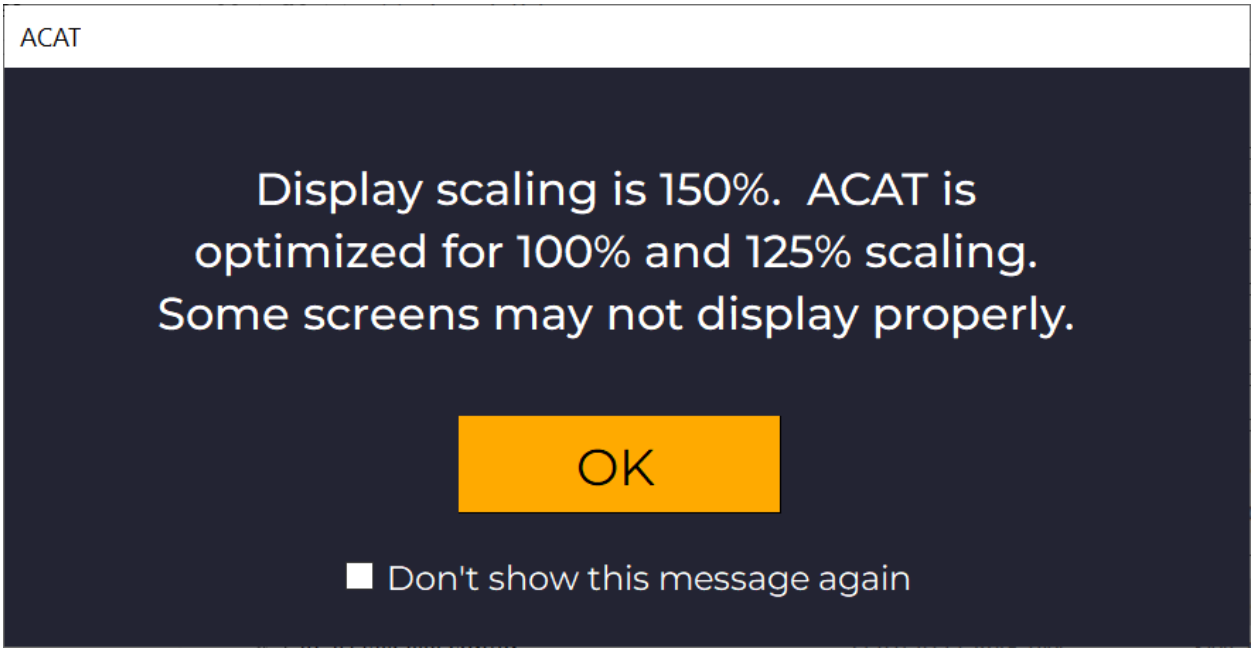


Figure 46

If you see this message, you can follow the steps outlined in Section "How to adjust display scaling" to adjust the display scaling to 100% or 125%

Some UI screens look weird

This can happen if the display scaling is not properly set or if the fonts that ACAT uses do not get properly loaded. To fix this, first make sure the display scaling is at 100% or 125% (see above). If the issue persists, then

- Uninstall ACAT by running ACATsetup.exe
- Reboot system
- Install ACAT by rerunning ACATsetup.exe

ACAT seems to be stuck on this screen

This is expected. When ACAT launches, it loads the language models into memory. This can take a few minutes depending on your system, especially the first time you run ACAT and subsequently when you start ACAT after system reboot. Please wait.

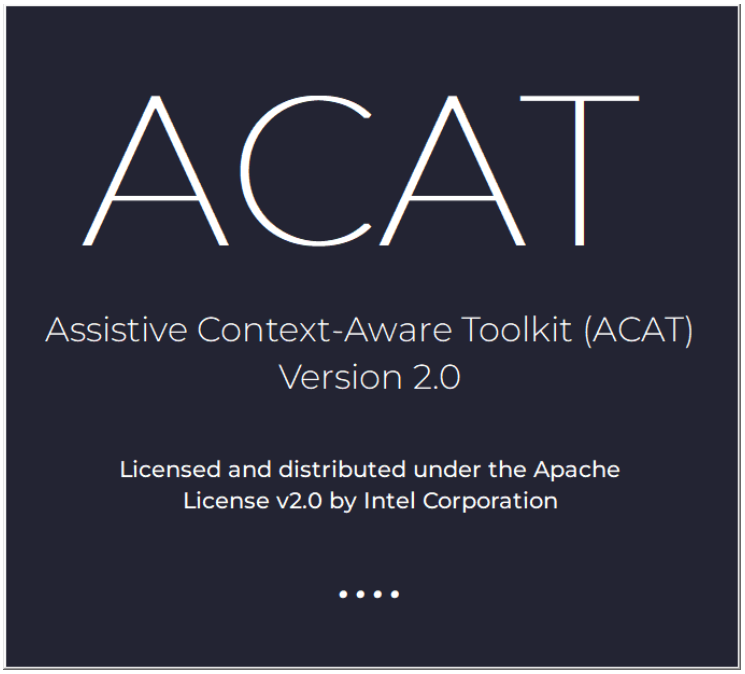


Figure 47

Switch Interface Not Working

Refer to Switch Interface section.

Camera Switch: Camera view window not showing

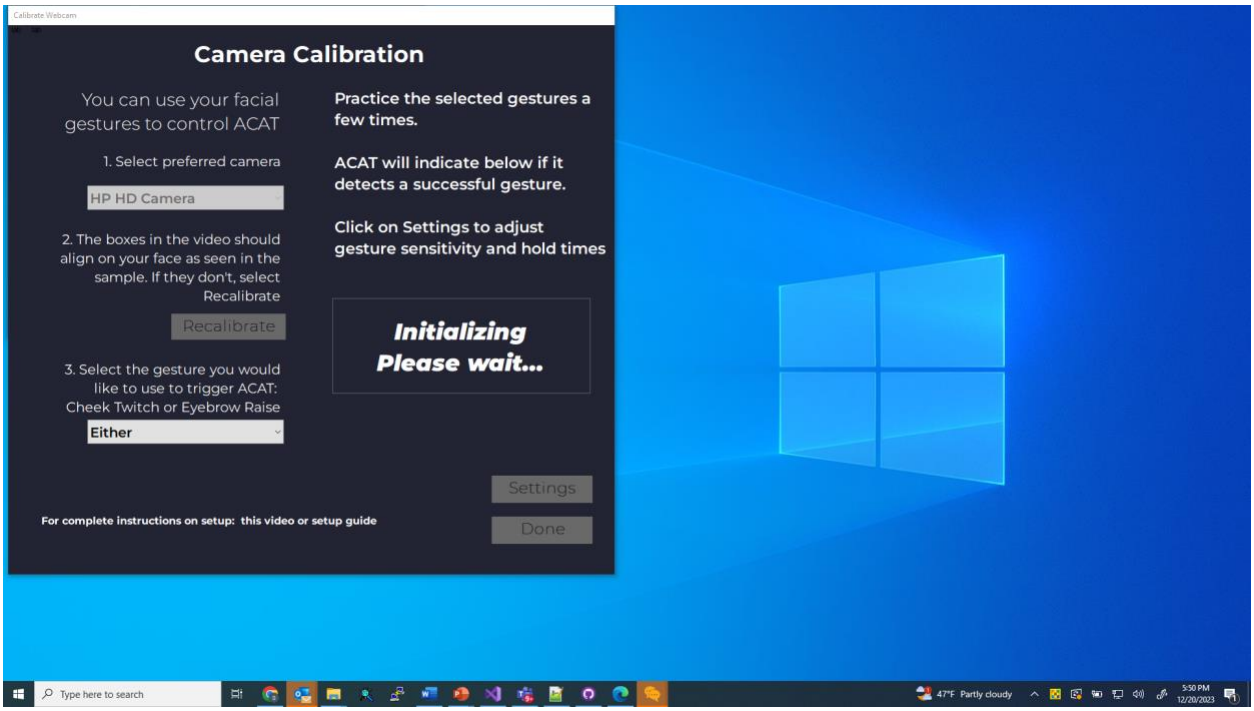


Figure 48

This can happen, if the face is not detected within the camera view.

- Make sure the camera shutter is in the open position
- Make sure that the camera is facing the user and the face is in camera view
- Move the Camera Calibration window using a mouse. Sometimes the camera view window gets hidden behind the Calibration window (Figures below)
- The camera view should show the face. Adjust the camera or user position, until the user's face shows up in the camera view

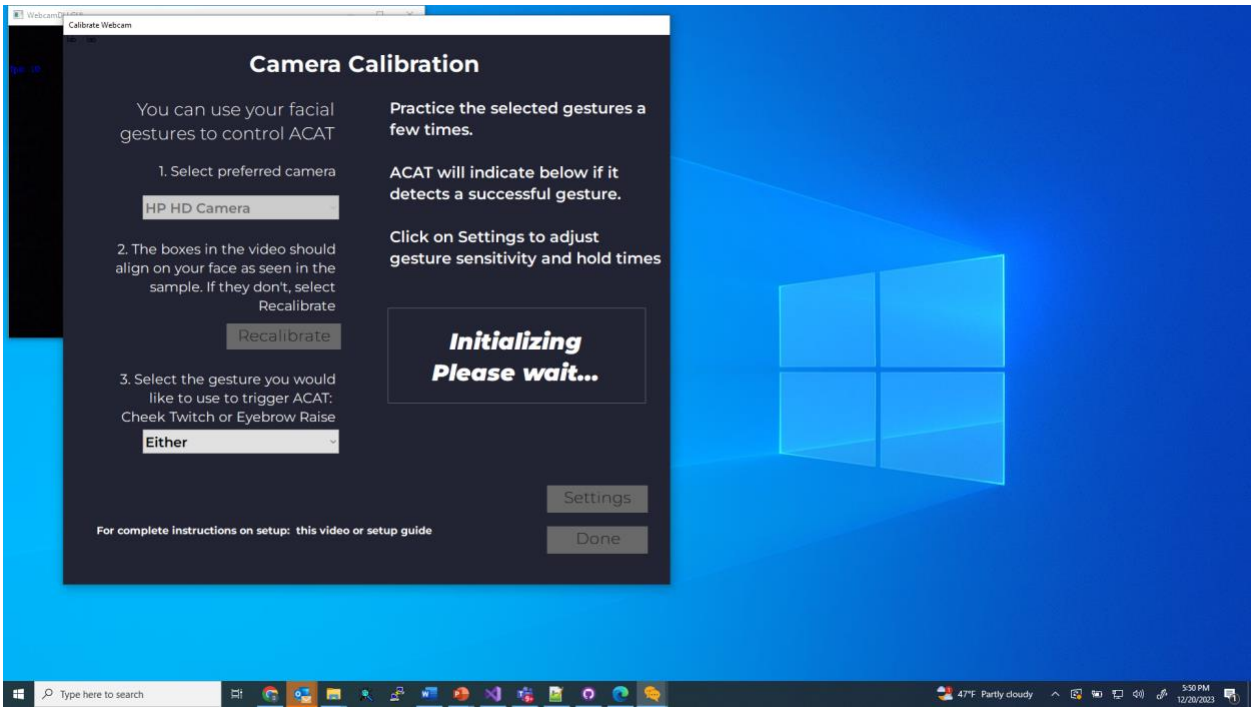


Figure 49 Camera view behind calibration window

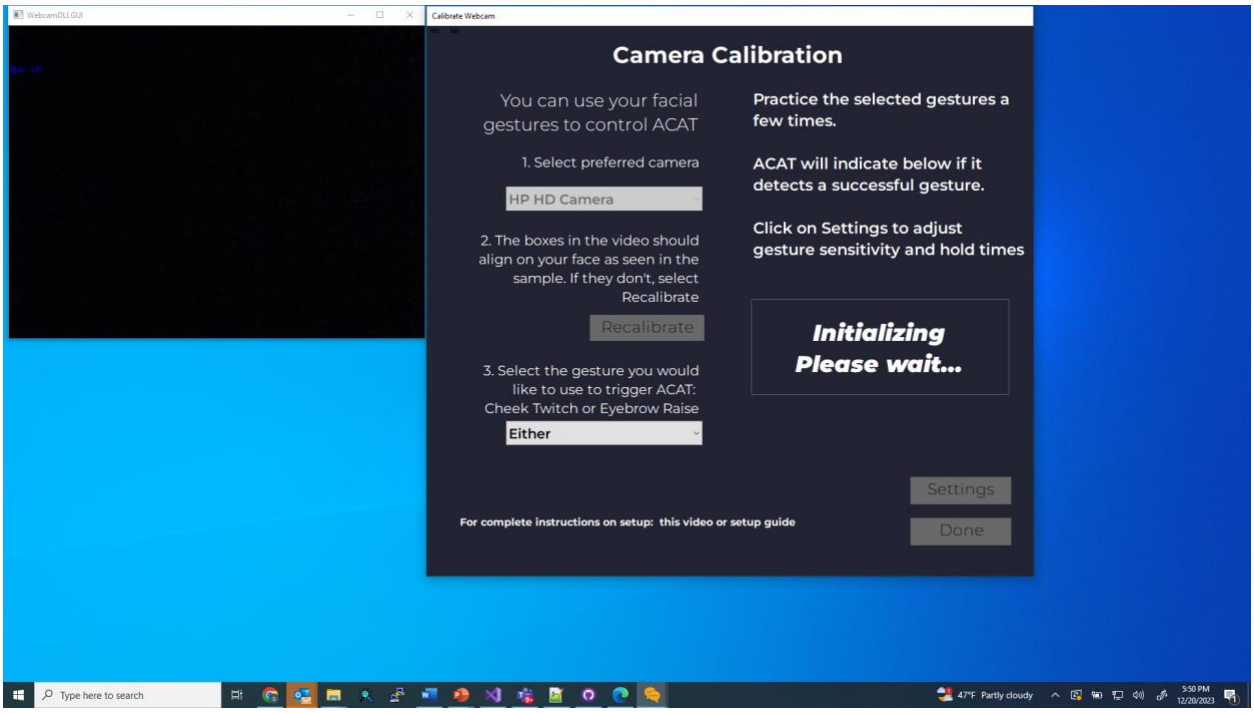


Figure 50

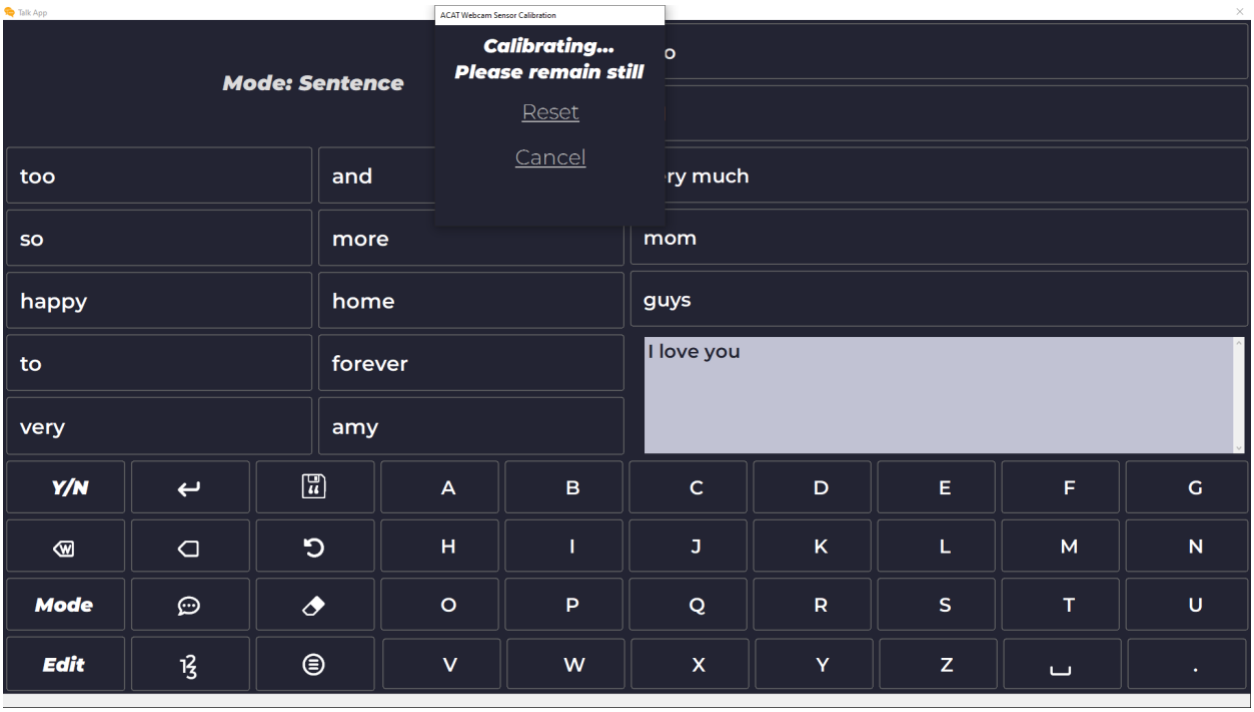
When ACAT is running you cannot bring up any other application

This is by design. ACAT runs in full screen mode and grabs focus.

If you want to see other applications, you can add a second monitor in Extended Display mode.

Even if you have a second monitor, you may not be able to interact with those applications, because ACAT grabs focus by design.

Camera Switch: Calibration Window pops up when Typing



This is by design. When using the Camera switch type, the system needs to understand the Neutral Face and Environment changes so as to be able to detect facial gestures. When the system detects a significant change in head position, it goes into auto-calibration mode. If you see the Calibrating message pop-up, please stay still and do not do any head movements of face gestures until Calibration completes.

Disclaimer

ACAT presents predictive sentence completion suggestions for users to choose from in order to reduce typing effort. This model is designed only for communication support and does not offer medical advice.

The AI model that generates these predictions is based on OpenAI's GPT2 model [Radford. A, Language Models are Unsupervised Multitask Learners, 2019, OpenAI] that has been specifically fine-tuned on an Alternative and Augmentative Communication (AAC) dataset, to support ACAT's assistive usage.

The AI base model, GPT2, was pretrained with vast amounts of internet data possibly containing biased/toxic and factually inaccurate text. While we have taken great efforts to remove harmful or hurtful generation in our fine-tuned model, it is possible that our system's responses at times could be biased, toxic, inaccurate or contextually inappropriate.

Users retain full control of whether to choose from the AI generated content or not and also have the ability to edit and confirm all responses to ensure they reflect their intended message. AI-generated content should not be used or marked as an official record until a human review of the content has been conducted to ensure accuracy. Users assume all risks associated with the use of ACAT (AI component). Neither the developers nor Intel are responsible for any inaccuracies, errors, biases in the AI-generated content.

Take caution around incorrect attribution/explanation. AI-generated content isn't always reliable. It doesn't always correlate with a human explanation and cannot be relied on for definitive explanations. It is your responsibility to fact check information with traceable, reliable sources.

Be skeptical of tone. It is users' responsibility to edit for tone as well as facts.

Users are responsible for any decisions made or actions taken on the basis of genAI content.

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