



ICU

Intelligent Identification
Developed by Innovative Technology Ltd

Leading Biometric Solutions

ICU Intelligent Identification offers age verification and several facial recognition-based functions

- ✓ Age Restricted Sales
- ✓ Access Control
- ✓ Machine Access
- ✓ Authorised Vehicle Use
- ✓ Photo ID Verification
- ✓ Face Covering Detection
- ✓ Targeted Advertising
- ✓ Know Your Customer (KYC)

Applications

ICU can benefit a vast number of industries.

Customise facial recognition, age verification and gender identification functions to fit your application

Age Restricted Sales



Access Control



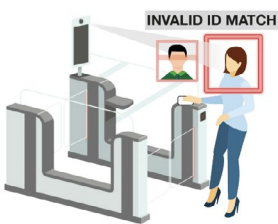
Machine Access



Authorised Vehicle Use



Photo ID Verification



Face Covering Detection



Targeted Advertising



Know Your Customer



Our Technology

ICU's core objective - to provide affordable and easy to use biometric technology



Proprietary Algorithms

- We design, train and fine-tune all our own algorithms
- All algorithms run locally on the hardware – quick, no internet required (ICU Pro & ICU Lite)



Edge Solution

- Complete intelligent solution
 - Local processing
 - Quick outputs



Non-Intrusive Spoof

- Multi-layered spoof detection
- No customer interaction required



ICU

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ICU Intelligent Identification offers age verification and several facial recognition-based functions

Our Products

ICU Pro



Perform age verification & facial recognition-based functions on a machine or control entry points (e.g. Electronic Gates, Barriers, Restricted Premises)

- No PC required
- Connect up to two USB cameras
- Directly control relays or send software commands
- All functions included as standard
- Spoof detection
- One-off cost, no recurring charges

ICU Lite



Add age verification & facial recognition-based functions to a machine (e.g. Self Checkouts, Betting Terminals)

- Plug directly into PC USB port
- Connect one USB camera
- Easily send software commands
- Choice of two functions* *Option to add more functions (additional fees apply)
- Spoof detection
- One-off cost, no recurring charges

ICU Management Suite (IMS)

Configure both ICU Pro & ICU Lite via your online dashboard

[See Demos >](#)





Development Kit

What's included:

- ICU Lite
- USB Camera
- Quick start guide
- Documentation (stored on ICU Lite)
- 3 months free IMS Cloud account (access to database & ICU Online calls)





Innovative Technology

INTELLIGENCE IN VALIDATION

ICU

USER MANUAL

User Manual ICU Range

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1 DOCUMENT INTRODUCTION

1.1 Contact Information

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Further Innovative Technology Ltd. representatives can be found on our website.

www.innovative-technology.com

1.2 Related Documents

This document should be read together with the following documents:

ICU Image API – (GA00...):

ICU Face API – (GA00...):

SSP Protocol Specification – (GA00138)

For further information or other interface protocols please contact

support@innovative-technology.com.

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1.3 Manual Amendments

Rev.	Date	Amendment Details	Issued by
1.0	09.07.2021	- First Issue	MZ





1.4 Copyright

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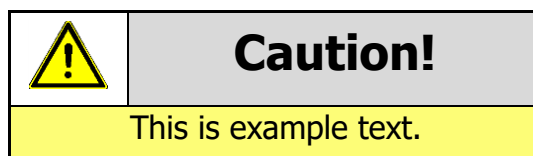




1.6 Product Safety Information

Throughout this user manual, we may draw your attention to key safety points that you should be aware of when using or maintaining the product.

These safety points will be highlighted in a box, like this:



This user manual and the information it contains is only applicable to the model stated on the front cover and must not be used with any other make or model.

1.7 Disclaimer

Innovative Technology Ltd is not responsible for any loss, harm, or damage caused by the installation and use of this product. This does not affect your local statutory rights. If in doubt, please contact Innovative Technology for details of any changes.

Innovative Technology Ltd has a policy of continual product improvement. As a result, the products supplied may vary from the specification described here.

Innovative Technology Ltd does not accept liability for any errors or omissions contained within this document. Innovative Technology Ltd shall not incur any penalties arising out of the adherence to, interpretation of, or reliance on, this standard.



Safety Notice! Read before using this product!

Safety Notice - Warning. Ensure power is removed before allowing access to the inside of this product. Ensure any static build up is discharged before allowing access to any part of this product or media contained. Always earth this product/base plate in accordance with the manual.

For use only in or with complete equipment where the acceptability of the combination is determined by UL LLC. When installed in an end-product, consideration must be given to the following:

- The power supply terminals and/or connectors are: Not investigated for field wiring
- The investigated Pollution Degree is: 2
- The following end-product enclosures are required: Mechanical, Fire

Sicherheitshinweis – Warnung: Es muss sichergestellt werden, dass das Gerät von der Versorgungsspannung getrennt wird, bevor ein Eingriff in das Innere des Gerätes erfolgt. Es muss sichergestellt werden, dass jegliche statische Aufladung des Gerätes entladen wird, bevor auf das Gerät oder auf innerhalb des Gerätes befindliche Objekte zugegriffen wird. Die Erdung des Gerätes muss immer gemäß Handbuch erfolgen.

Nur für die Verwendung in oder mit kompletter Ausstattung, dessen Eignung und Kombination von der UL LLC ermittelt wurde. Bei der Installation in einem Endprodukt, muss folgendes berücksichtigt werden:

- Die Spannungsversorgungsklemmen und/oder Verbinder sind: Feldverkabelung wurde nicht untersucht
- Der untersuchte Verschmutzungsgrad ist: 2
- Folgende Anforderungen an die Gehäuse des Endproduktes sind gefordert: Mechanisch, Feuer

Aviso de seguridad: Asegúrese de que la alimentación está desconectada y de que toda la energía estática es descargada antes de manipular este producto. Conecte a tierra la chapa base de la manera que se indica en el manual.

Solo para uso con dispositivos con los cuales la compatibilidad ha sido certificada por UL LLC. Tras su instalación en producto acabado, tener en cuenta lo siguiente:

- Los conectores y terminales de alimentación son: No se ha investigado/especificado cableado externo.
- El grado de contaminación determinado es: 2
- Los siguientes manuales/certificados de producto final son requeridos: Mecánico, Fuego

Avis de sécurité : Assurez-vous que l'alimentation est coupée et que toute l'énergie statique est déchargé avant de manipuler ce produit. Connecter à la terre, la plaque de base à la manière indiquée dans le manuel.

A utiliser Seulement avec les dispositifs dont la compatibilité a été certifiée par UL LLC. Après son installation dans le produit fini, prendre en considération ce qui suit:-

- Les connecteurs et les bornes d'alimentation sont : cela n'a pas été étudié/spécifié câblage externe.
- Le degré de contamination déterminé est: 2
- Les manuels suivants / les certificats du produit final sont nécessaires : mécanique, incendie

Bezpečnostní upozornění. Před manipulací uvnitř tohoto produktu se ujistěte, že je produkt odpojen od zdroje elektrického napětí. Ujistěte se, že jakýkoliv elektrostatický náboj byl vybit před manipulací s jakoukoliv částí tohoto produktu nebo obsaženým médiem. Vždy uzemněte tento produkt/základovou desku v souladu s návodem.

Pouze pro použití v nebo s kompletním vybavením, kde je přijatelnost kombinace určena UL LLC. Při instalaci v konečném produktu je třeba zvážit následující:

- Napájecí svorky a/nebo konektory: Nejsou sledované pro externí kabeláž
- Sledovaný stupeň znečištění je: 2
- Následující krytí konečného produktu jsou požadované: Mechanické, Protipožární



Caution!

Accessibility to children not evaluated. To be evaluated in end product application.





2 PRODUCT INTRODUCTION

2.1 ICU Pro

2.1.1 General Description

ITL's edge solution performs processes locally (no other PC required), with an internet connection only needed for set up and updates. ICU Pro offers an accurate (99.88% LFW) precise and affordable facial recognition system. Transform your cameras (up to two per device) into intelligent identifiers triggering peripherals directly from the unit to control access to buildings, safes or specific machinery. Our non-intrusive spoof detection gives the highest level of security, constantly monitoring users without the need for customer intervention.

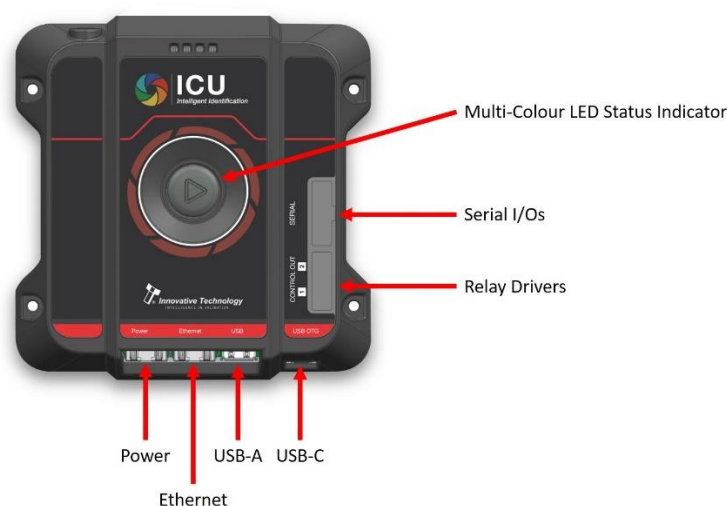
2.1.2 Key Features

- No PC required
- Connect up to two USB cameras
- Directly control relays or send software commands
- All functions included as standard
- Spoof detection
- One-off cost, no recurring charges

2.1.3 Typical Applications

- Age Restricted Sales
- Access Control
- Photo ID Verification
- Face Covering Detection
- Know Your Customer (KYC)

2.1.4 Component Overview



2.2 ICU Lite

2.2.1 General Description

ICU Lite transform any USB camera into a Smart Camera to intelligently identify customers with a high level of accuracy and speed with spoof detection as standard.

ICU Lite delivers intelligent identification in a compact, plug-in device. ICU Lite connects to an individual host machine or terminal such as kiosk, self-service or gaming machine.

Installed at machine-level, it protects children from accessing age restricted goods or services, staff from intimidation or abuse and can also identify premium or excluded customers and allow staff authorised access to machinery or vehicles.

2.2.2 Key Features

1. Plug directly into PC USB port
2. Connect one USB camera
3. Easily send software commands
4. Choice of two functions*
5. Spoof detection
6. One-off cost, no recurring charges

*Option to add more functions (additional fees apply)

2.2.3 Typical Applications

- Age Restricted Sales
- Machinery Access
- Authorised Vehicle Use
- Photo ID Verification
- Targeted Advertising
- Know Your Customer (KYC)

2.2.4 Component Overview



3 MECHANICAL INSTALLATION

3.1 Mounting Instructions ICU Pro

The ICU Pro should be securely mounted to a flat surface using 4mm screws and the 4 mounting holes provided



3.2 Mounting Instructions ICU Lite

Simply connect the ICU Lite to a USB port of the host machine using the USB-A connector



Caution!

The ICU Lite may interfere with wireless USB dongles if connected too close to each other



4 SOFTWARE INSTALLATION AND CONFIGURATION


4.1 Introduction

When an ICU device is ordered the first time ITL will create an account and provide the account details including username and password. Any ICU devices will need to be linked and registered to that account by accessing the device directly using a web browser and the devices' IP address. Once a device is registered the web interface allows further configuration such as camera and API settings.

The ICU Management Suite (IMS) provides an online dashboard that allows easy configuration of any ICU device registered.

4.2 Register an ICU device

To register an ICU device, you need to access the ICU device and register that ICU device to your account of the ICU Management Suite (IMS).

	Caution!
Local network needs to allow specific port access to specific IP addresses as described in the following sections. To do this consult the manual of your network router or seek advice of your IT administrator	

4.2.1 Accessing the ICU Pro via Ethernet

1. Insert a USB drive & Ethernet cable and power up the device



2. Remove USB drive once a pulsing blue light appears on the ICU Pro. This will take approx. 2 minutes



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3. Insert USB drive into a PC and open the text file stored on that USB drive



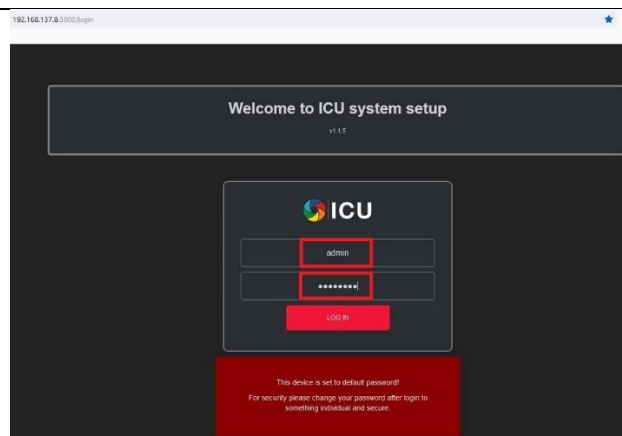
4. Type the IP address (and port :3000) into any browser

[DEVICE_ID] ae4a5dde40 [IP ADDRESS] **123.456.7.89:3000**

5. There is also a hyperlink to the device's IP address that can be utilized to access the device



6. To access the ICU Pro, enter:
Login: admin
Password: admin123



4.2.2 Accessing the ICU Pro & ICU Lite via USB (RNDIS)

You can also directly connect to the ICU Device via USB and a virtual Ethernet connection using Remote Network Device Interface Specification (RNDIS). This is default for the ICU Lite as it doesn't have an Ethernet connector. To establish an RNDIS connection with the ICU Pro the device needs to be connected to a computer via the USB-C connector.

1. Connect the ICU Pro to a computer via the USB-C connector and power up the device



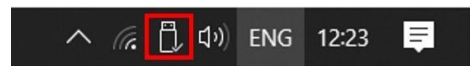
2. Connect the ICU Lite to a USB port of a computer using the USB-A connector



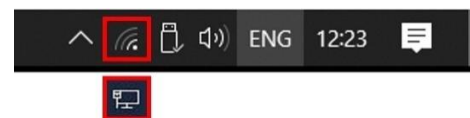
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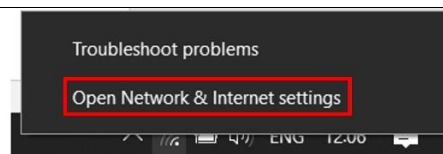
3. During the reset of the device the computer will detect the device as an external storage unit.



4. After reset right click over your active internet connection in the task bar to open network connections. This can be either Ethernet or WiFi

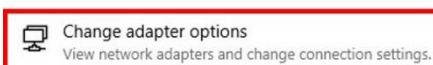


5. Click "Open Network & Internet settings"



6. Click "Change adapter options"

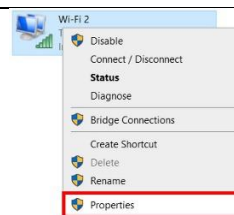
Advanced network settings



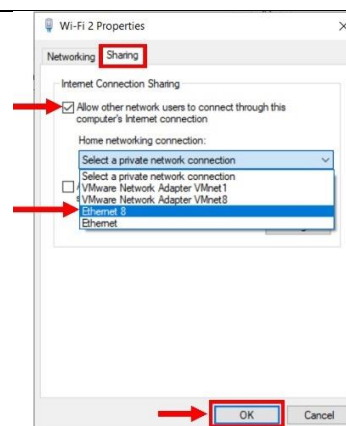
7. Look for a Remote NDIS connection and note the name, i.e. Ethernet 8



8. Right click over your active internet connection (can be Ethernet or Wi-Fi) and click "Properties"



9. Go to the "Sharing" tab, tick box as indicated and select to share with the Remote NDIS network (Ethernet 8). Click OK to confirm the settings

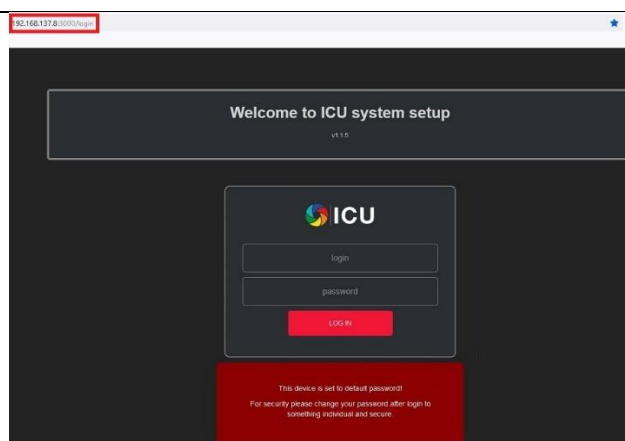


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10. The ICU device can now be accessed via any browser using the following static IP address and port 3000

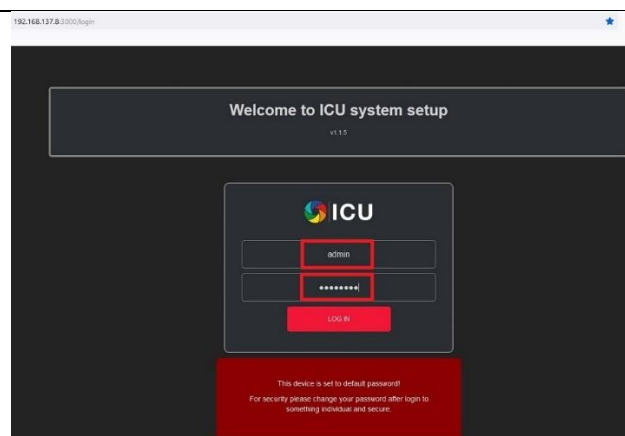
192.168.137.8:3000



11. To access the ICU Device, enter:

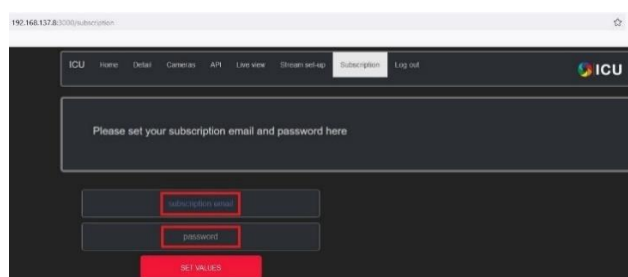
Login: admin

Password: admin123

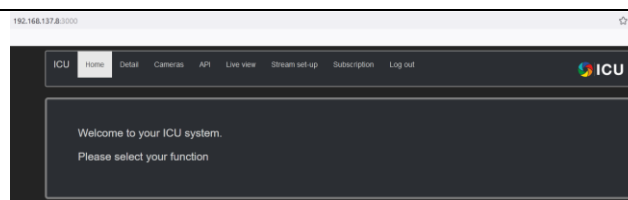


4.2.3 Link an ICU device to an account

1. Once logged into the ICU device you will now be prompted to enter your ICU Management Suite account details. Enter your account details as supplied by ITL




2. Once the account credentials had been verified correctly you will be prompted to the ICU home screen automatically

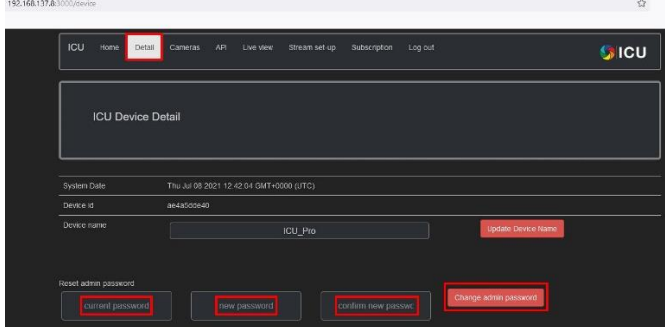


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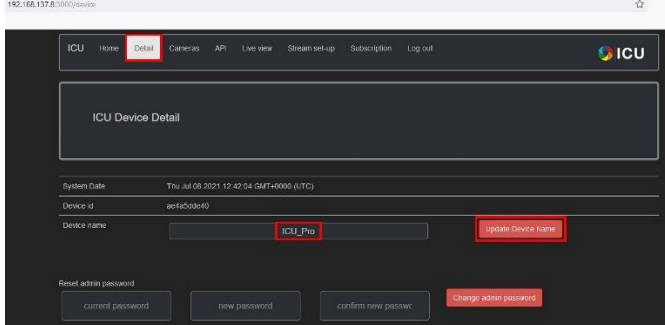
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	Caution!
Once subscribed it is recommended to change the admin password for security reasons	

3. Click "Detail" tab, type **admin123** in "current password", type in new password and confirm new password. Click "Change admin password" to save the changes



4. To change the device name, type in new device name and click "Update Device Name" to save the changes. This name will refer to this device throughout your account

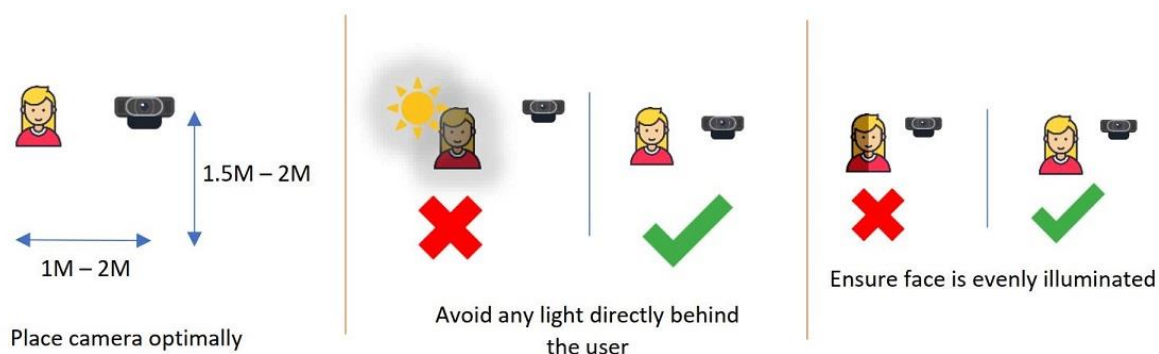


4.3 Camera Configurations

4.3.1 General Recommendations

The performance of the ICU device is related to the quality of the image provided. While the performance is directly related to the specific camera in general:

- It is recommended to operate with light levels from 70 lux (low level sodium bulb) to 1000 lux (bright LED gantry).
- The device will work in sunlight (>1000lux) if the camera is positioned to avoid direct glare.



For best results, use a USB camera with

- Resolution **1280 X 720 (720p)**
- **Auto focus** and **auto exposure**

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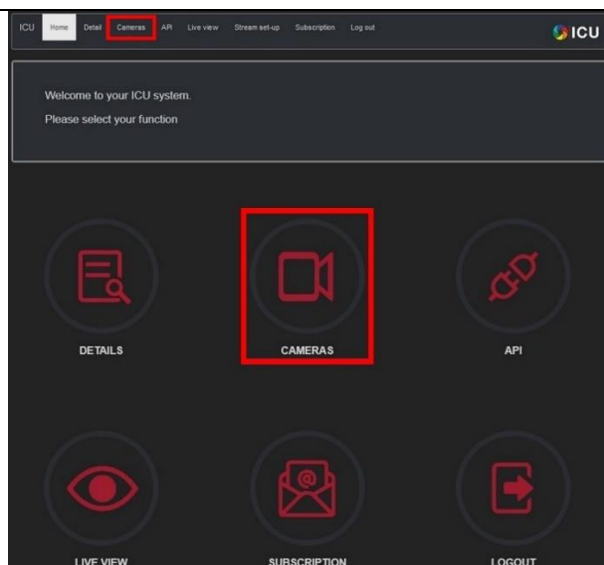
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4.3.2 Camera Setup

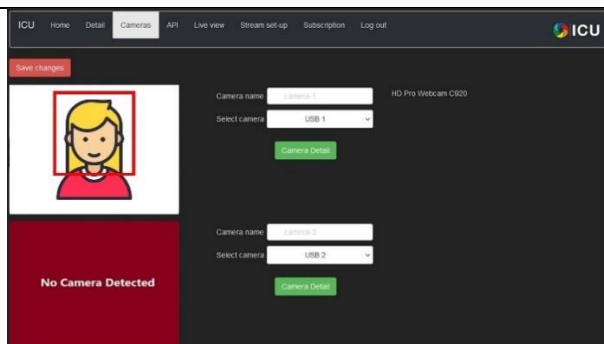
1. Plug USB camera into either USB port



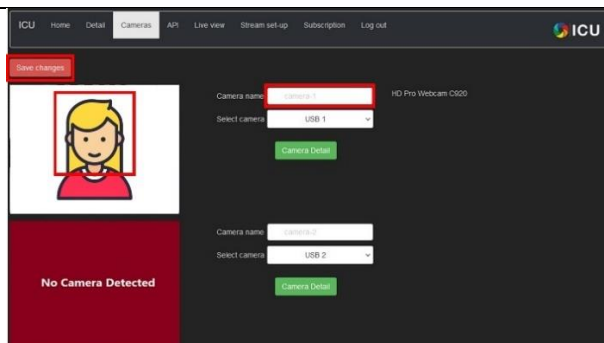
2. Click "Cameras" tab or button on home screen



3. Once a camera is connected you will see a live view from the camera



4. Select appropriate USB input and enter camera name. This name will refer to this camera throughout your account. If there is a second camera connected to the ICU Pro please repeat and then click "Save changes"

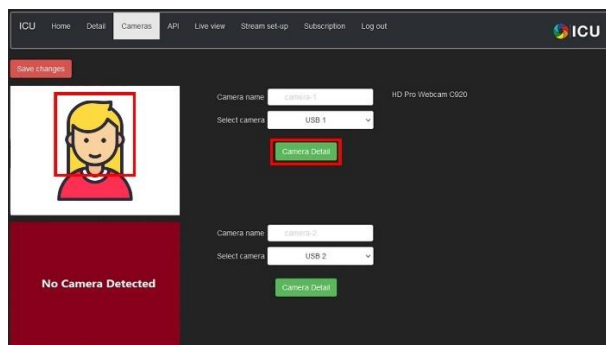


4.3.2.1 Face Size and Pose Angle

The individual camera settings can be optimised for your specific application. The adjustable settings are:

- Define the distance at which a face is processed (Face Size)
- Define the pose angle at which a face is processed

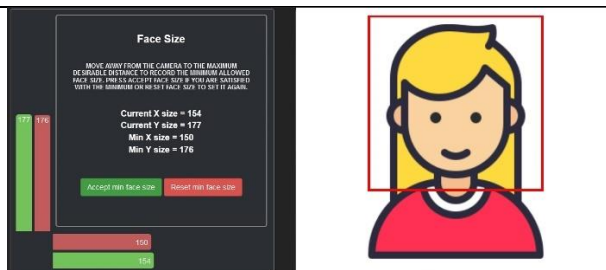
1. Click "Camera Detail" to enter camera settings



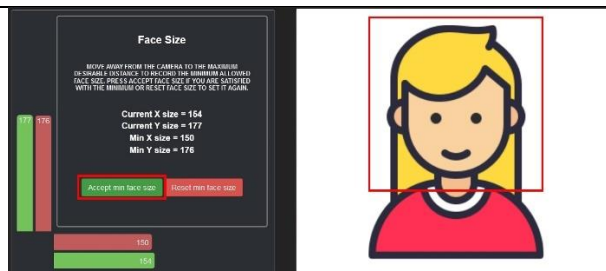
2. The minimum face size can be used to reject faces in the background. Faces are not processed which are less than that minimum size



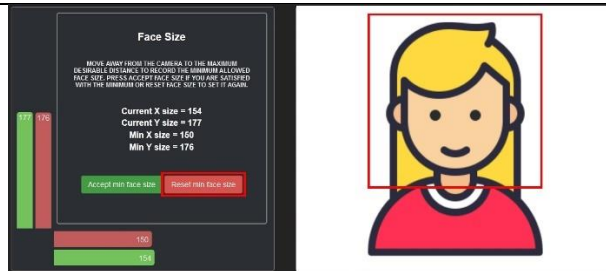
3. The bar in green returns the current Face Size. The red bar returns the minimum face size detected during that session



4. To apply the red bar settings, click "Accept min face size"



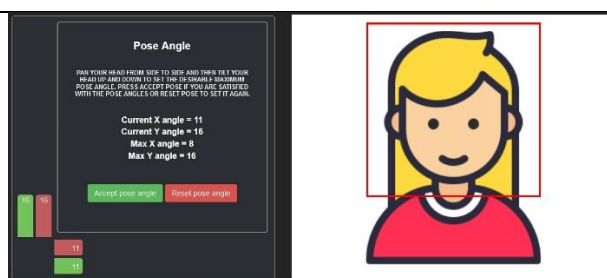
5. To reset the red bar, click "Reset min face size". This will return the settings to zero and update as the session continues



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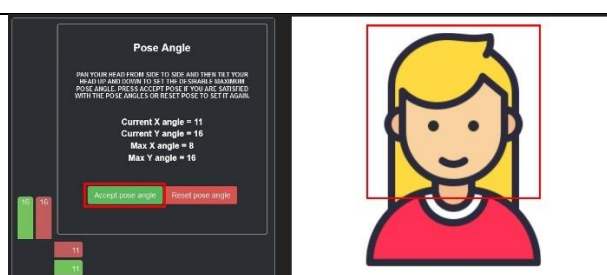
6. The pose angle can be used to ensure that side profiles and/or users not looking at camera will not be processed



7. The bar in green returns the current pose angle. The red bar returns the maximum pose angle detected during that session



8. To apply the red bar settings, click "Accept pose angle"



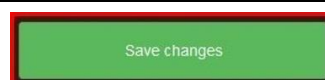
9. To reset the red bar, click "Reset pose angle". This will return the settings to zero and update as the session continues



10. The pose angle and face size can also be manually set by typing directly into the settings box

Face box x size	153
Face box y size	188
Pose angle x	18
Pose angle y	12

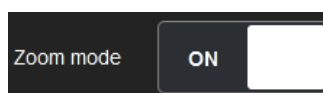
11. Click "Save changes" to set the parameters on the ICU device



4.3.2.2 Zoom Mode

Zoom Mode is a digital zoom where the central portion of an image is extracted and resized. Zoom mode will reduce the Field Of View (FOV) but can help with face detection and extends the reading up to 5 meters. This is recommended for applications where faces need to be picked up at a distance, i.e. access control where the user is walking towards the camera.

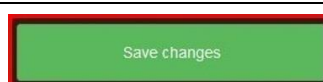
1. Click on white button to enable Zoom mode



2. Click on white button to disable Zoom mode



3. Click "Save changes" to set the parameters on the ICU device



4.3.2.3 Resolution

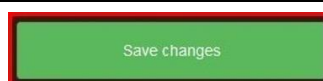
The resolution of the camera can be scaled if desired. Scaling of the camera resolution can result in an increased framerate. However, if the resolution is lowered this may also have an impact on the accuracy of the outputs. Ensure that the system is tested and performs as expected before any reduction in camera resolution is finalised.

Your camera will be automatically queried to populate the compatible resolutions in a dropdown menu.

1. Click on the dropdown menu and select camera resolution. Best practice of time to result vs. accuracy is a resolution of 1280 x 720 pixel



2. Click "Save changes" to set the parameters on the ICU device

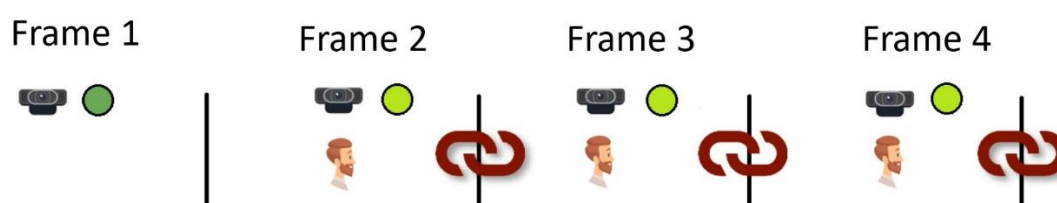


4.4 Modes of Operation

4.4.1 Spoof Detection

Spoofing is a type of presentation attack which tries to defeat or interfere with the biometric identification process. As biometric systems are being more widely used in real-world applications, presentation attacks or spoofs are becoming a larger threat to organisations. Fraudsters use various techniques to try and impersonate other people. For example, for facial recognition, they could hold up a photograph to try and impersonate someone or even use a video or photograph on a mobile device. More sophisticated ways to trick systems are being used such as a replay or video attack. This involves a looped video of a face which means that behavior and facial expressions look real and not fake.

The ICU range has an in-build multi-layered spoof detection that comes as standard with every ICU device to combat any spoof attempt. The spoof detection is non-intrusive. It obtains dynamic information in relation to the user. Frames are not treated as independent events but linked together to form a Transaction.

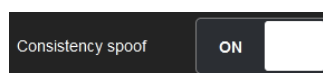


A Transaction is defined as the period of time (> 1 frame) that a single user is detected and either an action is performed and/or when that face is no longer detected.

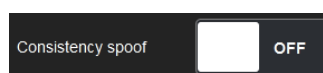
4.4.1.1 Consistency Spoof Detection

The Consistency Spoof ensures the same face is presented during a transaction.

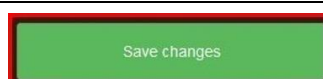
1. Click on white button to enable Consistency spoof detection



2. Click on white button to disable Consistency spoof detection



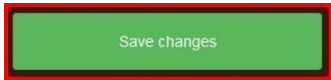


3. Click "Save changes" to set the parameters on the ICU device





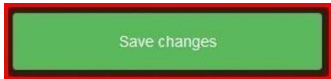
4.4.1.2 Screen Spoof Detection

Screen spoof detection uses trained models to detect images or videos presented on mobile devices.

1. Click on white button to enable Screen spoof detection	
2. Click on white button to disable Screen spoof detection	
3. Click "Save changes" to set the parameters on the ICU device	

4.4.1.3 2D Spoof Detection

2D spoof detection is trained to detect printed photographs presented to an ICU device.

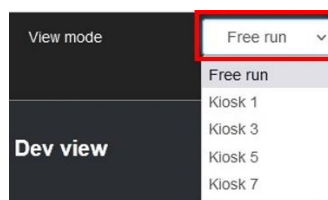
1. Click on white button to enable 2D spoof detection	
2. Click on white button to disable 2D spoof detection	
3. Click "Save changes" to set the parameters on the ICU device	

4.4.2 View Mode

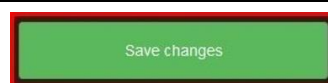
4.4.2.1 Free-Run Mode

The ICU device will run in free-run mode by default. In this mode the ICU will continually grab information while a face is in front of the camera. For every valid frame the User Identification Matrix (UIM) will be appended. This ensures that the optimal output is returned.

1. To enable the free-run operating mode select "Free run" from the drop down menu



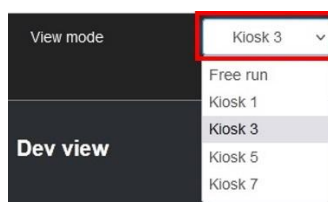
2. Click "Save changes" to set the parameters on the ICU device



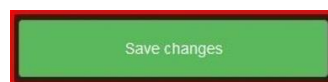
4.4.2.2 Kiosk Mode

In Kiosk mode, there are 4 modes to choose from (1, 3, 5, 7). These refer to the amount of valid frames to be processed and added to the UIM before a result is returned. As more frames are processed as longer it will take until the result is returned. The ICU device will not process any more information until the active face is no longer detected by the ICU. The transaction will reset when the active face disappears from the FOV or a new face appears.

1. Select a kiosk mode from the drop down menu



2. Click "Save changes" to set the parameters on the ICU device



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4.5 API Mode

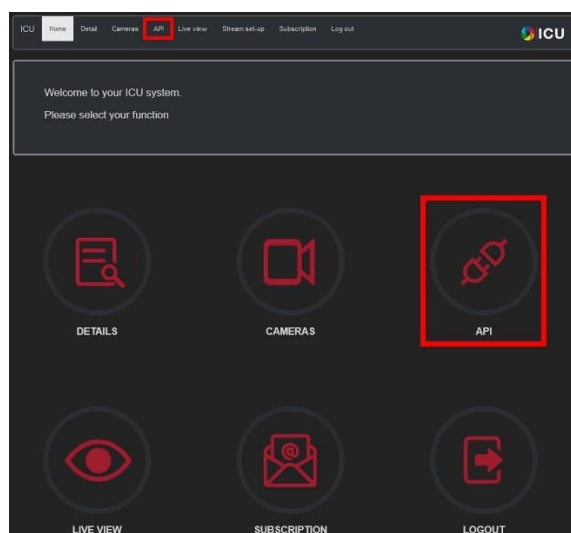
Each device has an API which can be accessed. This will also provide a form for applying API username and password for that device which will then form the credentials for the secure token authentication system for that device.

The REST API connection will be via HTTP or HTTPS but utilising a self-signed SSL certificate which will need to be trusted due to the impracticalities of deploying a full globally authenticated individual certificate for each ICU device we make.

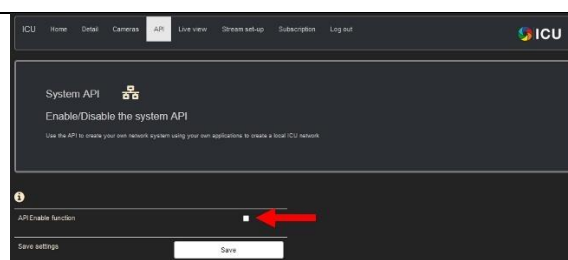
Using the above, a developer will be able to implement a full network face recognition system using ICU devices but with an internal network and private database.

Please contact support@innovative-technology.com for full API documentation.

1. Click "API" tab or button on home screen



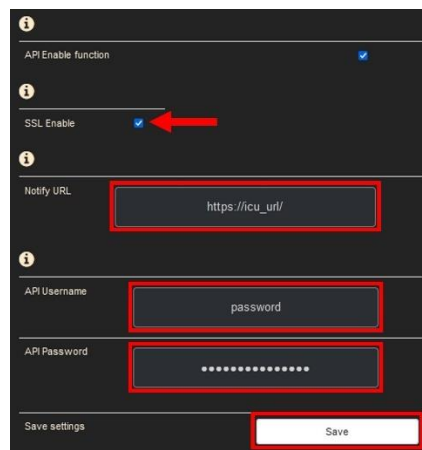
2. Tick "API Enable function". This will open the adjustable parameters



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3. To enable HTTPS tick "SSL Enable"
4. Enter URL for optional periodic device data POST containing device ID and IP address to application end point. Leave blank to disable
5. Set username and password so that application can create an authorised link with the ICU device
6. Click "Save" to apply the settings to the ICU device
7. The ICU device will reset and reboot in API mode



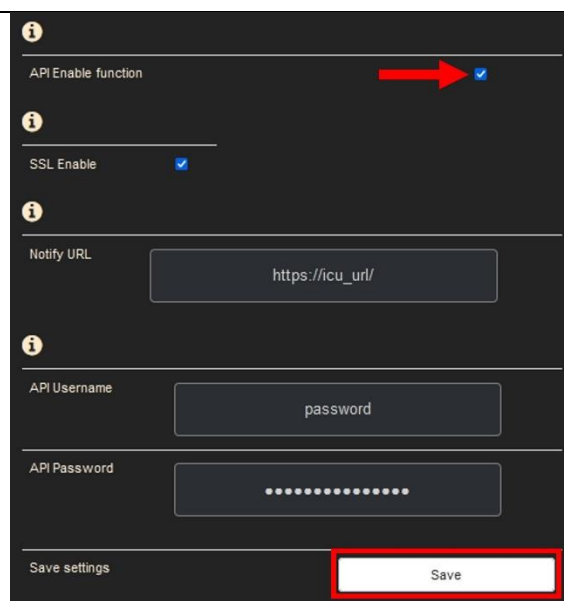
The screenshot shows a configuration interface with the following elements: 'API Enable function' with a checked checkbox; 'SSL Enable' with a checked checkbox and a red arrow pointing to it; 'Notify URL' with a text field containing 'https://icu_url/'; 'API Username' with a text field containing 'password'; 'API Password' with a masked password field; and a 'Save settings' section with a 'Save' button highlighted by a red box.



Caution!

In API mode, ICU devices cannot be configured via the ICU Management Suite

8. To disable the API mode untick "API Enable Function".
9. Click "Save" to apply the settings to the ICU device
10. The ICU device will reset and reboot with API mode disabled



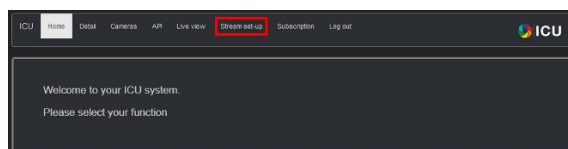
The screenshot shows the same configuration interface as before, but with the 'API Enable function' checkbox unchecked. A red arrow points to this checkbox. The 'Save' button remains highlighted with a red box.



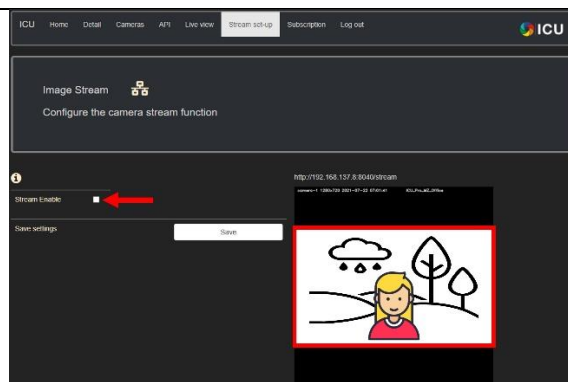
4.6 Video Stream Setup

The camera stream of ICU devices can be pushed out in a MOTION JPEG (MJPEG) format. This can help to position a user optimally in front of the camera in any application. The video stream is accessible via the device's IP address on port **:8040**.

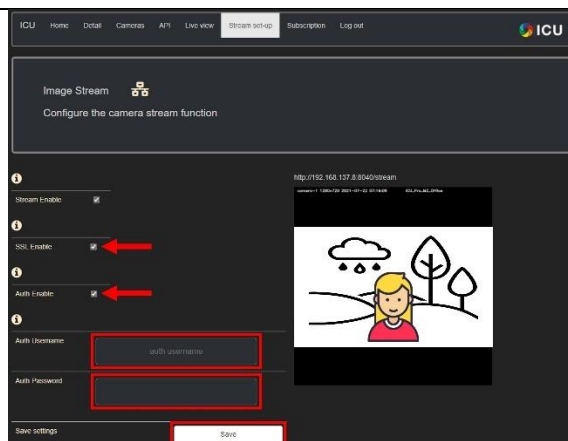
1. Click on "Stream set-up" tab



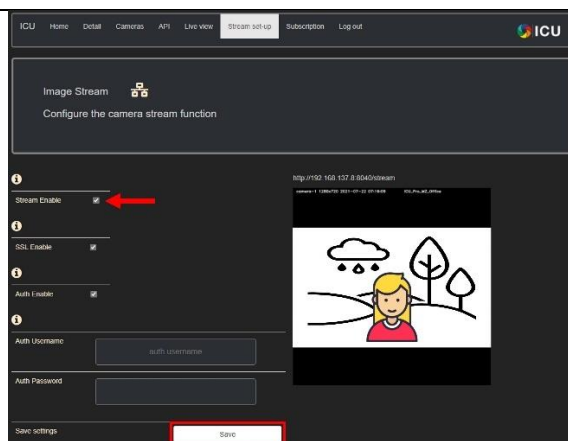
2. This will show a live view of the connected cameras. Tick "Stream Enable" to open the adjustable parameters



3. To enable HTTPS for the video stream tick "SSL Enable"
4. Tick "Auth Enable" to use Token Authentication for the video stream
5. Set username and password so that application can create an authorised link with the ICU device
6. Click "Save" to apply the settings to the ICU device
7. The ICU device will reset and reboot with video stream enabled

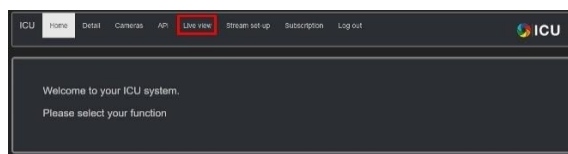


8. To disable the video stream, untick "Stream Enable".
9. Click "Save" to apply the settings to the ICU device
10. The ICU device will reset and reboot with video stream disabled

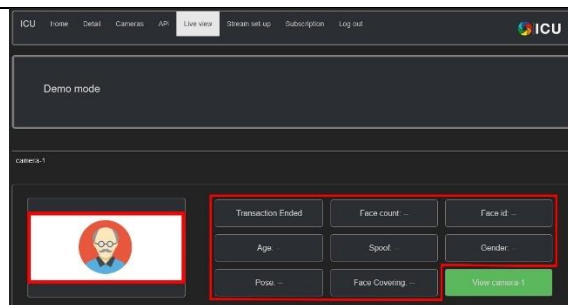


4.7 Live View - Testing the ICU Device Configuration

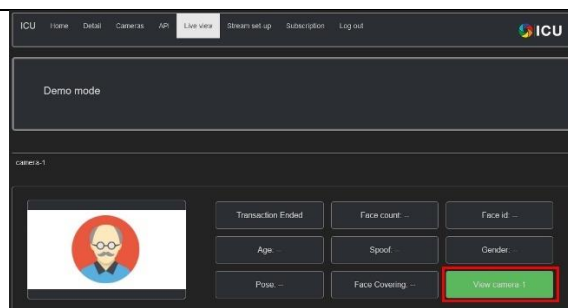
1. Click on "Live view" tab



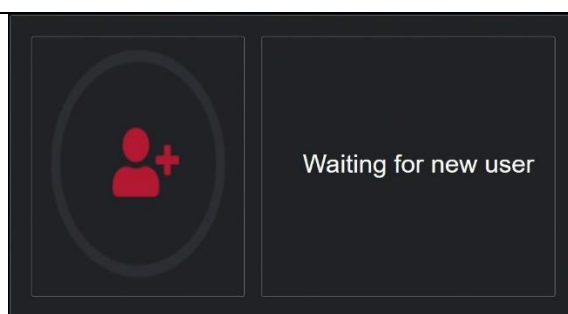
2. This will show a live view of the connected cameras. When a transaction has ended the results will be displayed in the appropriate fields



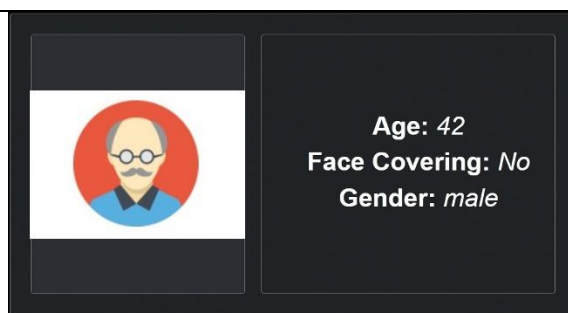
3. Click "View [Camera_Name]"



4. This will open a wide screen of the live video stream



5. When a transaction has ended the results will be displayed in the box as shown



4.8 ICU Management Suite

The ICU Management Suite (IMS) is an online tool that allows the user to manage the face image database and configure each ICU device registered to an account. It allows to enroll members, set member groups as well as setup outputs and actions when a face is presented to a camera connected to an ICU device.

4.8.1 Login to the IMS

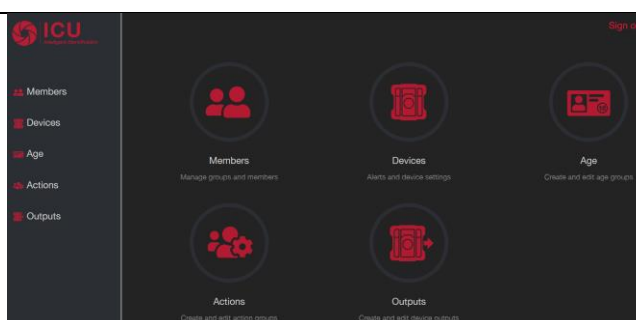
1. Open any internet browser and go to

<https://icu.innovative-technology.com/>

2. Sign in to your account with the login credentials provided by ITL




3. The ICU dashboard will open once signed-in to an account



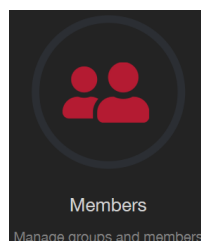
4.8.2 Members

The Members section allows the user to manage the face image database. Members are faces which can be added to an account. Once added to an account these Members will be shared with all ICU Devices registered with that account.

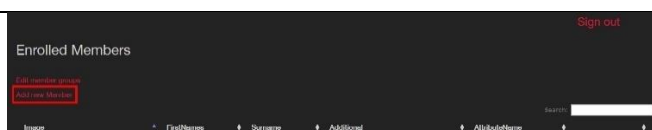
	Caution!
Changes will only apply and synced to ICU devices when connected to the internet and API disabled	

4.8.2.1 Adding Members

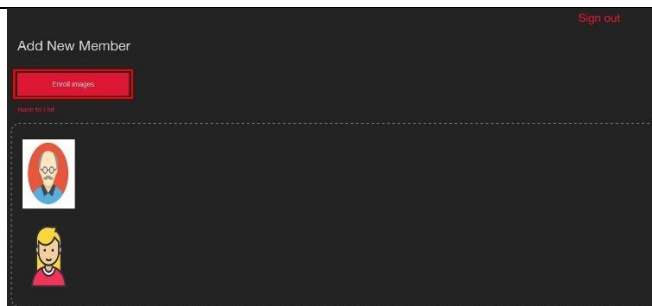
1. Click on Members from the main ICU dashboard



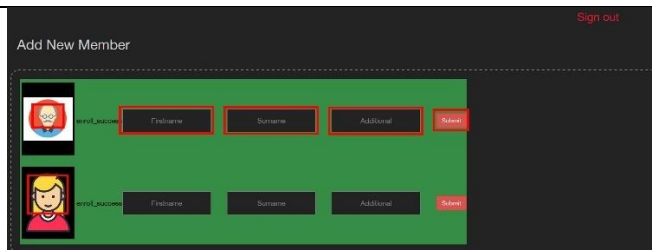
2. Click "Add new Member"



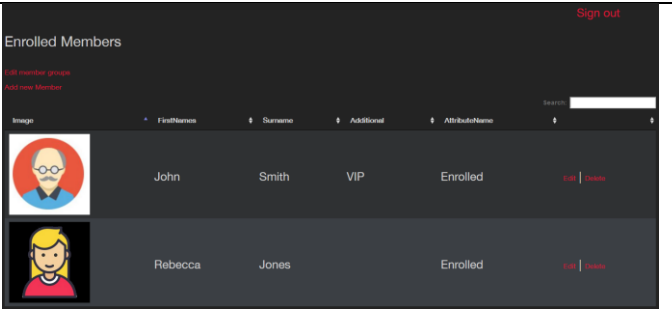
3. Drag and drop single or multiple face image files in the dashed area and click "Enroll images"



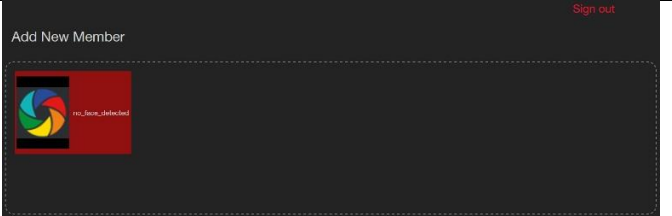
4. The in-build face detector will automatically check the images loaded and save to optimal format. Enter First name, Surname and Additional (can be edited anytime) and click "Submit" to enroll the new members



5. The new enrolled images are now listed in the Members database and can be edited or deleted



6. If the in-built face detector doesn't detect a face in a loaded image, it will be highlighted as shown



Caution!

For best results it is recommended to enroll images in a format how the person is likely to be presented to a camera in the application

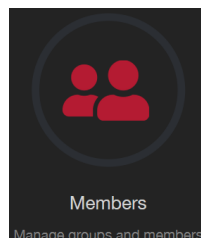
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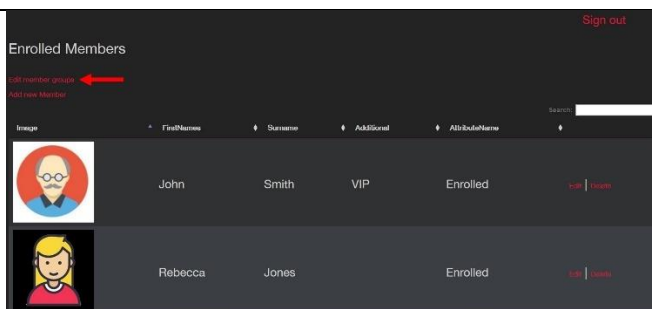
4.8.2.2 Creating a Group

Groups are a collection of Members. Once you have populated your Groups with your Members, specific Actions can be defined. There are no limitations in the number of different groups.

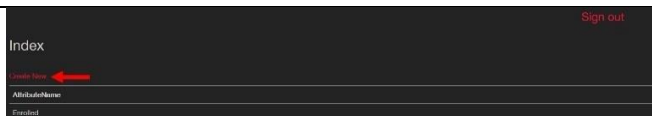
1. Click on Members from the main ICU dashboard



2. Click "Edit member groups"



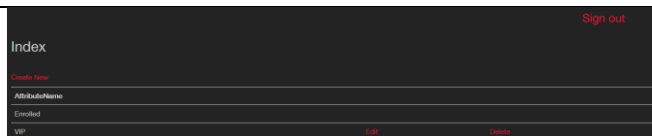
3. Click "Create New"



4. Type in any group name and click "Create"



5. All groups created will appear in the list and can be edited or deleted



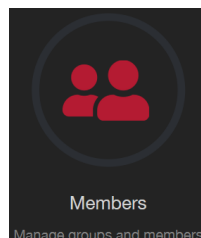
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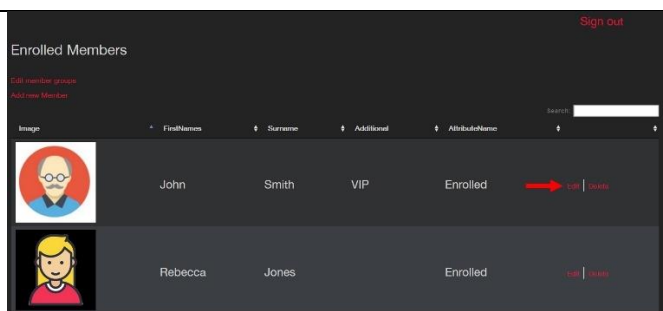
4.8.2.3 Adding Members to Groups

The default group for any added Member is Enrolled. Any Member can be added to any created groups as follows:

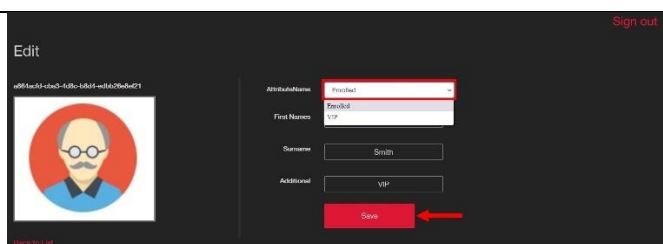
1. Click on Members from the main ICU dashboard



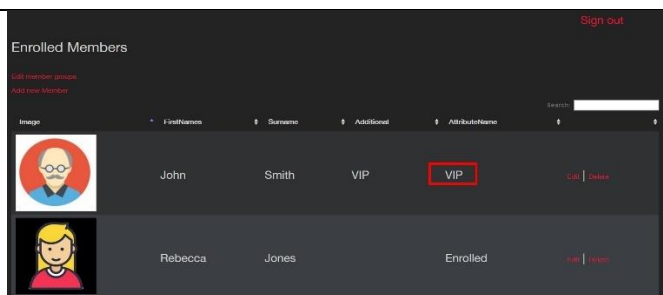
2. Select a member and click "Edit"



3. Select a Group from the dropdown menu and click "Save"



4. The selected group for a member is displayed as shown



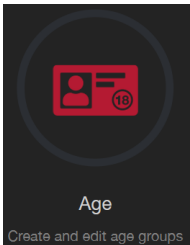
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4.8.2.4 Adding an Age Group

With ICU it is possible to return an age estimation. Some applications may require an Action depending on the age of the returned. This section will detail how to setup the age-related Group.

1. Click on Age from the main ICU dashboard



2. This will open a list of all created age-related Actions. You can edit or delete existing Actions or click "Create New" to create a new Action



3. Specify an age and a comparison i.e., if age < 25 and click "Create"



4. The new age-related Action will now appear in the list



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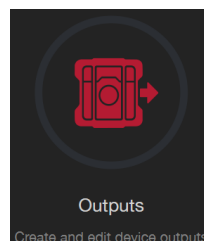
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4.8.3 Outputs

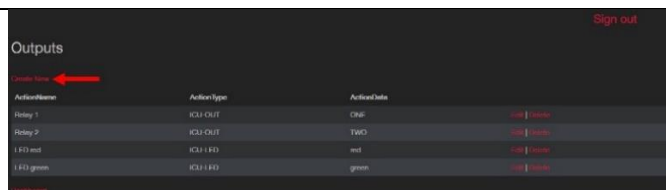
Outputs are how the ICU device responds when presented with a specific Group.

4.8.3.1 Creating an Output

1. Click on Outputs from the main ICU dashboard



2. This will open a list of all created Outputs. You can edit or delete existing Outputs or click "Create New" to create a new Output

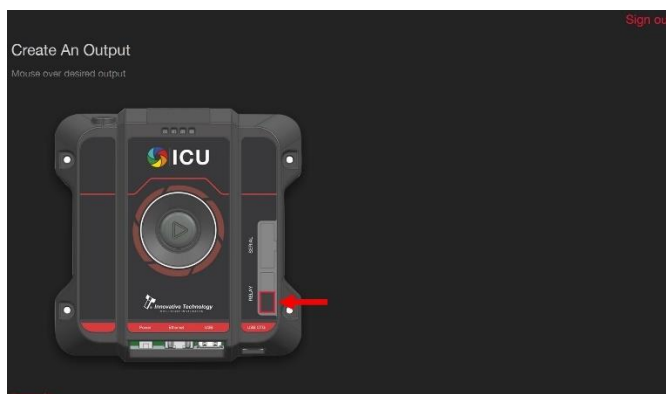


3. To select the Output, click on the desired Output in the ICU device image



4.8.3.2 Example 1: Configure an Output on Control Out One

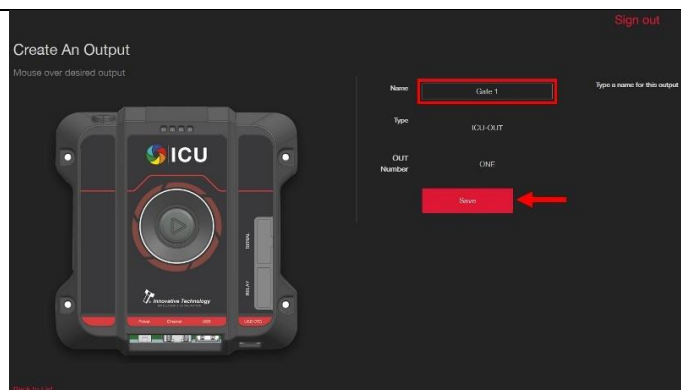
1. Click on the Control Out One Output on the device image. This will open the adjustable parameters for this Output



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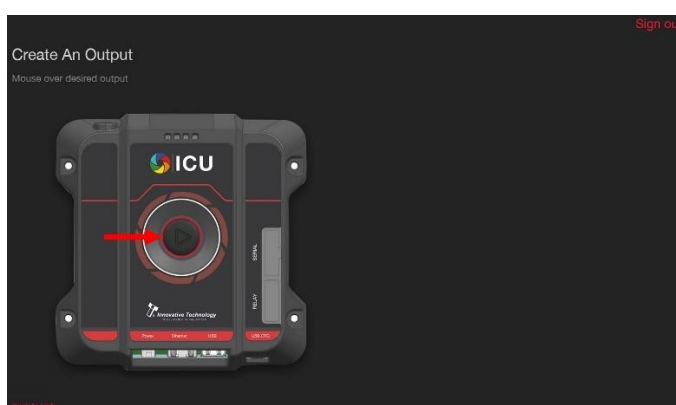
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2. Enter a name for this Output and click "Save". This new Output will now appear in the list of created Outputs

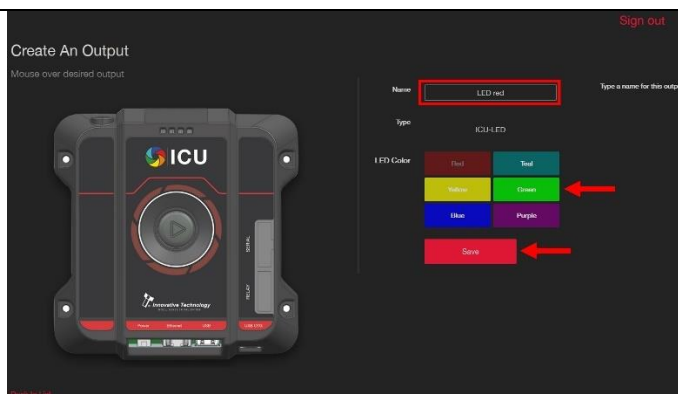


4.8.3.3 Example 2: Create a LED colour change

1. Click on the LED Output on the device image. This will open the adjustable parameters for this Output



2. Enter a name for this Output, select an LED colour and click "Save"



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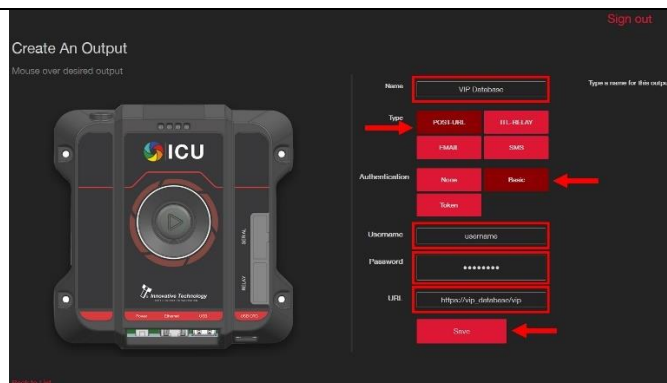
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4.8.3.4 Example 3: POST-URL via Ethernet

3. Click on the Ethernet Output on the device image. This will open the adjustable parameters for this Output



4. Enter a name for this Output, click "POST-URL", select the authentication method (Basic in this example), enter username and password and click "Save". This new Output will now appear in the list of created Outputs

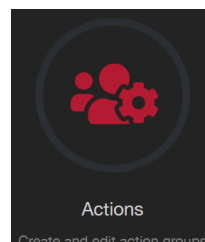


4.8.4 Actions

Actions are one or many Outputs you wish to perform in response to a Member of a specific Group

4.8.4.1 Creating an Action

1. Click on Actions from the main ICU dashboard



2. This will open a list of all created Actions. You can edit or delete existing Actions or click "Create New" to create a new Action



3. Enter a name for this Action and click "Create"



4. The new Action will now appear in the Actions list

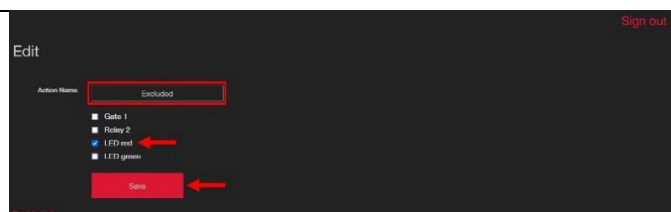


4.8.4.2 Adding Outputs to Actions

1. The new Action will now appear in the Actions list. Click "Edit" to add Outputs to an Action



2. This will open all available Outputs to assign to the specific Action. To assign an Output click the checkbox next to it. Click "Save"



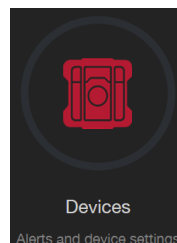
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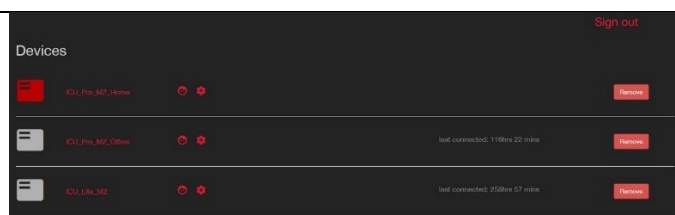
4.8.4.3 Applying Actions for Member Groups to specific ICU devices

This section will detail how to configure specific ICU devices to react to specific Member Groups.

1. Click on Devices from the main ICU dashboard



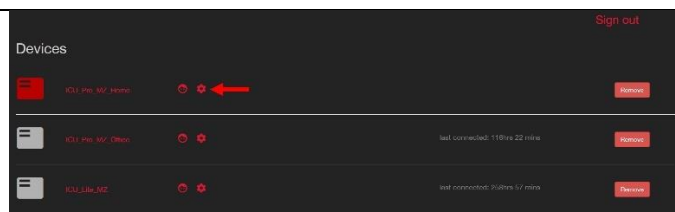
2. This will open a list of all ICU devices registered to the account. Refer to section [4.2](#) how to register an ICU device to an account



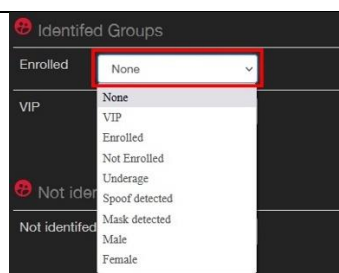
3. Online ICU devices are marked with a red symbol and offline devices with a grey symbol. Any changes are synced to an ICU device when online



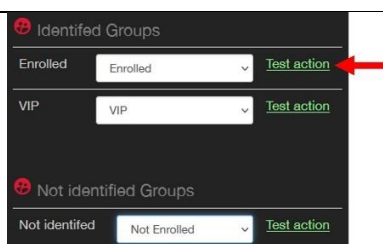
4. To apply Actions to an ICU device, click on the device settings



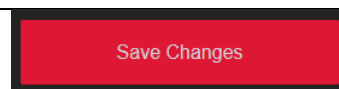
5. Click on the dropdown menu to select an Action for the created Member Groups. Refer to section [4.8.2.2](#) how to create a Group and section [4.8.4.1](#) how to create an Action



6. Once an Action is selected these can be tested by clicking on "Test action"



7. Scroll down to the bottom of your browser and click "Save Changes" to apply the settings to the ICU device



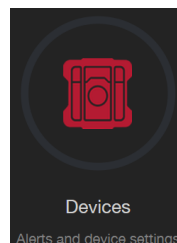
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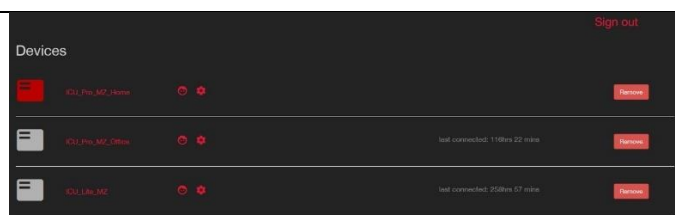
4.8.4.4 Applying Actions for Age Groups to specific ICU devices

This section will detail how to configure specific ICU devices to react to specific Age Groups.

1. Click on Devices from the main ICU dashboard



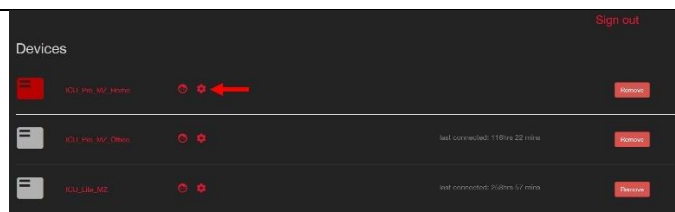
2. This will open a list of all ICU devices registered to the account. Refer to section [4.2](#) how to register an ICU device to an account



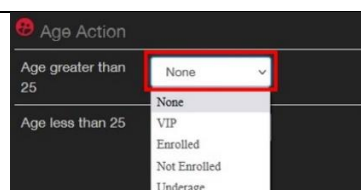
3. Online ICU devices are marked with a red symbol and offline devices with a grey symbol. Any changes are synced to an ICU device when online



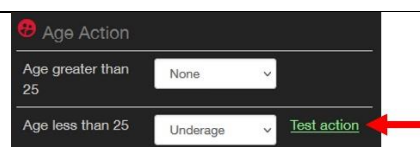
4. To apply Actions to an ICU device, click on the device settings



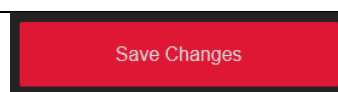
5. Click on the dropdown menu to select an Action for the created Age Groups. Refer to section [4.8.2.4](#) how to create an Age Group and section [4.8.4.1](#) how to create an Action



6. Once an Action is selected these can be tested by clicking on "Test action"



7. Scroll down to the bottom of your browser and click "Save Changes" to apply the settings to the ICU device



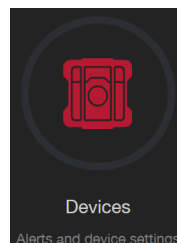
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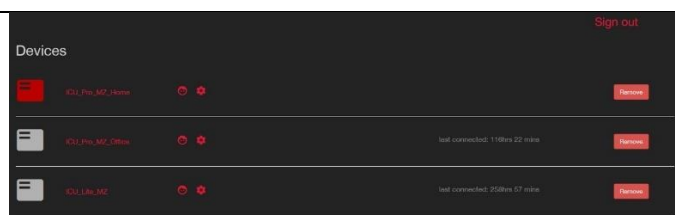
4.8.4.5 Applying Actions for Gender Detection to specific ICU devices

This section will detail how to configure specific ICU devices to react to Gender Detection

1. Click on Devices from the main ICU dashboard



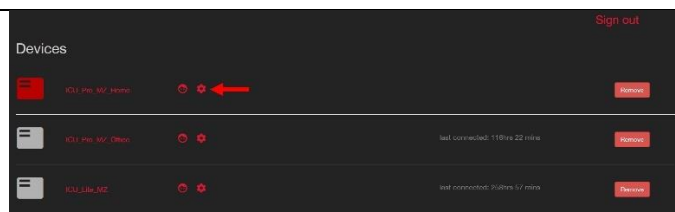
2. This will open a list of all ICU devices registered to the account. Refer to section [4.2](#) how to register an ICU device to an account



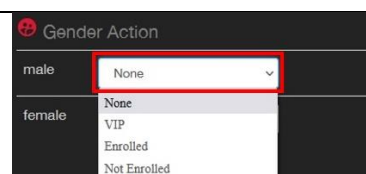
3. Online ICU devices are marked with a red symbol and offline devices with a grey symbol. Any changes are synced to an ICU device when online



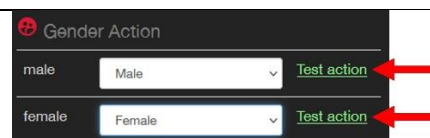
4. To apply Actions to an ICU device, click on the device settings



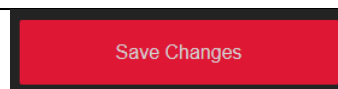
5. Click on the dropdown menu to select an Action for the Gender Detection. Refer to section [4.8.4.1](#) how to create an Action



6. Once an Action is selected these can be tested by clicking on "Test action"



7. Scroll down to the bottom of your browser and click "Save Changes" to apply the settings to the ICU device



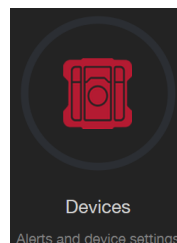
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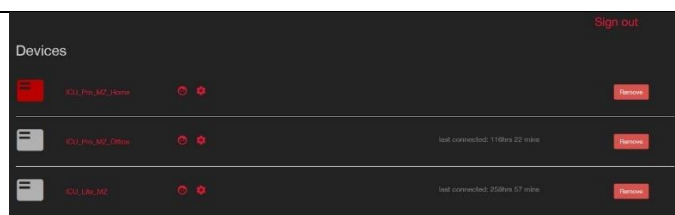
4.8.4.6 Applying Actions for Mask Detection to specific ICU devices

This section will detail how to configure specific ICU devices to react to Mask Detection.

1. Click on Devices from the main ICU dashboard



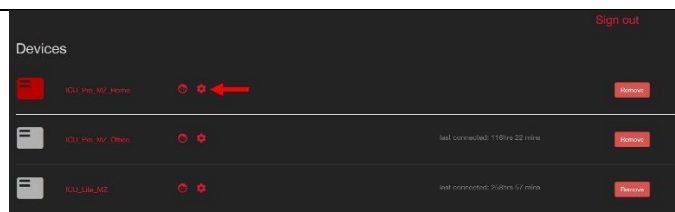
2. This will open a list of all ICU devices registered to the account. Refer to section [4.2](#) how to register an ICU device to an account



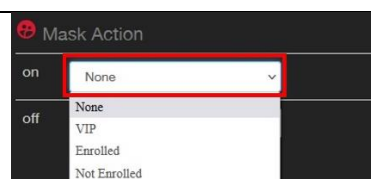
3. Online ICU devices are marked with a red symbol and offline devices with a grey symbol. Any changes are synced to an ICU device when online



4. To apply Actions to an ICU device, click on the device settings



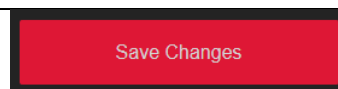
5. Click on the dropdown menu to select an Action for the Mask Detection. Refer to section [4.8.4.1](#) how to create an Action



6. Once an Action is selected these can be tested by clicking on "Test action"



7. Scroll down to the bottom of your browser and click "Save Changes" to apply the settings to the ICU device



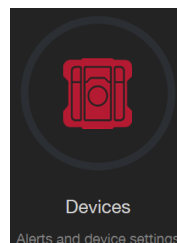
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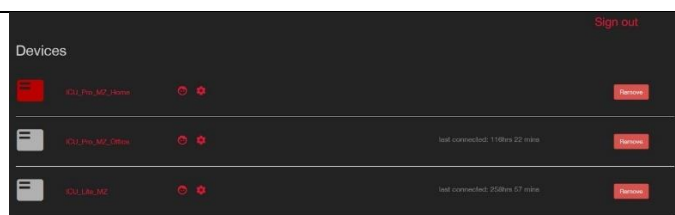
4.8.4.7 Applying Actions for Spoof Detection to specific ICU devices

This section will detail how to configure specific ICU devices to react to Spoof Detection.

1. Click on Devices from the main ICU dashboard



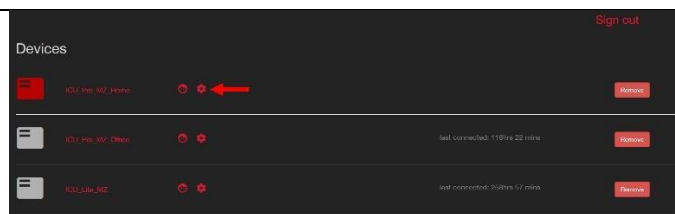
2. This will open a list of all ICU devices registered to the account. Refer to section [4.2](#) how to register an ICU device to an account



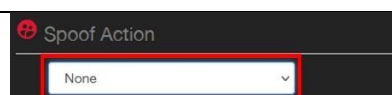
3. Online ICU devices are marked with a red symbol and offline devices with a grey symbol. Any changes are synced to an ICU device when online



4. To apply Actions to an ICU device, click on the device settings



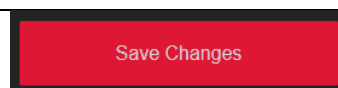
5. Click on the dropdown menu to select an Action for the Spoof Detection. Refer to section [4.4.1](#) how to enable Spoof Detection on an ICU device and [4.8.4.1](#) how to create an Action



6. Once an Action is selected these can be tested by clicking on "Test action"



7. Scroll down to the bottom of your browser and click "Save Changes" to apply the settings to the ICU device





5 PROTOCOLS AND INTERFACES

5.1 ICU Image API

The ICU Image API provides REST interface to allow users to access functions to allow enrollment and verification of face images against that enrollment. The API also provides functions for editing and deleting enrolled members from a hosted database.

5.2 ICU Face API

The ICU Face API provides REST interface to allow users to create image recognition networks using ICU devices. This API provides functions to update ICU devices with face images for the local on the device image database. This API also allows the user to setup actions and outputs for faces presented to a camera connected to an ICU device. This API is also used to get the results for any faces presented to the camera connected to ICU devices.

5.3 SSP and eSSP

Smiley® Secure Protocol (SSP) and Encrypted Smiley® Secure Protocol (eSSP) are field proven secure interfaces initially designed by Innovative Technology Ltd. to address the problems by cash handling systems in gaming machines. The SSP protocol specification has been updated to allow the user to poll ICU devices for faces presented to a connected camera and to retrieve the results of face detections.





5.4 Interface Options ICU Pro

5.4.1 Ethernet RJ45

Gigabit Ethernet port capable of running up to 1Gbps and is backward compatible with 100Base-T and 10Base-T and used for Network access.

5.4.2 USB-C

Super-Speed USB 3.0 port capable of data rates up to 5.0Gbps and can be used as either a device or host port. Intended for connection to a USB compatible webcam, external USB hubs or additional memory storage. Can also be used as Network access using RNDIS.

5.4.3 USB-A

High-Speed USB 2.0 Host port capable of data rates up to 480Mbps. Intended for connection to a USB compatible webcam, external USB hubs or additional memory storage.

5.4.4 Serial

16-way Serial Header provides access to 2x UART ports, 2x Logical Inputs & 2x Logical Outputs. Power (V_{IN}) can be supplied using this header as an alternative to the Latching Main Power connector.



5.4.5 Control Out

This driver is intended to be able to drive up to two separate inductive loads for applications such as door access relays or solenoids. The drive duration is limited to 10 seconds but can be re-engaged within 100ms. A voltage source is provided by the ICU Pro and the driver pin sinks the current.

An external power source can be used if:

- the external supply does not exceed V_{IN}
- (if the load is inductive) that an external re-circulating diode or other system is used to reduce the back EMF. Not required if using the voltage output pin from the ICU.

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5.4.6 Pin Assignments ICU Pro

5.4.6.1 Serial



Pin	Description	Pin	Description
1	Serial Data Out 1 (SSP Tx)	9	Logic Out 1
2	Serial Data Out 2 (Tx)*	10	Not Connected
3	reserved*	11	Not Connected
4	reserved*	12	Not Connected
5	Serial Data In 1 (SSP Rx)	13	Not Connected
6	Serial Data In 2 (Rx)*	14	Logic Out 2*
7	Logic In 1*	15	V _{IN} 9-24VDC
8	Logic In 2*	16	0V / GND

* for future use

5.4.6.2 Control Out



Pin	Description	Pin	Description
1	0V / GND	5	Output Driver 2
2	V _{OUT} for inductive loads	6	Output Driver 2
3	Output Driver 1	7	V _{OUT} for inductive loads
4	Output Driver 1	8	0V / GND



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5.4.6.3 Power



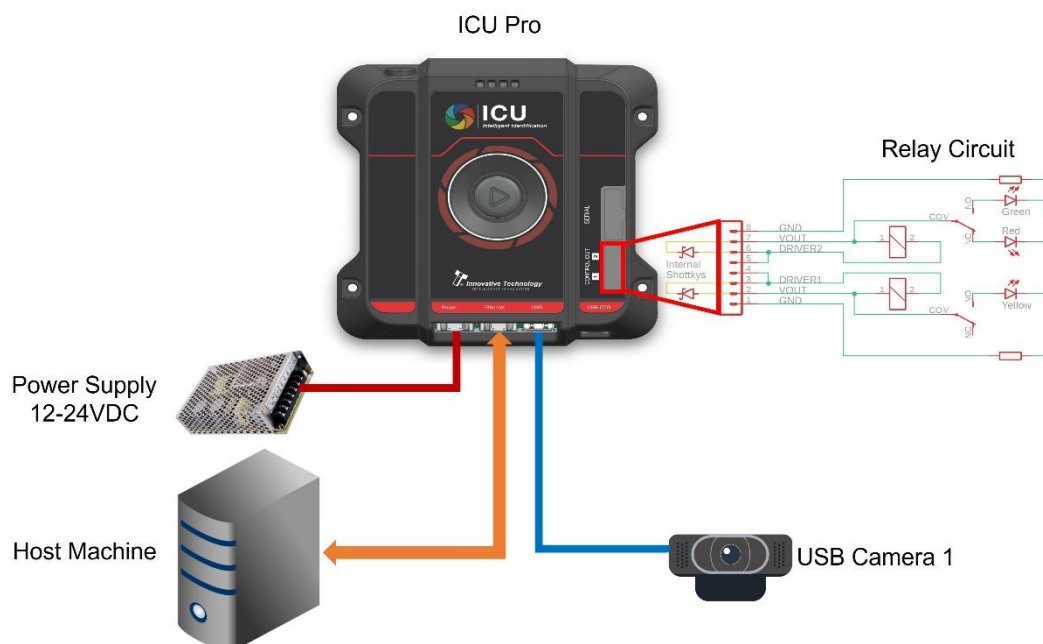
Pin	Description
1	0V / GND
2	V _{IN} 9 - 24VDC
3	0V / GND
4	V _{IN} 9-24VDC

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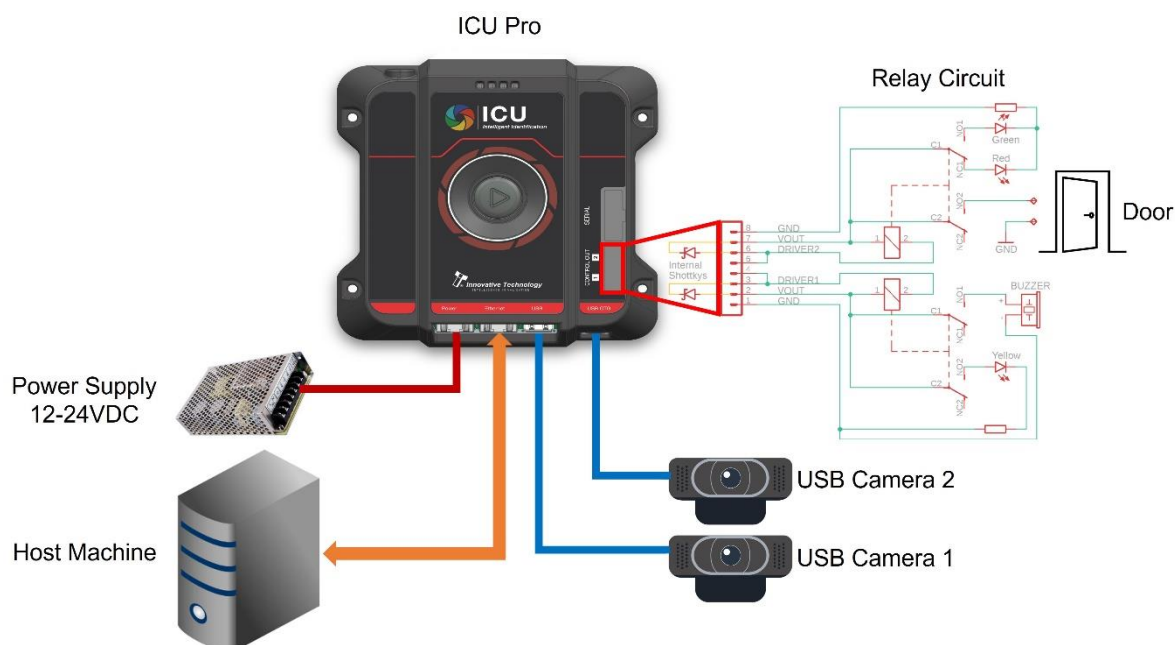
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5.4.7 Setup Examples ICU Pro

5.4.7.1 Example 1: Age Verification with LED indications



5.4.7.2 Example 2: Door Access with Buzzer and LED indications



5.5 Interface Options ICU Lite

5.5.1 USB-A_1

High-Speed USB 2.0 Host port capable of data rates up to 480Mbps. Intended for connection to a USB compatible host for RNDIS Network Connection.

5.5.2 USB-A_2

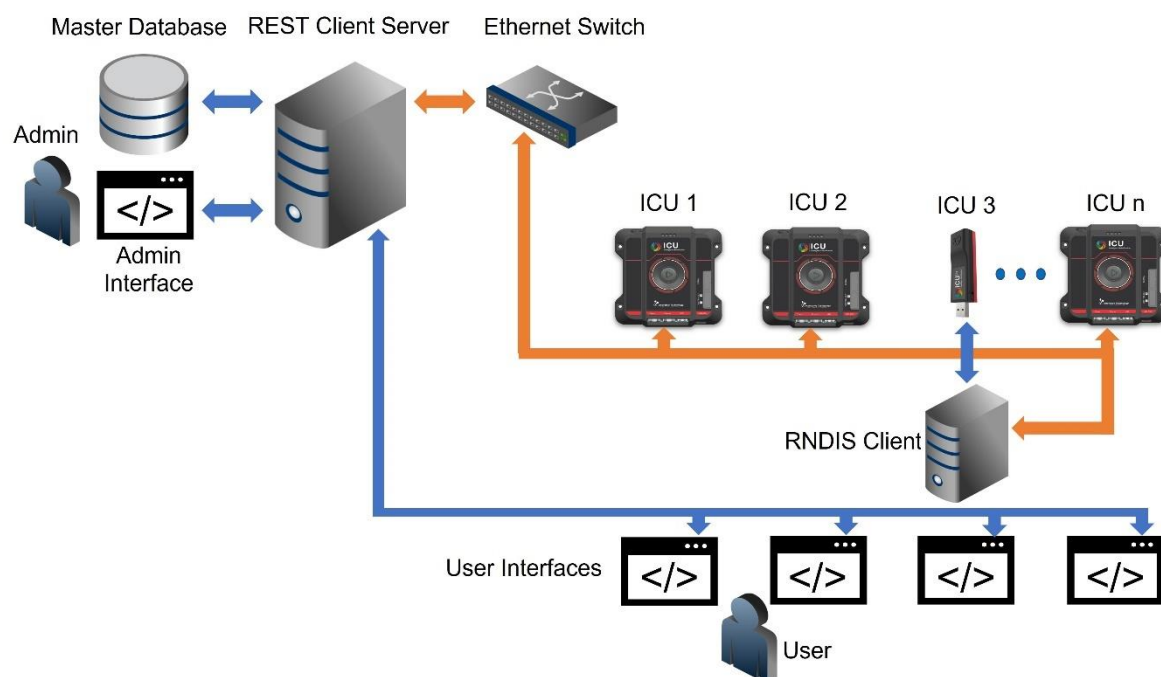
High-Speed USB 2.0 Host port capable of data rates up to 480Mbps. Intended for connection to a USB compatible webcam.

5.5.3 Setup ICU Lite



5.6 Overview of Basic ICU Network Infrastructure

5.6.1 Example 1: ICU devices connected via Ethernet Network

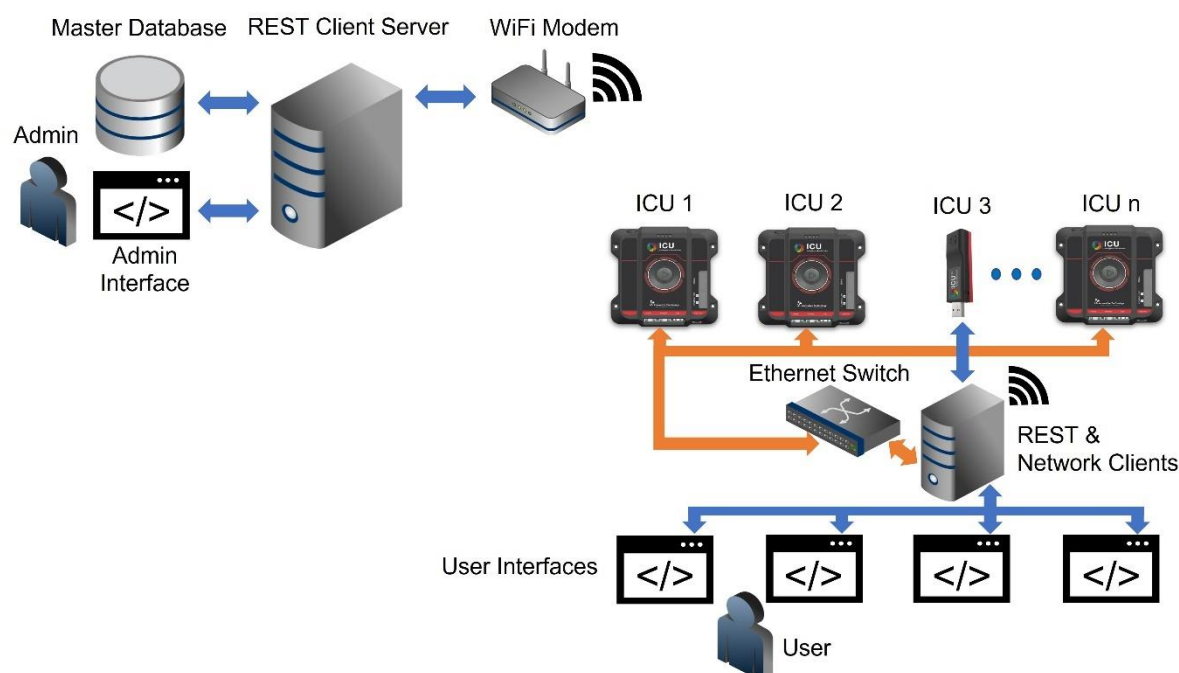


Master Database	Local database containing all information to any enrolled member
REST Client Server	Contains REST API Client that talks to individual ICU devices connected, i.e. update ICU devices with new enrolled members
Ethernet Switch	Provides Ethernet connection for individual ICU devices
Admin	Administrator maintains Master Database and Network Clients
Admin Interface	Portal for admin to maintain Master Database and Network Clients
ICU 1, 2, 3, n	Individual ICU devices connected to the Ethernet network
RNDIS Client	Provides network connection for ICU Lite devices
User	User interacts with user application
User Interface	User portal to interact with user application. All tasks are initiated from the User Interface

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5.6.2 Example 2: ICU devices connected via Ethernet to WiFi Client



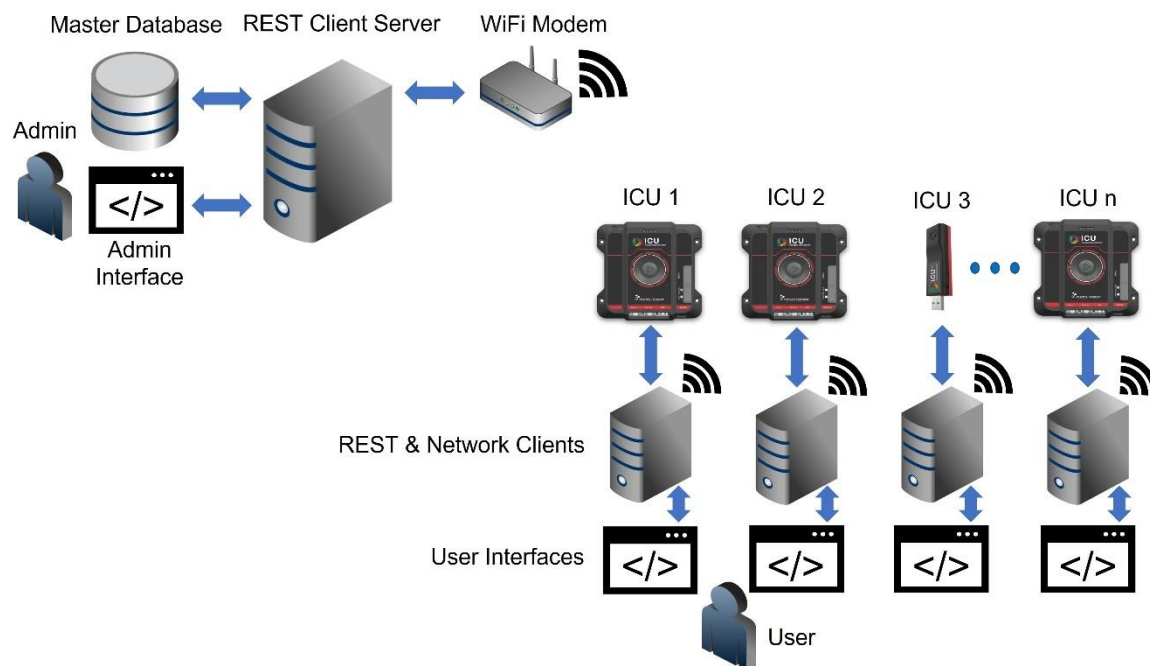
Master Database	Local database containing all information to any enrolled member
REST Client Server	Contains REST API Client that talks to individual ICU devices connected, i.e. update ICU devices with new enrolled members
WiFi Modem	Provides WiFi Network connection
Admin	Administrator maintains Master Database and Network Clients
Admin Interface	Portal for admin to maintain Master Database and Network Clients
ICU 1, 2, 3, n	Individual ICU devices connected to the WiFi network
Ethernet Switch	Provides Ethernet connection for individual ICU devices
REST & Network Clients	Hosts individual REST Clients and User Interfaces, provides WiFi Network connection
User	User interacts with application
User Interface	User portal to interact with user application. All tasks are initiated from the User Interface



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5.6.3 Example 3: ICU devices connected via WiFi Network



Master Database	Local database containing all information to any enrolled member
REST Client Server	Contains REST API Client that talks to individual ICU devices connected, i.e. update ICU devices with new enrolled members
WiFi Modem	Provides WiFi connection for individual WiFi Clients connected to an ICU device
Admin	Administrator maintains Master Database and Network Clients
Admin Interface	Portal for admin to maintain Master Database and Network Clients
ICU 1, 2, 3, n	Individual ICU devices connected to the WiFi network
REST & Network Clients	Hosts individual REST Clients and User Interfaces, provides WiFi Network connection
User	User interacts with application
User Interface	User portal to interact with user application. All tasks are initiated from the User Interface





6 FIRST LEVEL SUPPORT

6.1 Status LED Flash Codes ICU Pro

6.1.1 Start Up Procedure

These colours are hard coded in the Device and indicates the process during startup. These actions cannot be altered.

Color	Behavior	Process
White	Slow flash	Loading OS
Green	Quick flash	Device is not registered to any account
Purple	Quick flash	Loading Neural Networks Populating Device DB
Blue	Slow flash	Device waiting for Face

6.1.2 Default reactions to face:

This are the default LED actions that come with the ICU Pro. These may be changed via the ICU Management Suite

Color	Behavior	Process
Red	Solid colour	Excluded member
Green	Solid colour	Premium member
Purple	Solid colour	Underage detected
Yellow	Solid colour	Spoof detected

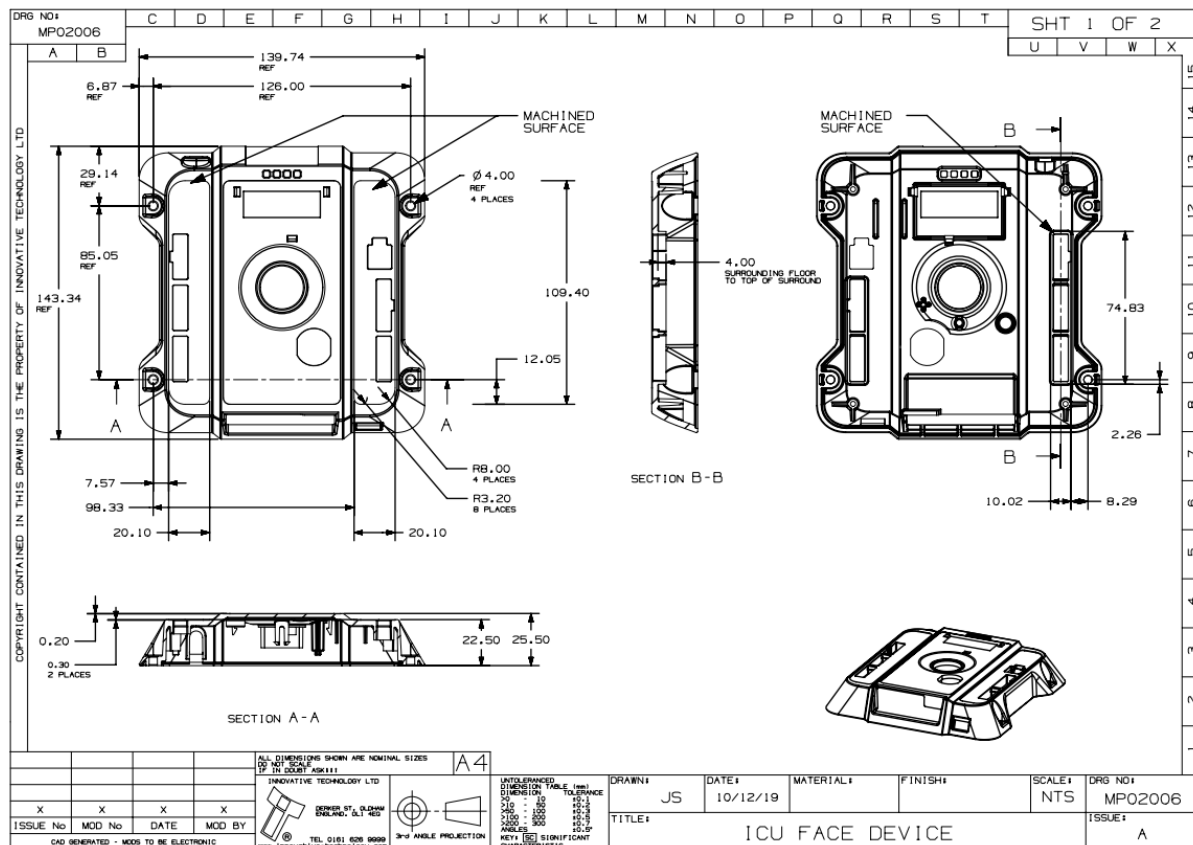
6.2 Staus LED Flash Codes ICU Lite

Color	Behavior	Process
White	Slow flash	Loading OS
Green	Quick flash	Device is not registered to any account
Purple	Quick flash	Loading Neural Networks Populating Device DB
Blue	Slow flash	Device waiting for Face



7.1 Dimensions

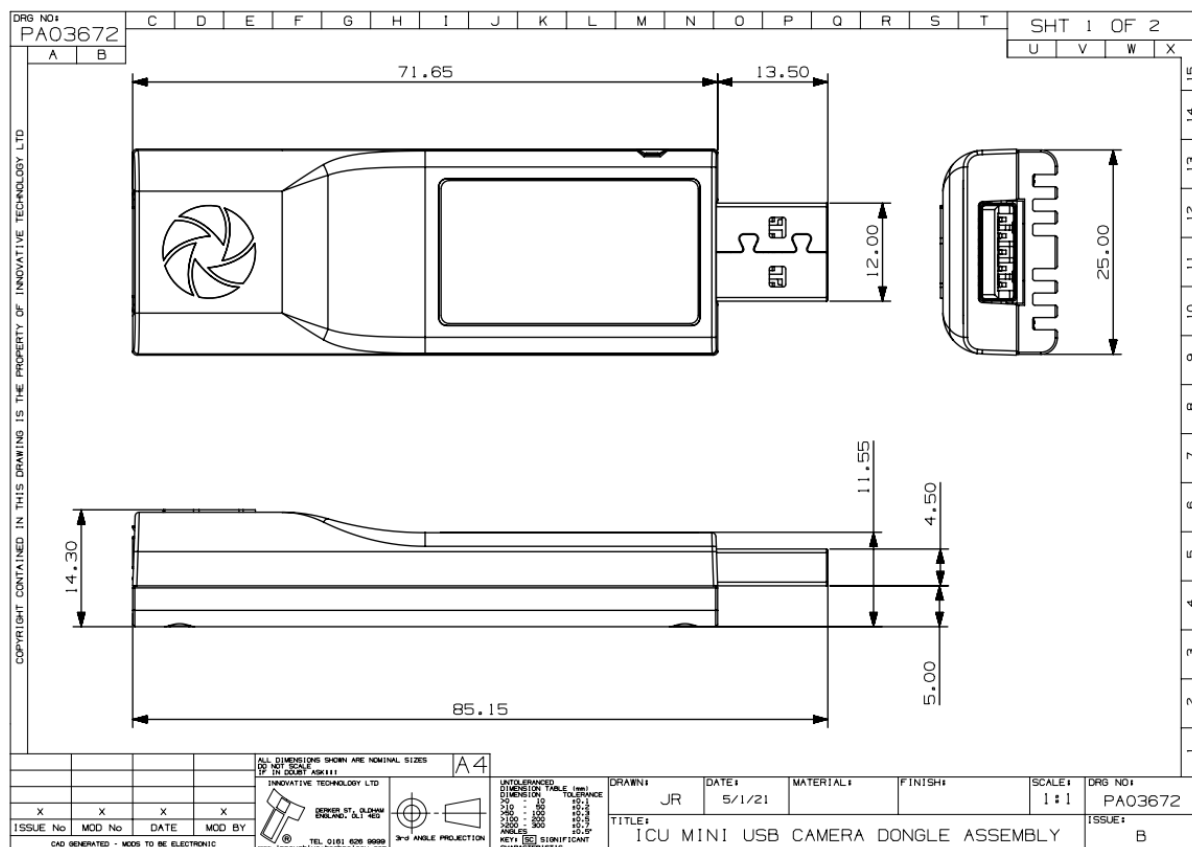
7.1.1 ICU Pro



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7.1.2 ICU Lite



7.2 Weight

ICU Pro:

ICU Lite:





7.3 Environmental Requirements

7.3.1 Operation

Environment	Minimum		Maximum	
	ICU Pro	ICU Lite	ICU Pro	ICU Lite
Temperature				
Humidity				

7.3.2 Storage

Environment	Minimum		Maximum	
	ICU Pro	ICU Lite	ICU Pro	ICU Lite
Temperature				
Humidity				



7.4 Power Requirements ICU Pro

7.4.1 Supply Voltages

Supply Voltage	Minimum	Nominal	Maximum
V _{IN}	8.1VDC (-10%)	9 – 24VDC	26.4VDC (+10%)
V _{OUT}		V _{in} – 0.5V (Schottky Diode Drop)	
V _{Ripple}	0V	0V	0.25V @ 100 Hz

7.4.2 Supply Currents

Operating Mode	Load Details	Nominal RMS Current		Peak Current	
		12VDC	24VDC	12VDC	24VDC
Normal operating, detecting faces	ICU Application Running, connected to Gigabit Ethernet Switch. 2x cameras connected, no additional USB or solenoid loads.	400mA	220mA	500mA (5ms burst)	260mA (5ms burst)
Normal operating, no faces	ICU Application Idle, connected to Gigabit Ethernet Switch. 2x cameras connected, no additional USB or solenoid loads.	300mA	180mA	500mA (5ms burst)	260mA (5ms burst)
Idle	ICU Application Idle, no cameras connected, no network connection, no additional USB or solenoid loads.	100mA	60mA	110mA (10ms burst)	100mA (10ms burst)
Max. Load	As normal operating (detecting faces), also drawing 0.5A max. from each USB port.	0.9A	0.5A	1A (5ms burst)	0.55A (5ms burst)



Caution!

Any additional current required to drive external equipment from the solenoid drive outputs is to be added to the Nominal RMS Current value above



Caution!

The combined output of the two solenoid drivers is limited to 1.5A continuous. Solenoid outputs have a HW safety feature which limits the output drive to 10 seconds.

7.5 Power Requirements ICU Lite

7.5.1 Supply Voltages

7.5.2 Supply Currents





7.6 Interface Logic Levels ICU Pro

Interface Logic Level	Logic Low	Logic High
2x UART Inputs	0V – 0.9V	3.1V
2x UART Outputs	0V – 0.9V	3.1V
2x Logic Inputs	0V – 0.9V	3.1V
2x Logic Outputs	0V – 0.9V	3.1V

The 2x UART serial ports have been designed to drive out with an open collector which must be externally pulled up (max. external pull up voltage should not exceed V_{IN}). The UART inputs are protected to allow the user to use logic high input voltages up to V_{IN} . The Input low voltage threshold is 1V, the input high voltage threshold is 3.1V.

The logic inputs have internal 10K 1% resistors pulled-up to the internally regulated 5V supply which make them suitable for use with open-collector systems and 5V driven TTL logic systems. The logical inputs are protected to allow the user to use logic high input voltages as high as V_{IN} . The Input low voltage threshold is 1V, the input high voltage threshold is 3.1V. The outputs are driven using a push-pull 5V logic output. The source impedance is 470R.



8 COMPLIANCES AND APPROVALS

8.1 Certifications

The ICU Pro has received certification for the standards in the sections below. Certificates are available on request email support@innovative-technology.com

8.1.1 EC Declaration of Conformity

The ICU Face is fully compliant with the Declaration of Conformity (CE Marking) and RoHS.

8.1.2 EMC

- FCC CFR 47 Part 15B
- EN 55032: 2015
- EN 55035: 2017

8.1.3 Safety

- IEC 62368-1:2018 (CB Scheme)

The CB Scheme covers the below National Differences:

- | | |
|----------|--------------------------|
| • Europe | EN 62368-1:2020+A11:2020 |
| • Canada | CSA 62368-1: 2019 |
| • USA | UL 62368-1: 2019 |
| • Japan | J62368-1 (H30) |





9 APPENDIX

9.1 Example Faces

The following faces can be used to test the ICU Device. Test Members are also added by default.

Member	Group
Obama Real	Premium
Obama Fake	Excluded
Einstein Real	Premium
Einstein Fake	Excluded
Underage	Under 25



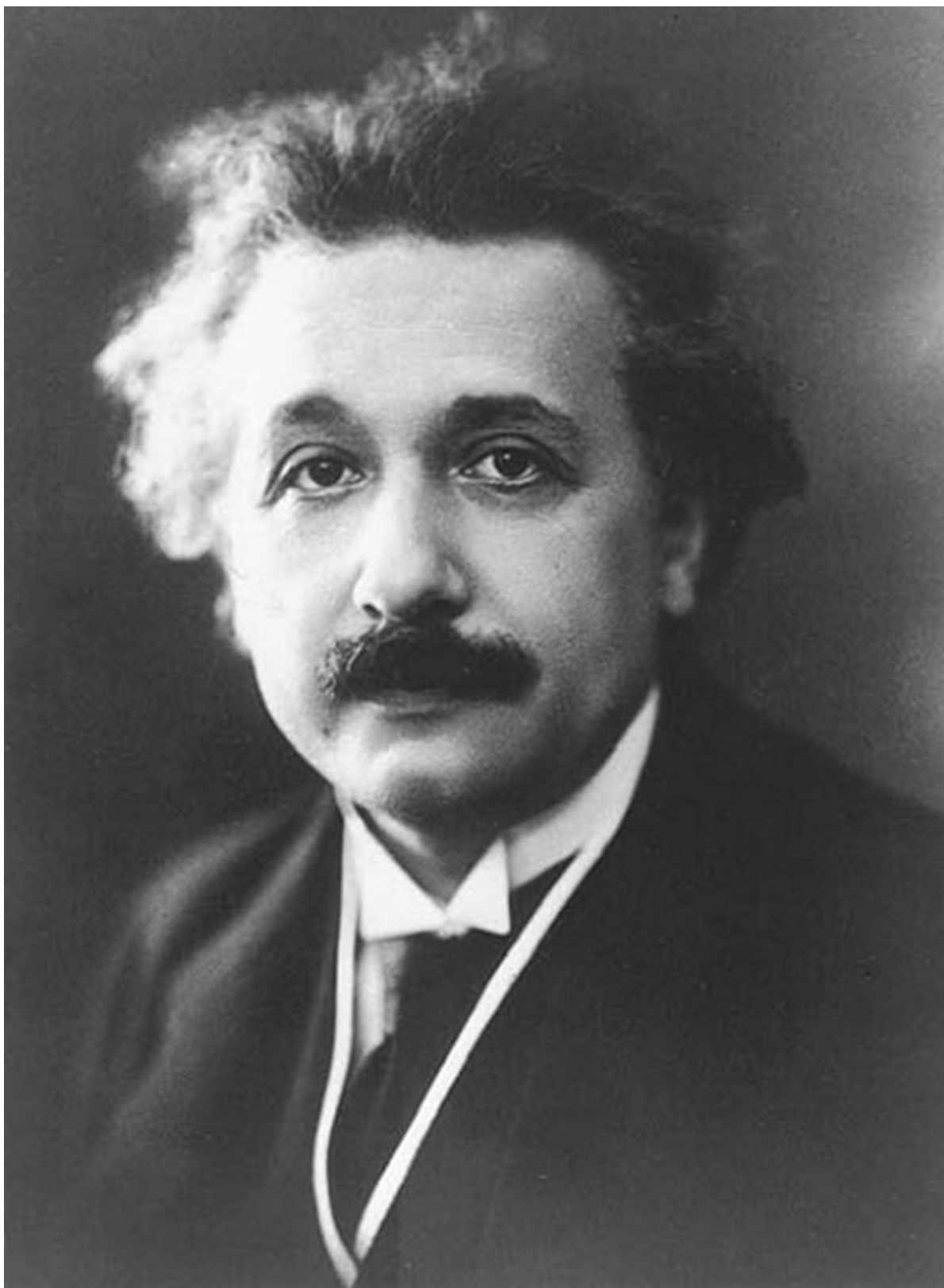
9.1.1 Obama Real



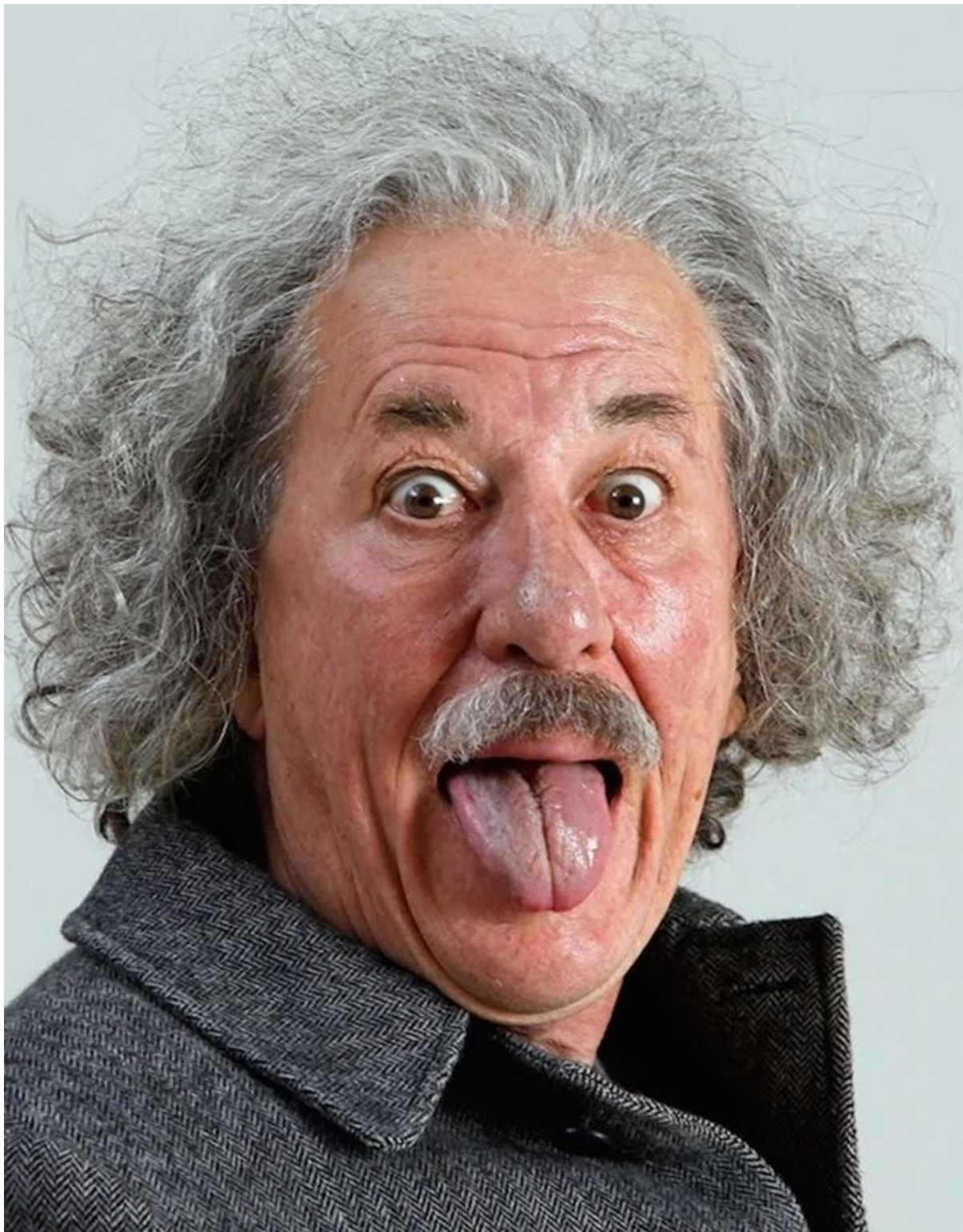
9.1.2 Obama Fake



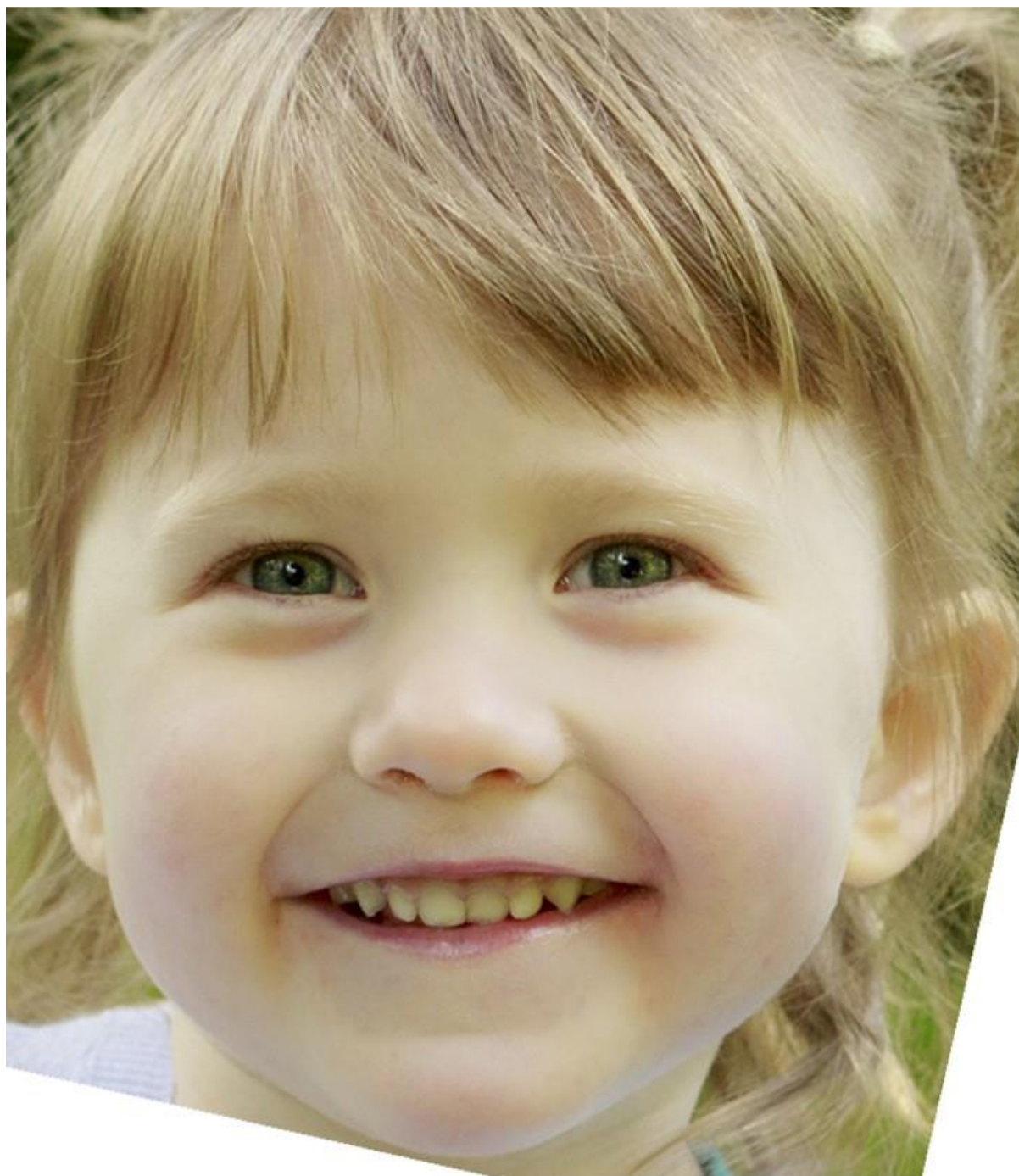
9.1.3 Einstein Real



9.1.4 Einstein Fake



9.1.5 Underage



9.2 Example Circuits Solenoid Driver

