

SIMON

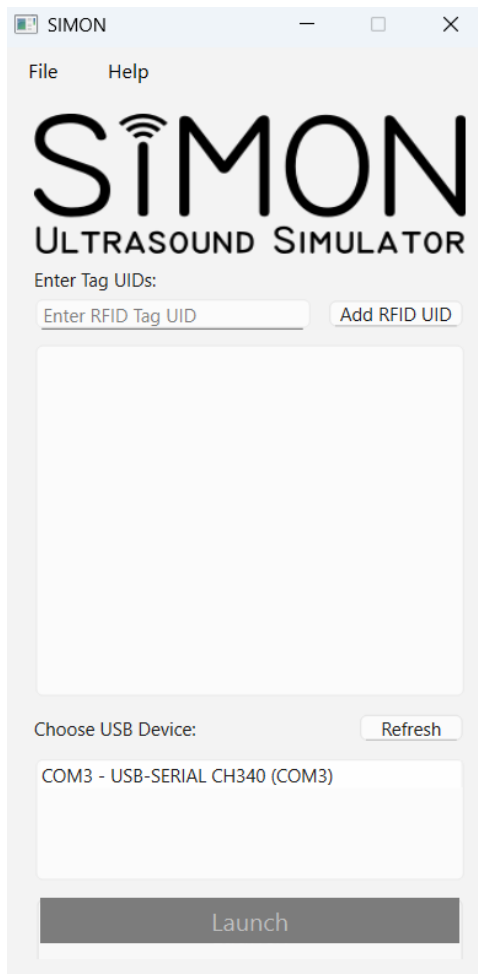
SIMON Ultrasound Simulator (Full Kit)

Information Packet

Tutorial

Before starting, create a new folder in your computer's library. This is where you should save the ultrasound videos you plan to use for the simulator (**the name and location of this folder is irrelevant**). Videos can either be your own collection, or you can download ultrasound videos from our website at: simonedu.org

Step 1: To start, download the SIMON software on your computer from our website at simonedu.org. Once the software has been installed, double click the program to open the user interface as seen below.



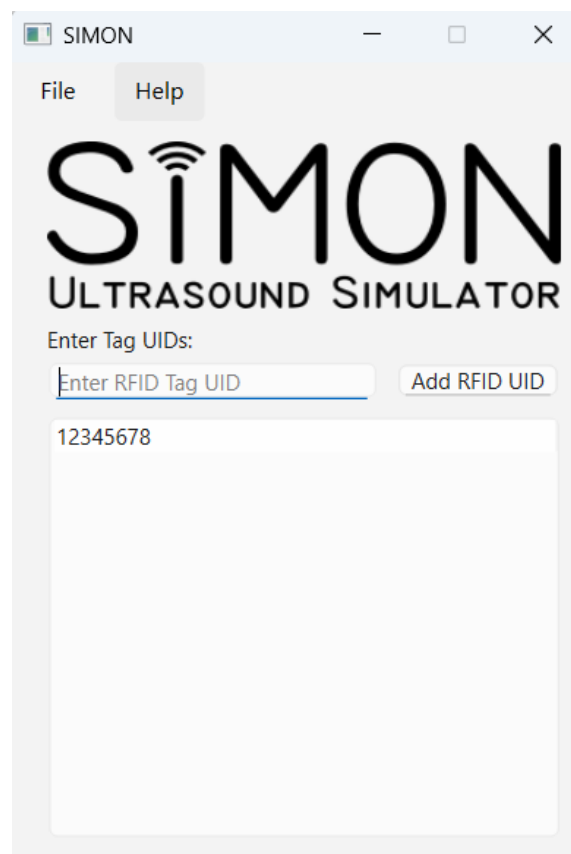
Step 2: Refer to the “Tag ID Card” included in your kit and find the first code listed on your card (all codes are 8 characters long). The first code listed on your card should correspond with “Right Liver”. Next, on the user interface, enter the first code from your card into the space titled “Enter RFID Tag UID” (**first image shown below**). Once you have entered the code, click the button titled “Add RFID UID”. This should add it to the white box (**second image shown below, with “12345678” as an example**).



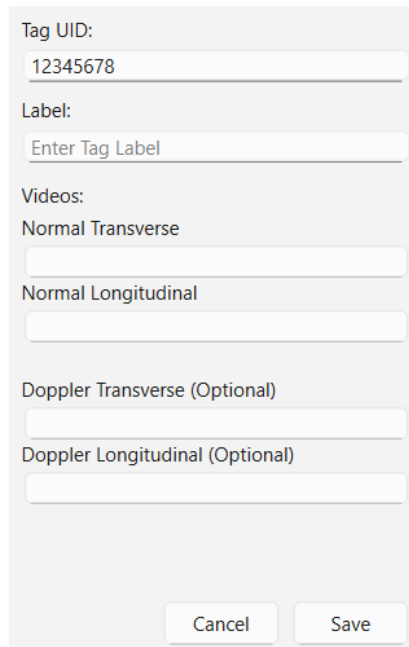
Enter Tag UIDs:

Enter RFID Tag UID

Add RFID UID



Step 3: Double click the code in the white box. This should open another window (**shown below**). In the section titled “Label”, enter the tag name as listed on the “ID Card” in your kit (for example, Tag #1 should be labeled “Right Liver”, Tag #2 should be labeled “Middle Liver”, etc.).



The screenshot shows a form with the following sections:

- Tag UID:** A text input field containing the value "12345678".
- Label:** A text input field with the placeholder text "Enter Tag Label".
- Videos:**
 - Normal Transverse:** A text input field.
 - Normal Longitudinal:** A text input field.
 - Doppler Transverse (Optional):** A text input field.
 - Doppler Longitudinal (Optional):** A text input field.
- Buttons:** "Cancel" and "Save" buttons at the bottom.

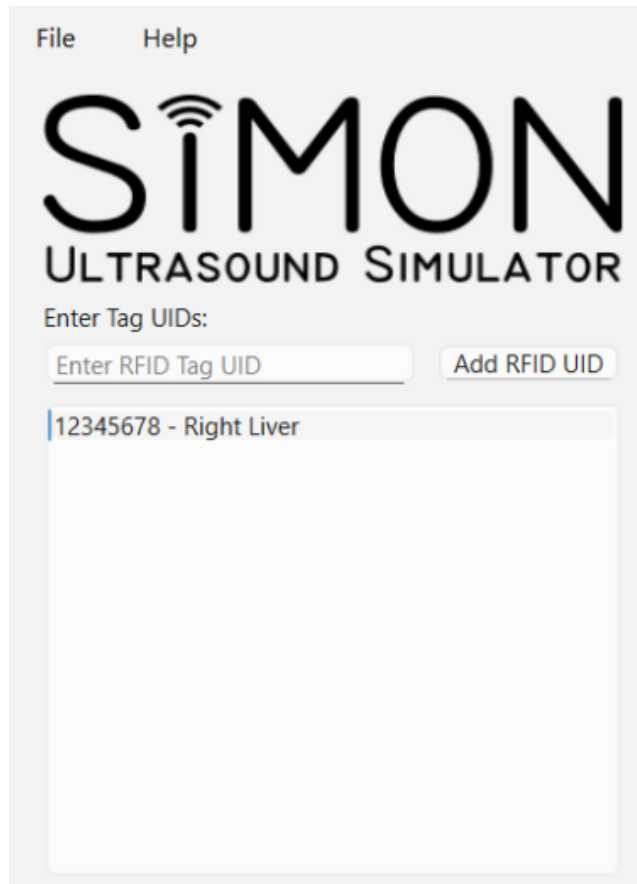
Next, double click the white box under “Normal Transverse”, which will open file explorer on your computer.

In file explorer, navigate to the folder containing your collection of ultrasound videos (created at the beginning of this tutorial). Select a transverse video corresponding with the label from your “Tag ID Card” and then click “Open” to upload it (for example, with Tag #1, you would upload a transverse video of the right liver). **The video you upload can either be normal or pathological, whatever you want to see in this location.** Repeat this process for the Longitudinal section.

Make sure you upload transverse videos to the transverse section, and longitudinal videos to the longitudinal section.

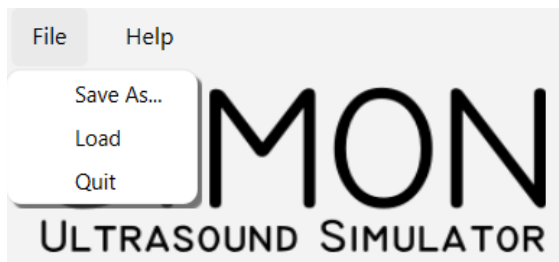
“Doppler” videos are completely optional for the simulator. If you have any doppler videos that you wish to use for this specific region, you can upload them to the corresponding section. **Once you have uploaded all the desired videos for this specific tag, click “Save” at the bottom.**

Step 4: Clicking “Save” should bring you back to the main user interface. The tag you just entered should now be listed in the large white box (**example shown below**). If you wish to edit the information or videos associated with this tag, simply double click it to re-open the window from the previous step.



Step 5: Repeat steps 1-4 for each tag listed on your “Tag ID” card. Make sure to title the tags correctly and upload the right videos for each anatomical location.

Step 6: Once you have finished uploading the videos for each tag, you can save this information as a “case” by going to “File” → “Save As...” and saving under the appropriate name (**shown below**). The next time you run the program and want to access this “case”, go to “File” → “Load” and select the desired file in your computer library. **For example, if the videos you uploaded to each tag are considered “normal findings”, you can save these settings as a “Normal Case”. Then, the next time you want to look at a “Normal Case”, you can simply press “Load” and select the appropriate file. By saving your settings, this will prevent you from having to re-upload videos every time you run the software.**



Step 7: Plug the ultrasound probe into your computer using the USB cord included in your kit. When the probe is plugged in, a device should appear in the white box at the bottom of the user interface (**shown below as “COM3”**). If you do not see a device when you plug your probe in, try pressing “Refresh”. If this does not work, try plugging the probe into a different USB port. **Once the probe is detected by your computer, simply click once on the name listed in the box to select it.**



Step 8: After completing steps 1-7, click the button at the bottom of the user interface titled “Launch”. **The program will not launch unless a USB Device has been selected.** Pressing “Launch” will start the simulator and should prompt a black screen to appear.

Step 9: You are now ready to perform a simulated ultrasound exam on the dog model included in your kit. Start by placing the dog model in dorsal recumbency (on its back).

Very Important: With the dog in dorsal recumbency, the user needs to sit/stand behind the dog with the hind end closest to them and the head furthest from them.

The black vest must remain on the model at all times.

To begin your exam, hold the probe by the handle and lightly press the gray end against different regions of the dog's abdomen (aka the "belly" or the "underside" of the dog). **If you are not familiar with the location of canine abdominal organs, refer to the "Canine Abdominal Organ Guide" included in this guide below the tutorial.**

While scanning the abdomen...

- If the probe encounters a tag, a video will play on your screen
- If the probe does not detect a tag, then a video will not play and the screen will remain black.
- Once you see an organ, hold the probe over that spot to inspect it.
- While a tag is being scanned, the probe can be rotated horizontally and vertically to demonstrate transverse and longitudinal videos of that location, respectively.
- Scan the full abdomen to see different organs. The dog model is anatomically accurate and represents the location of organs in a live canine patient.

Step 10: To activate "Doppler Mode", press "D" on your keyboard while scanning a particular tag. This will play a doppler video of that specific location, **but only if a doppler video has been uploaded to that tag.** If a doppler video has not been uploaded to this tag (as previously described in this tutorial) then pressing "D" will do nothing. To exit "Doppler Mode", press "D" again.

Step 11: When you are done using the simulator, press "Q" on your keyboard to exit and return to the user interface.

Step 12: Before closing the program, make sure you have saved your current settings (if desired). If you close the program without saving your settings then your progress will be lost.

Canine Abdominal Anatomy Guide

Abdominal organs can be identified by their shape, size, and echogenicity. Each organ has a unique and consistent location in the body, which allows us to find them quickly in any given patient. While scanning the abdomen, make sure to get both transverse and longitudinal views of every organ. Listed below is each organ you may encounter in the abdomen, with a description of how/where to find it, and how the organ is supposed to look. Additionally, an anatomy diagram is provided below for your reference.

Although this simulator is a great way to practice ultrasound organs identification and learn normal vs pathological findings, please understand that patient anatomy can often vary. The dog model included in your kit demonstrates the approximate location each organ, however the location of these organs can slightly vary in a real patient. Additionally, while the dog model does feature every major organ in the canine abdomen, there may be organs/structures in a real patient that the dog model does not have.

IMPORTANT - READ BEFORE USING

For the best experience, place the dog model on its back and place it in front of you with the tail (back end) pointing towards you and the head (front end) pointing away from you. If you are sitting down, you can place the dog model in your lap for stability.

Position your laptop either beside the dog model or on a nearby desk, such that you can scan the dog model while watching your screen at the same time.



Liver Gall Bladder Spleen (Head)
 Spleen (Tail) Stomach PDJ Duodenum
 Jejunum Ileum ICJ Colon Bladder
 Kidney Adrenal

Echogenicity Scale

Hypoechoic

Hyperechoic

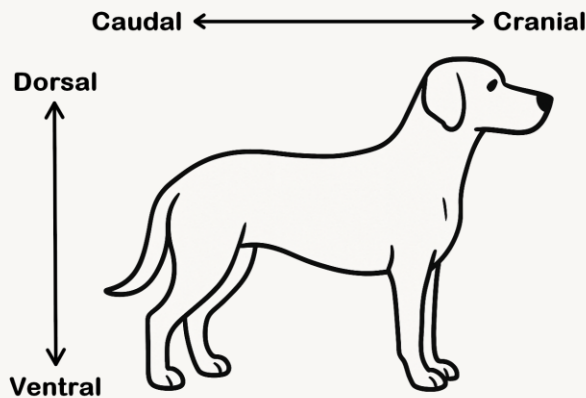


Fluid

Muscle

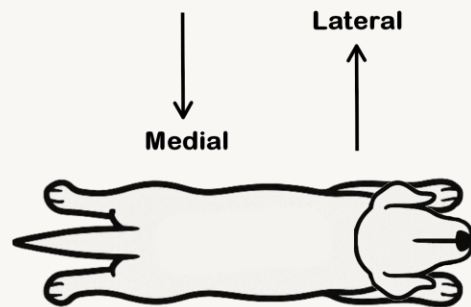
Tendon

Medical Directional Terms



Examples

The head is **CRANIAL** to the tail
The tail is **CAUDAL** to the head
The spine is **DORSAL** to the paws
The paws are **VENTRAL** to the spine



Examples

The paws are **LATERAL** to the spine
The spine is **MEDIAL** to the paws

Abdominal Organs

Liver: The canine liver is made of six lobes and is the most cranial organ in the abdominal cavity. These lobes can be found on both sides of the body in the cranial abdomen, however, the liver predominantly resides on the right side. On ultrasound, these lobes appear mildly hyperechoic and normally should have a smooth, homogenous texture. Additionally, the margins of these lobes should appear smooth and distinct. Thickening or rounding of the lobes may indicate pathology like hepatic lipidosis. Pay close attention for any nodules or cystic structures while scanning the liver, as this organ can be a common site for both primary tumors as well as secondary metastasis. Between two of the liver lobes (quadrate and right medial) sits the gall bladder, which is very hypoechoic because it is filled with bile. Other structures found within the liver include the aorta, the portal vein, and the vena cava. There are certain ways to tell these vessels apart; the portal vein has a more hyperechoic rim, while the aorta has a slight pulse that can be visualized.

Spleen: The spleen is a long and thin organ that sits on the left side of the body, just beneath the liver. It has two regions, known as the head and the tail. The head is more dorsally located in the body and sits closely attached to the stomach, while the tail of the spleen is more ventrally located in the body and is more “freely moving”. A normal spleen should be diffusely homogenous and moderately hyperechoic (it should always be brighter than the liver). If the spleen and liver appear to have the same echogenicity, then there may be a problem with one of those organs (either the spleen is too dark, or the liver is too bright). Additionally, much like the liver, there are large vessels that run through the middle of the spleen. These show up as hypoechoic structures throughout the splenic parenchyma. It is extremely important to visualize the entire spleen from head to tail, as well as to evaluate its general size and overall echogenicity. When observing the spleen, ensure that the margins are smooth and distinct, with no irregularities on the surface or internally. The spleen can be a common site for tumors, however, it’s important to know which tumors are more likely benign and which tumors are more likely malignant. If you see small, hyperechoic nodules that sit closely related to the splenic vessels, these are more likely benign and are referred to as myelolipomas. However, if you see a large, irregular, cavitated, and/or hypoechoic mass, this is more likely to be malignant (top differential is hemangiosarcoma, less commonly a benign hemangioma) and should be further investigated. Keep in mind that, while imaging can be a helpful way to identify tumors, you ultimately need to sample the tumors to know exactly what they are.

Stomach: The stomach is an organ that sits predominantly on the left side of the body, both caudal to the liver and medial to the spleen. In general, its appearance on ultrasound can vary. If the stomach is empty and filled with gas (**shown below**), then you won’t see very much because ultrasound waves can’t travel on air. However, when the stomach is full of fluid, ingesta (food), or other matter, you can see it quite well. The rugal folds (walls) of the stomach give it the characteristic “wavy” or “folded” appearance. It is important to evaluate the size of the stomach, assess the quality of the digestive contents, look for defects in the stomach wall, and watch for any “shadowing” that may imply the ingestion of a foreign body (ex. Bones, which are solid, so ultrasound can’t penetrate them, creating a shadow).

PDJ: The Pyloric-Duodenal Junction (PDJ) is where the pylorus of the stomach thickens and narrows, creating a sphincter that leads into the first segment of intestines known as the duodenum. This structure can be found more towards midline or slightly to the right of the stomach. On ultrasound, this structure may look like a “flower” in cross section, but it can sometimes be tricky to find. This is an important landmark to identify on any routine ultrasound exam because it is a common site of obstructions due to foreign bodies. Additionally, this is one of the most common locations for a linear foreign body to anchor (which is an emergency), so always remember to check this spot!

Duodenum: The duodenum is the first segment of intestine that leaves the stomach and can be found on the right lateral aspect of the body, just caudal the level of the stomach. It is composed of four layers that alternate with echogenicity. From superficial to deep, you have the serosa, the muscularis, the submucosa, and the mucosa. The serosa and the submucosa are hyperechoic, while the muscularis and the mucosa are both hypoechoic. An easy way to remember this is that the two structures that begin with the letter “M” are hypoechoic. Ultrasound of the duodenum can sometimes be tricky, which is why finding certain landmarks associated with the duodenum (such as the right limb of the pancreas, **circled in green below**) can be helpful. After leaving the stomach, the duodenum courses caudally and dorsally (“descending duodenum”) before it curves and crosses to the left side of the body, eventually transitioning into the jejunum (second segment of intestine).

Jejunum: The jejunum is the second segment of intestines and is the longest of all three. It can be found in the center of the abdomen, where it twists and turns throughout the body. Just like the duodenum, it has four alternating layers. Pay close attention to the thickness of each intestinal layer, as thickening may imply pathology. While imaging the jejunum, you should evaluate the quality of the digestive contents, monitor for any signs of foreign material / foreign body / obstruction, and monitor for gut motility by watching a specific piece of jejunum to confirm the presence of peristalsis (synchronized relaxation and contraction of bowel that moves ingesta through the body). Additionally, keep in mind that both lack of peristalsis and excessive peristalsis can both be bad signs. Normal peristalsis in the duodenum should occur 3-5 times per minute.

Kidneys: The kidneys are “bean shaped” structure that sits in the retroperitoneal space (thin space that sits dorsally to the abdominal cavity). Ultrasound of the kidneys requires a little more “finesse” than the other structures, due to both their size and location. Additionally, the left kidney in most patients is located more caudally than the right kidney, so one must have a good understanding of anatomy before attempting to find these structures. To find the kidneys, scan the lateral aspect of the animal’s abdomen, but aim your probe more dorsally and ensure you’re below the level of the stomach and spleen. The kidney contains a hypoechoic cortex (outer layer) with a hyperechoic medullary cavity (inner layer). The renal pelvis sits within the medullary cavity and is responsible for draining urine to the bladder via the ureters. Normally, the renal pelvis should be very small. However, in cases of hydronephrosis (caused by stones, tumors, strictures, etc.), the renal pelvis will appear dilated and filled with fluid. Additionally, in cases of urolithiasis, stones may be found within the renal pelvis or potentially further downstream blocking urine outflow from the kidney. Stones, much like bones, are completely solid and will create a shadow on ultrasound because ultrasound waves cannot penetrate them. Therefore, if you see a shadow while ultrasounding the kidney, you should suspect a stone. Other important things to look for in the kidney include cortico-medullary distinction (in other words, make sure you can tell the difference between the two layers of the kidney. In cases of pathology, that layering distinction is lost, and the entire kidney is the “same shade”). Additionally, within the renal parenchyma, evaluate for any cysts (circular and hypoechoic structures) or tumors (abnormal masses with varying echogenicity) within the renal tissue. Often times finding just one cyst can be incidental but finding multiple cysts in one or both kidneys may indicate pathology, especially in cats.

ICJ: The Ileo-Colic Junction (ICJ) is another important structure to find when performing ultrasound. At the junction of the ileum and the colon is where you’ll find the cecum, and all three of these structures make up the “ICJ”. It can be found in the more caudal aspect of the abdomen and slightly to the right of midline. This structure has a unique “wagon wheel” appearance to it when viewed in cross-section and should be identified on every ultrasound exam. Pay particular attention to this spot, as this is the other very common location for both generalized obstructions and anchoring of linear foreign bodies due to the drastic decrease in diameter at this location.

Urinary Bladder: The urinary bladder is a round, durable organ that receives and stores urine from the kidneys. It is one of the most caudal organs in the abdomen and sits right on midline. It is very important to identify this structure on ultrasound, but thankfully it is also one of the easier structures to find. In cases of urinary tract infections (UTIs), the bladder wall on ultrasound may be thickened and urine within the lumen may contain free-floating particles (cells, inflammatory debris, bacteria, etc.). Additionally, common tumors of the bladder like urothelial cell carcinoma (UCC) which was formerly known as transitional cell carcinoma (TCC), can often be found on ultrasound and help with diagnosis and surgical planning. Another common problem in the bladder is the formation of urinary stones. These stones, as described in the kidneys, create a shadowing artifact that is easy to identify once you know what it looks like. Stones can vary in both size and location, which is why some stones are found incidentally while others aren't found until they cause urinary obstruction. The best way to prevent these obstructions from occurring is by identifying them early on routine abdominal ultrasounds.

Descending Colon (DC): The descending colon is visualized routinely on ultrasound. It courses caudally down the left side of the body, just lateral to the bladder before it leads into the rectum. However, you don't always see it very well. Much like the stomach, it can often be filled with gas, which disallows the user from seeing a well-defined structure. However, in cases of diarrhea, the descending colon contains fluid, allowing it to be easily visualized.

Educational Product Disclaimer

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Ultrasound Simulator Disclaimer

This product is a non-functional simulation tool. It does not produce ultrasound waves or interact with body tissues. It relies on RFID (radio-frequency identification) technology to display pre-recorded or pre-selected videos on a computer or tablet when scanning specific areas of a physical model. It is meant to help users understand probe placement, basic scanning techniques, and image recognition in an engaging, hands-on format.

- This device does not diagnose, monitor, treat, or prevent any medical conditions.
- It is not a substitute for real ultrasound equipment or professional medical training.
- It should never be used in a clinical or emergency setting.

The anatomy of the canine abdomen is complex. While this anatomy guide can be a helpful way to learn canine abdominal anatomy, it is mainly intended to teach the user about major structures they should see on ultrasound. In other words, structures like nerves, vessels, and smaller ligaments/tendons have not been depicted in this anatomy guide simply because they aren't as relevant on ultrasound. If one wishes to learn more intricate details about canine abdominal anatomy, we encourage the user to refer to other sources in conjunction with this anatomy guide, as opposed to using this guide alone.

Additionally, the structures seen with ultrasound of the canine abdomen often vary to a certain extent. While the images in this anatomy guide are accurate and serve as a good reference for canine abdominal anatomy, it is possible that the user may encounter slight differences between live patients and the appearance of their abdomen on ultrasound.

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 - You agree to use it exclusively for educational and demonstrational purposes.
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