Thank you for buying the St. Just in Roseland Organ!

Or, if you have only downloaded the free 'Explorer Edition', please play with it, and if you like it and want the full complement of stops for full authenticity, do buy the full version. If you are a lover of church organs you will not regret the purchase. Plus, half the proceeds go to St. Just in Roseland church for the upkeep of their organ, so you can feel good about helping them out.

This organ is modelled on the organ at St Just in Roseland Church, on the Roseland Peninsula in beautiful Cornwall. This Virtual Pipe Organ gives you a complete, very realistic church organ experience without filling your device with Gigabytes of sample data. This organ synthesises its sounds using WAVETABLE TRAJECTORY SYNTHESIS - no samples are used in this application. This approach allows a 22-stop organ to be implemented within a download package of under 25MBytes, yet the app delivers very realistic pipe organ sounds. This organ is not just memory-efficient, it is extremely CPU-efficient as well - it runs GREAT on iPad 3 and above, iPad Mini 2 and above, iPhone 5C and iPod Touch 6G. With older devices the app will still run very well if you are careful with couplers - in general you will be able to use the whole organ apart from the swell octave couplers, which will typically lead to a CPU overload on iPad 2 or iPod Touch 5G. But if you are modest with registrations this is a great option to squeeze many more years of use from an old, neglected iPad 2 - turn it into a full-time musical instrument.

Doug Woods (of The Soundtestroom) and Doreen Freeman (organist at St Just in Roseland, St Mawes and St Symphorian, Veryan) give the St Just in Roseland Organ a thorough run through in St John The Baptist RC Church, Camborne, Cornwall
Using the app - playing the organ

You will have already noticed that there is no on-screen keyboard included in this organ. The organ publishes a virtual MIDI channel (called OMENIE:StJustOrgan or OMENIE:StJustFree) so you can audition sounds and test out registrations using other apps (e.g. Chordion, Navichord). But to actually play the organ you will need at least one MIDI controller keyboard. You may eventually wish to graduate to two keyboards plus a set of pedals. The real St. Just in Roseland organ was specified to include 16’ stops in each of the manual divisions, so you can generate very low bass notes without pedals, but that can muddy up the sound with big, deep chords. To facilitate a more appropriate and more realistic organ pedal sound for non-pedal players the app contains an 'Auto Pedal' feature that passes the lowest-played note on the GREAT manual into the pedal division.

Camera Adapter Kit / USB interfaces

To plug in USB MIDI keys you will need a compatible 'Camera Adapter Kit' for your iPhone or iPad. Apple’s authorised devices obviously work perfectly, but unusually, so do the unauthorised ones, at much lower price points. These inexpensive clones of Apple Camera Connection devices, typically marketed as 'Lightning USB3 adapters', really do work great. Unless you have a keyboard that can run on very little power, you will also need a powered USB hub. If you want to plug in 2 keyboards, or 2 keyboards plus pedals, you will definitely need a powered USB hub.

Starting out - single keyboard mode

To play the organ you will also need to correctly configure your MIDI settings, both within the app and on your controller keyboards and pedals. But if MIDI fills you with fear; DO NOT PANIC. The organ contains a single setting to make your first time as easy as possible, and that single setting (“Single keyboard / OMNI mode”) is the default, so from the point you buy the app you need to do nothing at all to get started. Just plug in your MIDI controller keyboard and start playing.
Advanced use - beyond single keyboard mode

Of course the truly great thing about pipe organs is that they feature multiple keyboards and pedals to allow 3 completely different sounds to be created at the same time using left hand, right hand and feet. In order to take advantage of this, you will need to set up your keyboards and pedals so that they are each transmitting on a different MIDI channel, and you need to make sure that they are set to output on the MIDI channels that the app is expecting. The app boots for the first time expecting to find GREAT connected on channel 1, SWELL on channel 2 and PEDAL on channel 3. You can change these in the app to different values, of course. Look at the section 'Settings' for more information.

See the Omenie website for instructional videos showing how to connect keyboard to the St Just in Roseland Organ.

Using a home organ as MIDI controller

A surprisingly inexpensive but very effective option to drive the St. Just in Roseland Organ is to buy a used home organ that features MIDI output. As an example, the Yamaha Electone HS6 has 2 manuals, a 'spinet' style set of 20 pedals and an analog pedal that can operate as swell or crescendo. Basically, it has everything. And they can typically be found on eBay for under £70, significantly less than the price of a new 4-octave MIDI controller keyboard. WAY less expensive than a pair of keyboards, a set of pedals and a swell pedal. This particular model of organ has been tested and shown to work very well with the app. The Roland Atelier series is another great fit for the St Just in Roseland Organ, the AT-10 S has been tested extensively.

Because these older home organs typically have an old-style 5-pin MIDI jack rather than a USB port, you will also need a MIDI USB adapter. The inexpensive versions of these are to be avoided - they simply do not work (strictly speaking, they fail to honour 'running status', so they miss notes and emit random notes when the swell pedal is used. We recommend the M-Audio Midisport 1x1, a mature and reliable device that costs typically around £23.
The console - stops, couplers and pistons

The app presents a user interface modelled on the console of the St. Just in Roseland organ.

A - The blue ‘info / help’ button. You have already discovered the ‘info’ button, well done there.

Next, stops and couplers. Left to right, the stops are

B - SWELL stops
C - PEDAL stops - most of these are in fact borrowed from the SWELL and GREAT divisions
D - COUPLERS
E - GREAT stops.

Yes, it is unusual to have SWELL over on the left, but that’s how it is on the real organ. However on the real organ the couplers are arranged somewhat differently. We have taken a few liberties with the console to make everything fit. Apologies to the three people who will be affected by this!

Along the bottom of the screen, we have
F - the ‘settings’ button which takes you into the Setting app
G - the ‘program’ button, which is used to assign stops to the pistons, and also to assign MIDI note numbers to the pistons to allow registrations to be selected without moving your hands from the keyboards. In addition the ‘Program’ button acts as a MIDI panic button, so if you have stuck notes as a result of MIDI channel changes, a crashed 3rd party app or a cable being pulled out, quickly switching the button on and off will send MIDI note off commands to the Great, Swell and Pedal channels.

And finally
H - the 8 programmable pistons

The pistons allow a complete console registration - stops for all divisions, and coupler settings - to be retrieved instantaneously. The pistons effectively allow you to set up 8 frequently-used presets for the whole organ.

Settings

All settings for the organ are managed within the iOS Settings app. In order to allow the organ to continue playing while you are in Settings - for example, you may wish to be playing keys as you adjust the organ’s Reverb settings - you will need to turn on ‘Background Audio’, within settings. All settings are preserved between runs of the app, but to register a couple of the settings - Background Audio, Force 48kHz - you will need to shut the app down and restart it, before the revised settings take effect. All other settings are immediate.
General Settings

These are high-level app controls, and reverb MIDI settings.

The overall volume of the instrument may be changed with the 'ORGAN VOLUME' slider. MIDI CC 7 (volume) has the same effect. Be careful to not turn this up too high as the app may distort if you have all the stops and couplers out and are playing big chords.

'Reduce dynamic range' makes the quiet stops and notes louder, leaving the louder tones largely unchanged. This evens out the peaks and troughs of the organ's levels and can be very useful if you are playing the organ at low volume, particularly for home practice. The physical organ in St. Just in Roseland church has a VAST dynamic range, and the app accurately reproduces the levels of each note within each stop in the organ. The combination of Trumpet 8 and Clarion 4 for 'Brass fanfare' passages is staggeringly loud, so much so that we have had to tone it down in the app! Contrast that with the gentleness of the Stopped Diapason, particularly with the Swell pedal backed off all the way, which is whisper-quiet. Similarly Salicional and Lieblich Gedact in the Great are very quiet stops. So to give a more balanced and usable instrument when not playing at 'in church' levels, turning on 'Reduce dynamic range' squashes the relative levels of the notes to be closer together. There is still a ton of dynamics and liveliness, it still sounds not only great but also very realistic, but there is much less chance of waking the neighbours - or indeed the entire town - by pulling out the wrong stop.

'Background Audio' - if you intend using AudioBus, AudioShare, Garageband or any 3rd party app to control or record the organ, you need to turn this on. Similarly, if you enter the Settings app, if Background Audio is off, the organ will stop making sounds. So, in general, best to leave this on all the time, although it will drain your battery if you leave the app running all the time.

‘EQ Compensation’ - this applies an EQ curve to the output of the app to more closely match the sound of the real organ. In general this increases 'mid-range honk' and decreases brightness - experiment with it to find which setting you prefer.

The other 3 settings here are the MIDI CC assignments for reverb send / space / tone. There is no 'learn' function for the reverb MIDI CC settings, so if you want to change these values you will need to read the manual that came with your controller keyboard. These CCs are assumed to come from the GREAT keyboard, so if you are using a knob box for reverb control, make sure it outputs on the same MIDI channel as your GREAT keyboard.
Settings - Synthesis Sample Rate / Reverberation Control

Historically, all iPhones and iPads ran their audio system at 44.1kHz. Recent iPhones and iPads run the audio system at 48kHz. It turns out to be tricky to automatically detect what frequency a device is running at, so we provide these switches to allow explicit control of synthesis. If these are set incorrectly for your device the organ will still work, but it will no longer be at concert pitch - it will be just under 1 semitone out, either sharp or flat. So just fiddle with these until you get concert pitch, then never touch them again.

The inbuilt reverberation engine publishes 3 very simple controls. The mappings of these controls to MIDI controller numbers is set in the section shown above. The default numbers of controllers 21 22 and 23 map onto the Novation Launchkey's first 3 knobs, so if you have a Launchkey it will work out of the box. Otherwise work out the controller numbers you want by using the free app ‘Midi Wrench’ (search for it on the app store), just rotate the knob or push the slider you want to map onto the function, take a note of the controller number that Midi Wrench tells you is being moved, and put that number in here.

If you don’t have a MIDI keyboard with slider or rotaries - for example, if you are using a digital piano or a home organ as a controller - you can still set up the reverb you want by changing the 3 sliders shown on the right.

The 3 controllers set the following parameters
- **Reverb send**: 'amount of reverb'
- **Reverb space**: 'size of reverberant space'
- **Reverb tone**: 'brightness' of reverb (e.g. tiled vs. carpeted floor).
Settings - MIDI / pedals

First things first - if you are new to MIDI, or are uncomfortable with MIDI, and you have a single MIDI controller keyboard that you want to use to play the organ, just turn on ‘Single keyboard / OMNI mode’ and start playing. When you are more familiar with MIDI and MIDI channels, come back here.

Welcome back! So, the rest of these settings, in order:

‘Look for Bluetooth Midi’ lets the organ search for any nearby Bluetooth Midi controllers, so you can play wirelessly. Turn this on, then go back to the organ to complete the finding process.

The ‘Autopedal lowest octave’ setting determines how the ‘Auto Pedal’ coupler performs.

When the Auto Pedal coupler is engaged, the lowest note played on Great will be passed through to the Pedal division, so will sound on whatever stops are pulled out for the Pedal. With ‘Autopedal lowest octave’ turned OFF, the lowest note played on Great is simply passed through to Pedal with no modification. Thus high notes will get no bass reinforcement as they will be beyond the top note of the 32-note pedalboard. Tuning this setting ON folds the lowest note played on Great into the bottom octave of the pedals. Thus any automatically generated pedal notes are always very low, and are always played, even if you are playing very high notes up the keyboard. You can take your pick, over here we really like the low ones.

The MIDI channels used for your manuals, as well as your pedals, are also set here. Any MIDI channel may be used for GREAT, SWELL or PEDAL, except MIDI channel 16 which is reserved for internal use.

The default values are

**GREAT**: channel 1  **SWELL**: channel 2  **PEDAL**: channel 3  **SWELL / CRESCENDO**: channel 3

The app supports both Swell and Crescendo pedals on MIDI Continuous Controllers (CCs). The Swell pedal operates on the SWELL Division (and on any pedal stops borrowed from the SWELL Division), and makes the sound both quieter and less trebly / more muffled when it is backed off. Crescendo brings out an increasing number of stops on all Divisions to make the organ louder.

The sequence in which stops are pulled out as you apply the Crescendo pedal is at present not user-programmable, but the settings chosen deliver a very usable lift in level as stops are pulled out.

The setting ‘Virtual MIDI only’ is used if the app is to be driven by another app, or if you are using a MIDI processor app for example to split a large keyboard into zones to allow Swell and Great on a single keyboard. To avoid any inter-app confusion, and doubled notes, turning this setting on informs the organ to stop listening to any attached keyboards, so that it only plays when sent commands over its virtual MIDI channel.
**Settings - tuning / temperament**

*Tuning* - ‘early music’ is often tuned to a lower pitch than today’s standardised 440 Hz International A, and apparently 415Hz is a popular choice for early music recitals. We honestly have no preference, but we offer you the choice of modern 440Hz tuning and ‘ancient’ 415Hz. Note that by toggling this setting rapidly while somebody tries to play the organ is guaranteed to make the best organist sound like Les Dawson.

*Temperament* - most historic organ music sounds better when performed in the temperament that was prevalent when the music was written. Bach sounds beautiful on Werckmeister III for example, and early Bach was written and performed on instruments tuned to a Meantone temperament. Try them all out, there is beauty and depth to be found when you move away from the straightjacket of Equal Temperament and discover the reality of ‘key colour’.

The ‘Out of tuneness’ slider allows you to simulate how long has passed since the organ was tuned or serviced. This does NOT act as a global tuner, so does not repitch the entire instrument up and down. Rather, it applies random tuning discrepancies to each pipe within each stope. Sometimes having the organ be tuned a little way from true pitch can add yet more realism to a performance, but be careful pulling it too far as it will wreck the effect of the Celeste, which relies on tiny tuning discrepancies for its angelic shimmer.

**Settings - Display, swap Great and Swell left/right**

It has been brought to our attention that the perspective of the stop display makes no sense whatsoever. Also, some people are much happier having the Great stops on the left and the Swell on the right. If this is your preference, turn this switch on, exit the app and restart it.
If you have a MIDI controller with drum pads - and many mid-level keyboards have these nowadays - or if you are adding a 'Box of Pads' / 'Ableton Controller' (e.g Novation LaunchPad) to your setup, you can use the pads to control the pistons. Doing this lets you change registration of the organ without having to touch the screen, which is great when using an iPhone as the pistons can be hard to touch accurately on a little screen.

Most drum pads output on MIDI channel 10 (the General MIDI Drum Channel), so you will probably leave this setting as is.

The individual note numbers for the pistons may be entered here by hand, but there is a very quick shortcut to set up all 8 pistons - read on!

### Programming a registration into a piston

To program a registration into a piston, first press the piston you wish to program. This will recall the piston’s registration settings. Now set up the registration on the console that you want, stops and couplers. When you are happy with the sound, touch the PROGRAM button. The red LED will light up on screen. With the red PROGRAM LED illuminated, touch the piston you wish to program one more time. Now all the LEDs (SWELL / PEDAL / GREAT / PROGRAM) will all flash once, to let you know the programming has happened. If the lights do not flash, you got the sequence wrong, so try again. It is easy to forget to do this in the right order, and to hit PROGRAM rather than the piston. Hitting PROGRAM again cancels program mode, and turns off the LED. This is useful if you decide you don't want to program the registration.

### Assigning MIDI note numbers to pistons - the easy way

This trick is great, and assumes you have a MIDI controller keyboard with at least 8 drum pads, or a Novation Launchpad or similar that has drum pads.

In Settings, make sure that the Piston MIDI channel is set to channel 10 (or whatever channel your drum pads are using).

Now on screen, make sure no pistons are selected. Also, make sure the red program LED is not lit. Now touch PROGRAM, and keep it touched for about 2 seconds. When you stop touching, all 4 LEDs will begin to flash. This is visual feedback to tell you that you are in "piston MIDI note assignment" mode. Now touch piston 1. This selects it for MIDI note assignment. And this is the cool trick - in sequence, just hit the 8 drum pads you wish to program as pistons 1 through 8. As you do this, the pistons on screen will be selected in turn. The whole process only takes about 2 seconds. You can test it immediately by touching the drum pads on your controller - they will now control your on-screen pistons.
These settings are experimental and this part of the app may change in future.

This is a first step to allowing a 'Box of Pads' / 'Ableton Controller' (e.g Novation LaunchPad) to control the stops, as well as just the Pistons.

To use the stops for MIDI you will need to turn on MIDI stop control, and set up the MIDI channel. The stops will only respond to NOTE ON commands, not CCs, so your 'box of pads' needs to be configured to issue notes when the pads are pressed.

The idea is, rather than exposing every single stop within the settings, which would have been a pretty horrible experience for us and for you, we expose the bottom stop of each column, and allow you to set up whether the note number issued by your 'box of pads' increments in 1 or 16 as you move vertically up through the pads.

**Audiobus / IAA support**

The St. Just in Roseland Organ offers native AudioBus 3 support. It does not offer native Inter-App Audio, BUT since AudioBus brings in a certain amount of IAA support, you get a large chunk of IAA functionality for free. But the app is not natively IAA-capable, so be aware of that.

Novation LaunchPad, a popular and typical 'Box of Pads' / 'Ableton Controller' / 'Clip Launcher', suitable for use with the St Just in Roseland Organ for MIDI stop control.
Taking liberties

How the app differs from the actual St Just in Roseland organ

We have striven to make this as honest and authentic to the original instrument as possible, within the limitations of the wavetable synthesis technology. There are a handful of places where we have either chose to, or been forced to diverge -

Pistons
The piston system is not based on that of the real organ. It is simply a nice easy way to give you 8 instantly-accessible registrations. And it was easier to program this way ...

Great Trumpet and Clarion
These stops on the real organ are INCREDIBLY loud. Really, they are terrifying. When the are pulled out together the rooks in the nearby trees scatter in fear. The app tames them somewhat, but we have left them loud enough to still leap out to form a stirring brass fanfare. But at least you now won’t drive away the church bats when you pull them out.

Great Mixture
Confession time - it turned out to be really tricky to bend our in-house wavetable generator to do the right thing with our recordings of the Mixture. No matter what we tried, our automatic harmonic finder just couldn’t make sense of our recordings of the Mixture. So, we cheated. On this one stop where we simply synthesized the pipes by ear, based on close listening to the originals rather than harmonic analysis. And they sound great. But we have to be honest, it felt more than a bit like like cheating.

Pedal Bombarde
The real organ shares the ranks for Trumpet 8 between GREAT, PEDAL (Trumpet 8) and PEDAL (Bombarde). This simulation has a set of virtual pipes for Bombarde in the PEDAL. Trumpet 8 in the PEDAL is borrowed from GREAT, as in the real organ. Again, it was easier to program this way, and only three people in the world could possibly notice the difference, and one of those people (Hi Doreen!) has the good grace to never use the abrasive, cat-scaring, bat-removal service that is the Bombarde. Nor does she ever use the Trumpet. We like her very much indeed, as does the elderly and easily-frightened congregation.

Pedal Quint
The one really big difference between this app and the real organ is in the implementation of the Quint on the PEDAL. A pipe organs Quint exists for only one reason - to allow Quint and Bourdon 16, when played together, to simulate a 32' pipe, using the magic of resultant tones. However, on the actual St. Just in Roseland organ, Quint is implemented as a 7-semitone transposition of Bourdon 16. This transposition by necessity inherits the tempering of the organ, so that the Quint is not tuned 100% consonant with the harmonic series of a 32' pipe. This dissonance breaks the illusion, and the honourable attempt to give a 32’ resultant bass in the pedals is far from convincing. Additionally the Quint comes out just as loud as the Bourdon, because it is from the same set of pipes, whereas the third harmonic of a 32' stop should be much softer than the second harmonic, so the Quint should be softer than the Bourdon.

The net result of all this is that neither your ears nor your brain are fooled, and the desired 32' resultant tone is not heard.

So to give you an opportunity to enjoy some 32’ resultant bass tones, we have implemented our Quint as a rank of pipes that are both softer than the Bourdon, and are tuned pure. Thus the Quint generates as its fundamental the true third harmonic of a 32’ pipe, in whatever temperament you select for the organ. This means, irrespective of your selected temperament, if you have big enough speakers, the combination of Bourdon 16 + Quint in the pedals will, by the magic of harmonic series, psychoacoustics and addition, convince your brain that you have 32’ pipes. Try it out! We road-tested this on a big in-church sound system with an impressive, building-rattling subwoofer, and there was no doubt that the Bourdon + Quint sounded deeper and lower than Bourdon alone. If it doesn't work for you, buy bigger speakers, ideally with 12" or 15" woofers.
Wavetable Trajectory Synthesis - Eliminating noise and minimizing download size

So, how does this simulated organ work? By using just 4 unique wavetables per pipe, per stop, we have been able to implement a lovely English 2-manual, 22-stop church in a tiny application. The audio data embedded in the app that defines the pipes is - quite remarkably - only 50 kBytes in size, which as the app launches is blown up into just under 3MBytes of wavetable data.

A wavetable is a short array of samples held in iPad / iPhone memory that contains the audio data for a single cycle of a waveform. In this organ app each wavetable is 1024 16-bit samples, sampled at 44.1kHz (CD quality). A wavetable can represent the fundamental tone of a sound and up to 511 harmonics, but it cannot represent any INHARMONIC information, such as noise. Because the wavetables contain only harmonic data, they are a really good choice for simulating a pipe organ. In isolation, when played repeatedly to generate an audio signal, a single wavetable typically sounds very much like an organ pipe. But a single table is dull and lifeless, with no movement or variation. The trick that we employ is that each pipe of the organ is represented by 4 wavetables, and we blend smoothly between these 4 wavetables during the lifetime of a note.

The 4 wavetables represent *early attack*, *maximum transient* *sustainA* and *sustainB*

As a key or a pedal is pressed, the tone the pipe is playing starts out as *early attack*, moving rapidly into *maximum transient* then *sustainA*. Depending on the stop and the pitch of the note being played this phase of the note can take between 1/200th and 1/3 of a second. The note then gradually oscillates between *sustainA* and *sustainB*, over a couple of seconds. The *sustain* wavetables are typically very similar; but by providing a pair of tables the pipes exhibit some life and movement during sustain, adding significant realism. Summarising - each pipe of each stop of the organ is modelled by 4 unique wavetables. No tables are shared between pipes, so every single key or pedal makes a unique sound.

So if this technology is so good, why aren't all organs built this way? Remember that wavetables can only hold and synthesize harmonic information. Sounds such as wind noise, blower pump noise, mechanical clicks etc. can’t be recreated using this technology. The plus side of this obvious - our recordings have no noise, at all. They are pristine and utterly musical. The downside is that some of the realism of the experience of a sampled pipe organ is the wheezing, puffing and breathing of the wind through the pipes, and the knocking and clattering of the valves opening inside the instrument to let wind through the pipes.

But for us, two issues dominate - app size and background noise. Our app is only a 25MByte download, and that download includes large images that make up the graphical user interface. Compare that with sampled organs with a similar number of stops, which require a Gigabyte or more. We know from experience that iOS devices always run out of storage, and when that happens the largest applications get thrown out first. We want this organ to be played, and treasured, rather than being thrown away, so keeping the application as small as possible was critically important.

And background noise is a nasty issue that we have completely eliminated. Blower noise, mechanical noise and environmental / background noise just can’t be avoided when recording an organ sample set. With 20 stops pulled out, and a 10-note chord being played, the background noise that was present in the sampled recordings is amplified 200 times! Our app is beautiful and clean and 100% noise-free, always.
Another benefit of our wavetable synthesis technology is that our recordings are clean and free of reverberation. It is almost impossible to record a sample set for an organ without also recording reverberation within the church or building where the organ is located.

This is great for realism, so long as you only want the organ to sound like it is in that location. But a sample set of a large Cathedral organ, captured with giant Cathedral reverberation, will just sound silly in a small chapel, or a small recording studio.

Our 100% clean wavetables do sound peculiarly dry when performed with no reverberation at all, but then so would a church organ if played in an anechoic chamber. By starting with a pure sound, you can either rely on the natural reverberation of your performance space, or can add reverb artificially. The app contains a high quality reverb engine, or you can use a third-party app or external unit to add a different flavour of reverb to your performances.