In the spirit of UNESCO’s International Year of Light, the Sydney University Optics Student Chapter entered a light-installation, the ‘Laser Harp’, into the Sydney Vivid Festival.

The Sydney Vivid Festival is a huge annual city-wide festival celebrating light, music and new ideas hosted by the tourism industry in New South Wales. This year attracted 1.7 million attendees with record numbers of international visitors, including large numbers from China, the USA, Korea and Singapore. The festival runs for 18 nights and provides live music performances and hosts local and international speakers who lecture on a wide-variety of topics. Most iconically, Vivid also includes a series of light installations spread throughout the city along the ‘Light Walk’ which is open to the public, where the installations vary from projected art onto iconic buildings (such as the Opera House, above), light sculptures, and interactive multi-media installations. You can see the highlights of the festival at www.vividsydney.com/media-centre.

The Laser Harp

The Laser Harp is a musical instrument which combines light and sound in an interactive piece of art. The strings are made from 15 lasers in which members of the public were invited to play by breaking the beam with their hands. An inbuilt hazer makes the lasers visible while also adding a sense of mystery to draw in passers-by.

Each note triggered the panel of programmed LEDs behind the strings to flash a different colour for every note played, which was also reflected by a cut-out laser emblem in the front of the harp likewise fitted with its own LED panel.

Accompanying the physical harp was a series of animated projections in which a small animation would trigger with every note played.
The Laser Harp was built not only as an artwork but also to serve as an educational tool. The aim was to subtly reinforce the links between properties of waves including wavelength, frequency, colour, pitch and size.

The animations consisted of three scenes, each one representing one type of wave; water waves, vibrational waves and light waves.

In the water environment, lily pad sizes and colours were matched to a note with corresponding pitch, or frequency. As each note was played, the respective lily pad would produce a proportionally sized ripple. Native Australian animals (such as the platypus and green tree frogs) were seen and heard to frolic around the pond.

The second scene was of an Australian bush landscape in which each musical note corresponded to a tree with a different size. Larger trees were assigned redder colours and lower pitched notes, and as each note played, the corresponding tree would shake and grow. This growing and shaking represented vibrational waves and ‘resonance’.

The final scene depicted the vibrant Sydney Harbour at night complete with the Sydney Harbour Bridge and the Opera House. Each time a note was played, a firework would explode and if multiple notes were held, lines of white light would connect them. Each firework was colour-coded and sized according to the pitch of its assigned note.

Opening Night!

The Laser Harp was a major project for this year’s student chapter and it took a lot of sleepless nights, teamwork and last minute tweaking to have it ready for the opening night of the festival! Thankfully it all came together and the Laser Harp survived the full 18 days of the Vivid Festival through all obstacles including rain, ocean humidity and the prodding and poking from hundreds of thousands of the public! But from the pictures below, you can see it was a big hit!
Collaborators

The Laser Harp was envisaged and designed by all the members of the Sydney University Optics Student Chapter.

The bulk engineering and construction of the Laser Harp itself was made by Owen Brasier of Animorphic Photonics, and also Angus Hamilton.

The animations were designed and programmed by Paul Sztajer and Anitta K Smith, and music and sound was created and mixed by Paul Nunes.

International Year of Light Grant 2015

The Laser Harp was made possible by the generous International Year of Light (IYL) Grants provided to the Sydney University Optics Student Chapter by the Optical Society of America (OSA) and from the SPIE! This funding went straight into hardware and animation costs which were vital in the construction of the harp.

From all of us in the Sydney University Optics Student Chapter, thank you to our sponsors for allowing us such a wonderful opportunity to give back to our community and participate in the IYL in such a meaningful way.