Littleham & Landcross Community Web Site Association

Experimental Birdcam Project – Spring 2009

Technical background

A commercially sourced bluetit nesting box was installed in a garden within the parish in 2007 – birds need time to get used to them. In 2009 the original opaque top to the box was been removed and replaced by a transparent top. A simple wireless video camera was installed in this top with a field of view encompassing the bottom of the nesting box. A couple of infra red emitters (LED's) were also installed in this transparent top in an attempt to provide some illumination at night time thus enabling the camera to capture images in the dark without the birds being aware. In actuality, these emitters have been disappointing, suggesting that rather more than the original two are required to provide adequate night time illumination.

The camera transmits analogue video data to an adjacent garden shed where the data is passed through an analogue to digital converter before being input to a web server via a IEEE 1394 (Firewire) interface. The webserver is running software that compiles the digital video data into a stream capable of being viewed by internet web browsers. This software adds real time data such as date and time to the images thus viewed. The software is also capable of detecting movement within the camera's field of view, such detection sensors can then trigger various actions such as SMS messaging, email, video recording and audio signalling. The action highlights were captured in this way.

The webserver is connected to a small local Ethernet network within the garden shed. Also connected to this network is a 4Mbps wireless bridge which is paired with a similar device in a house near the shed. The house has a 4Mbps connection to the internet.

Conventionally domestic internet connections are facilitated through routers which invariably contain Firewalls. These are designed to prevent access from the internet to the private systems within the house. This becomes problematic where there is a legitimate web server on the private side of the router as there is in this case. Because of this, no one on the public side of the router (the internet) would be able to see the web server because of the firewall.

This problem is overcome by the use of tunnelling techniques whereby carefully specified legitimate access is enabled in the firewall configuration using "port forwarding" controls.

The web server can then be accessed from the internet providing that the internet address is known. The basis of this address is a number (ip address) which is allocated by the

internet service provider. In most domestic internet services there is no certainty that the router's ip address on the internet will remain constant and indeed may be regularly changed by the internet service provider for a number of valid reasons. If this happens then users of the web server will fail to locate it due to the changed ip address.

To overcome this problem, the router is equipped with software which constantly monitors it's public internet address and takes the necessary action to inform the mechanisms that locate web servers on the internet, of any change. This technique is known as dynamic DNS.

There is no doubt that this configuration is unnecessarily complicated, particularly with the plethora of hardware that has been employed. However, the project has been put together on a limited budget with the various components being obtained at least cost from internet auction sites, and recycling organisations. For more detailed information please read on.

Video Camera

Technical Data

Model XC14E

Power supply : Power brick 230V AC/12V DC 100mA
Camera transmitter: 4 channels:
- channel A: 2.411 GHz
- channel B: 2.433 GHz
- channel C: 2.453 GHz
- channel D: 2.473 GHz

Bandwidth : 18MHz
Power output : < 10mW
Modulation : FM
Camera angle: 40°
Light sensitivity: 100 Lux
Camera: CMOS
Format: 1/3" 307 000 pixels
Video Signal: PAL
Auto exposure.
Auto white balance.

Motion sensor:

Frequency: 433.92Mhz
Power output: <1mW

Receiver VR30E

Power supply :Power brick 230V AC/12V DC 500mA
4 channels
channel A : 2.411 GHz
channel B : 2.433 GHz
channel C : 2.453 GHz
channel D : 2.473 GHz
AV Input : 2 RCA Plug (1 Audio 1 Video)
Video Output : 1 Vpp (type) / 75 Ohms
Audio Output : 1 Vpp (type) / 600 Ohms

Analogue to Digtal converter

PYRO A/V Link API-550
Capture resolution:

- NTSC – 720 x 480 @ 30 frames per second
- PAL – 720 x 576 @ 25 frame per second

Capture is in DV format
Audio capture: 48Khz (16 bit)

Wireless Bridges:

Cisco Aironet BR2000E
Interfaces:

- IEEE 802.3 10Base2
- IEEE 802.3 10Base5
- IEEE 802.3 10BaseT

Radio characteristics:
Frequency – 2.400 to 2.497 GHz
Modulation – Direct Sequence Spread Spectrum (DSSS)
Antennas – 2.2dBi dipole unidirectional
Power Output – 100mW

Sources:

Nest Box - http://www.rhs.org.uk/whatson/gardens/rosemoor/index.asp
Camera - www.letsautomate.co.uk
A to D converter – www.adstech.com
Wireless Bridges – www.cisco.com
Server – www.apple.com
Software – www.evological.com
Dynamic DNS – www.dyndns.com
Further enquiries should be addressed to the Web Site Technical Contact at:
http://www.littleham-landcross.org.uk/Contacts/Contact.php

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