Summary of Technology Group activities for 2025

6th February 2025 Bright Sparks!

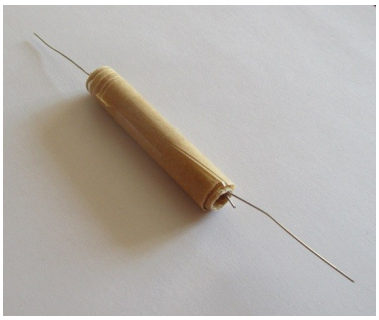
There were 5 members at the first session of the Electricity and Electronics course. We worked through some of the basic concepts and had some fun playing with batteries, lamps, motors and switches. We saw how a circuit diagram describes the connections between components. We had a gentle introduction to some basic laws (Ohm and…

24th February 2025 SiteWorks for Interest Group Coordinators (session 5)

On this session we added Book Club 2 to the list of Interest Groups that have a SiteWorks Author. We also provided refresher training for one of our early adopters, who just wanted to come back for more!

28th February 2025 Current Affairs

On the second session of the Electronics course we looked in detail at resistors, including making our own variable resistor using a pencil 'lead'. We considered the meaning of Power, and made a hot-wire for cutting polystyrene; we couldn't resist (pun intended) winding up the current until the wire glowed red-hot.

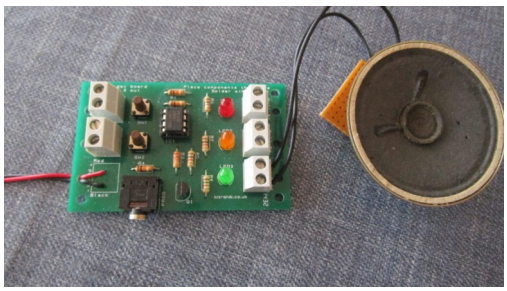


We then moved on to seeing how capacitors work. We stared by making one from kitchen foil and paper - it turned out to have a capacity of 4.2nF, which was a satisfying result.

Our plans to make a start on the basics of microprocessors was thwarted by a technical problem (now fixed), so that will be carried over to the next session,

21st March 2025 Charging Up

On the third session of the Electronics course we started by demonstrating the microprocessor program that we couldn't complete last time. After a brief revision of resistors we went on to look further at capacitors, and their use in timing circuits. We briefly discussed power in AC circuits and the meaning of RMS measurements. We began the subject of semiconductors with an exploration of the behaviour of diodes, and their uses.



We finished by developing our microprocessor program to generate two different tunes on the press of either of the two input buttons

10th April 2025 Power to the People

In this 4th session of the electronics course we completed our investigation of the three fundamental properties of electrical components (resistance, capacitance and inductance). We turned our attention to domestic electrics with a look at how power comes into the house via the Consumer Unit. We also had an overview of domestic wiring. We finished with another exercise on the microprocessor, by writing a 'traffic lights' program, that required control of the output ports and introduction of delays.

24th April 2025 Hot stuff!

On this 5th session we concentrated on the practical skill of soldering components into a circuit board.

22nd May 2025 Bits and Pieces

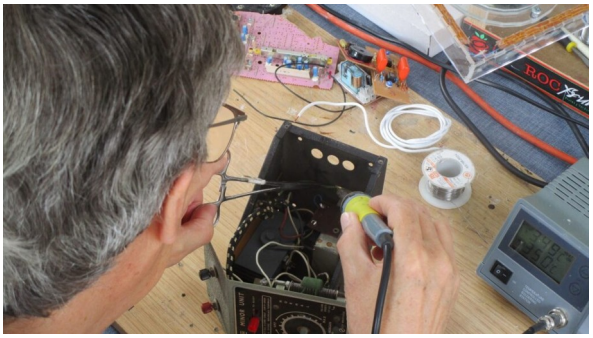
This session was quite quiet, with only a few members attending. We did some PICAXE programming; revising previous material and learning a couple more blocks. We also collected together components that we will be using in future sessions.

5th June 2025 Expanding Membership

Although there were only 2 participants this time, they were both (relatively) new to the group, so it was a chance to review the material we have covered so far, and to share thoughts on some specific questions.

24th July 2025 Soldering On

Back after a break for holidays, the Technology Group resumed their electronics sessions.

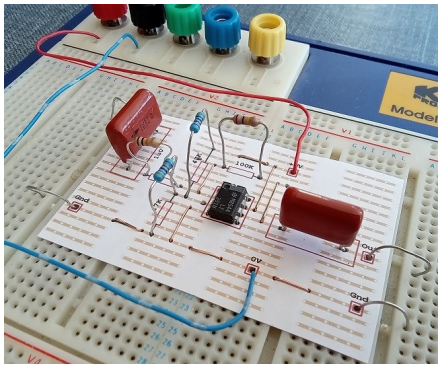


Richard bought along a very old (1950?) model railway controller for a safety check. We replaced the deteriorated rubber insulated mains cable with a nice modern one, and also made some improvements to the connections to the railway track. It was all good soldering practice.

There was time afterwards for a bit of the theory of transistors, including a demo of how to measure a transistor's gain.

14th August 2025 Feedback

We began with a bit of revision of resistors used as potential dividers, and of how the impedance of a capacitor depends on frequency.



Thus armed, we were able to discuss the basics of Operational Amplifiers, and the importance of negative feedback for controlling the gain of an amplifier. We considered the merits of single and dual rail power supplies. We looked at the concept of altering waveforms by introducing non-linear elements into the feedback loop.

No doubt we will be re-visiting the subject of Op-Amps in the future, as they are used in many types of circuit.

The session finished with a quick look at a problem bought in by one of our members - a control unit for an immersion heater connected to solar panels. This lead us to discuss a device called a Triac, and how to test one. It made us think that a session on solar panels might be idea sometime.

4th September 2025 Electronic Relaxation

We looked at the 555 timer device used as an interval timer and as an oscillator; a typical example of a class of circuits know as 'Relaxation Oscillators'. This gave us an opportunity to revise op-amps, as there are 2 of them in the 555 chip, acting as voltage comparators.



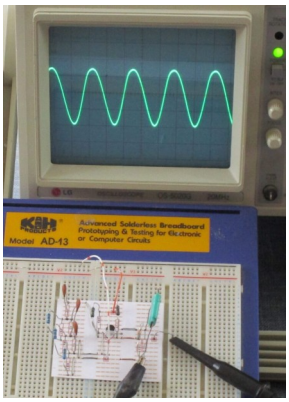
Unfortunately, one of the demonstration circuits refused to work properly. This was subsequently found to be due to an electrolytic capacitor been connected upside-down, which destroyed the dielectric layer. A few seconds after re-connecting it with the correct polarity the dielectric reformed and the circuit worked perfectly, and will be demonstrated again at the next session. On most electrolytics the arrow points to the negative terminal, but this one was unusual in that it pointed to the positive terminal - And the moral is - always check the polarity!

We had a look at Charlie's non-functioning rain-gauge, but were frustrated by not having a screwdriver to remove the (totally unnecessary) security screws on the cover.

We finished with Mike's question about interfacing the 12V output of a central-heating valve to the 3V input of a microprocessor and considered the merits of various methods of limiting the voltage, including Zener/resistor networks and voltage control chips.

2nd October 2025 A Good Sine

As promised, we corrected the error in the 555 oscillator circuit that failed to work last time, and made a modification to allow the frequency to be changed.



We then discussed the difference between relaxation oscillators and harmonic oscillators. We looked at a simple 1-transistor harmonic oscillator that uses a 3-stage phase-shift network to determine the frequency of oscillation. We obtained a very respectable sine wave output at about 22kHz.

Finally, we followed up on Mike's question about interfacing the 12V output of a central-heating valve to the 3V input of a microprocessor. He showed us the working circuit, which opened and closed the valve very nicely. We were particularly impressed with the Bluetooth interface on the processor, which allowed Mike to control the device from his phone.

4th December 2025 Right First Time

The group explored Computer Aided Design (CAD) software for creating circuit boards. We looked at 'TinyCAD' for laying out schematic circuit diagrams, and then transferred the circuit definition into 'VeeCAD' to create the physical arrange of the components on a circuit board. Finally we saw how the layout can be printed on paper and glued on to the circuit board to guide placement of the components for soldering. The unbroken chain of transfer of the design from schematic to final soldering ensures that circuits are error free. Both programs are free Open Source software, and are easy for the beginner to lean.

Charlie bought along a solar-powered battery charger, that needed the control circuitry replacing. We discussed options and hope to see it working at a future meeting.