FAN-CLUB-News 02/1998

Hi Fans,
Here it is, the second volume of the FAN CLUB 1998 News. I wish to welcome all of you who have just joined.
This issue once again focuses on our two new products: the IR CONTROL SET and INDUSTRIAL ROBOTS. Why? What the JUNIOR STARTER and HARBOR CRANE sets are capable of can be seen at a glance, but the incredible possibilities contained in the small IR CONTROL SET box need to be explored. And the INDUSTRIAL ROBOTS are now available with "Teach-in"; a simple and easy programming method. The last page contains new information about the Internet. Just visit us at www.fischertechnik.de. This article also includes other Internet pages devoted to fischertechnik. These are really great and extremely interesting!

By the way, many Club members have Internet access or their own e-mail address. Information about fischertechnik will no doubt soon be available via e-mail. But please give us a little more time; we're still working on the technical aspects.
For now, enjoy your copy of the FAN CLUB News, 02/1998.

With best wishes,

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Modeling with Robots

Under the guidance of Prof. Klaus Schilling, PhD., the Ravensburg Weingarten Technical College (Department of Autonomic Robot Systems) has recently created a construction contest known as "Modeling with Robots". The major goal of this project is to increase interest in technology among students (grades 8 - 13) by means of motivational goal setting.
The task: to build mobile robots to solve problems with various degrees of difficulty. The students were provided with ready-to-use microprocessors and sensor components and, of course, fischertechnik parts to be used as "development materials". The models will be displayed and used at the schools during project weeks and in working groups focusing on the topics "Robots" and "Information Technology".
The goal is to promote the mechanical construction of a vehicle with all its associated motors, drives, sensors, microprocessors, and the control of the finished model via PC or the Internet.
Thus, the following tasks have to be performed:

Construction of a mobile robot;
Race through a labyrinth containing obstacles;
Remote control race through a labyrinth;
Having the robot follow a marked line or light source;
Gathering a scattered set of balls;
Gathering samples in a "Mars" sandbox;
Remotely controlling the robot via the Internet.

The competition was carried out as part of a group session overseen by members of the Ravensburg-Weingarten TC in 3-hour sessions, each of which concluded with a race.
By the way, on the Weingarten TC Internet page you can actually control a "real" Mars robot online from home.
The address: http://arsun1.arsJhweingarten.de/ars/de/index.html (no longer valid, see www.ustream.tv/nasajpl)

Remote Control with Infrared Light - How does it Work?

Remote controls using infrared light are the latest trend. Regardless of whether its remote controls, video recorders, or the latest fischertechnik products, the little handsets with which products can be remote-controlled are everywhere. No matter how different the individual units are, all use infrared light to transmit "commands".

Light is one part of the full spectrum of electromagnetic waves. Science differentiates between visible light in the 380 nm to 780 nm range, and invisible light at the shorter and longer wavelength borders of this range (ultraviolet light and infrared light). Infrared rays have longer wavelengths and shorter frequencies than visible light, and are also known as "heat rays". All bodies emit such infrared rays, to a degree directly related to their temperature. Special devices can make this light visible. Human body heat is a source of large amounts of infrared radiation. One practical application of this is the familiar "motion detector" that turns on outdoor lights at night. These devices contain a special component that reacts to changes in the infrared range, and is linked to a light sensor. When it's dark, the motion detector turns the light on for a specific period of time as soon as we approach it.

Remote control employs electronic components that emit infrared beams at very low levels. The unaided eye cannot detect these beams. They can, however, be made visible with a simple trick. By holding the remote control close to the lens of a video camera, flashing dots appear on the viewer when the remote control is activated. This happens because the camera is able to detect "more" than the naked eye: it can "see" a portion of the infrared spectrum.

In order to understand how the new fischertechnik IR Control Set transmits the signals generated by pressing the button to the receiver, let us imagine that the transmitter is part of a standard light bulb. The light is turned on when you flip the switch. But, since the bulb can only be turned ON or OFF, while the receiver must be able to differentiate between several switch signals, the bulb is not switched on continuously. Instead, a small computer in the hand held transmitter turns it on and off several times. The receiver recognizes these "flashing codes", and can carry out the associated commands. These flashing codes can be compared with Morse code signals. Here too, dots (light OFF) and dashes (light ON) can be used to transmit a message or command.

Let us assume that each button on the transmitter has a specific code that transmits four pieces of information (also known as "bits"). Each bit being transmitted consists of two parts: in the first part, the bulb is turned on and, in the second, it is turned off. Each key is assigned a specific on and off pattern. Figure 1 shows an example of a pattern for three buttons. Pressing button 1 turns the bulb on for 2 seconds and then turns it off for 1 second. The bulb is then turned on for 1 second and then turned off for 2 seconds. This sequence is then repeated twice more. Only then have all four bits been transmitted. Pressing button 2 turns the bulb on for 1 second, then off for 2 seconds, then on for 2 seconds and off for 1 second. The difference is in the change in the sequence of on and off times. The receiver measures how long the light was on and how long it was off and, based on this "pattern" is able to tell which button was pressed.

Instead of a standard light bulb, the handheld control unit of the IR Control Set is equipped with an electronic component that transmits infrared light. This has the additional advantage that infrared light is more easily reflected by walls and ceilings in rooms than visible light. In other words, the remote control does not need to be pointed directly at the model (see Figure 2). In addition, the on and off times are significantly shorter than those in our example. This example also shows that two buttons cannot be pressed at the same time. Each button has its own pattern. If two buttons are pressed simultaneously, the transmitter doesn't know which pattern to transmit. In this case, it will therefore send no commands.

The transmission process described above is simply intended to help visualize the process. In practice, however, it is somewhat more complicated. When the first devices using infrared remote controls came on the market, Philips was the first to recognize the potential problems. If each manufacturer were to use their own "code", conflicts could easily arise. Thus, it was conceivable that turning off a TV manufactured by Smith would suddenly turn on a stereo system manufactured by Jones at full blast, or that a video recorder manufactured by Brown would stop recording just because the TV volume was changed. For this reason, Philips developed the RCS code that is currently being used as the standard by many manufacturers. This code specifies precisely which pattern is assigned to each button on a TV remote control. The IR Control Set also uses the RCS code, employing a special reserved range.

An advantage of this "standardization" can be found in the homes of persons with physical disabilities. For years, the social welfare institutes in Bad Kreuznach have been outfitting the homes of disabled persons with PCs that use voice recognition software. Equipped with special hardware, the PC interprets spoken words as "commands", and transmits the previously programmed codes via an infrared module. This is used to control TVs, radios, etc. that employ the RCS code. Working together with the IR Control Set development team, disabled children can now also control fischertechnik models via voice commands. Using the receiver 2 on a second vehicle, disabled and non-disabled children can now play together.

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The New IR CONTROL SET Described in Detail

The new IR CONTROL SET is the first fischertechnik remote controller that uses infrared light. Up to two receivers, each equipped with three motors */* lamps can be controlled from a single, high-performance transmitter (with a range of approx. 15 m in closed rooms). These new controllers are ideal for combining harbor cranes (don't forget the motors) and industrial robots (with 4 motors).

The IR Control Set consists of a transmitter, a receiver component (type “1”, in the black housing) with two mounting blocks, and the operating instructions.

The transmitter has 11 red buttons to switch three motors. All three motors can be operated at two speeds (fast/slow). In addition, the transmitter can be switched between receiver “1” and receiver “2" so that a total of six motors can be controlled.

The second receiver component (type “2” in the blue housing) will be available at the beginning of December.

Although at first glance the receiver component looks "tiny" (30 x 60 x 25 mm), it is nonetheless a powerful unit. It is so packed with electronic parts that the circuit board itself is barely visible through the transparent cover. Only by using the most modern components in conjunction with two-sided PCB mounting and by installing components "on top of each other" was the receiver able to be kept this small. The electronics for switching the motors is identical to that used in the Intelligent Interface. The advantage is obvious: the receiver can be installed in any model.

Because the receiver is equipped with its own microcontroller (microprocessor with memory and control lines), additional functions have been programmed in.

The receiver has eight connectors on top. This is where the three motors (M1 to M3) are connected. The two inputs "A" and "B" are queried when the unit is turned on, and are used to control the receiver's three operating modes: normal, servo function, and tread drive. After turning the receiver on, an LED flashes at different rates to indicate the receiver's current operating mode. The power supply connection (6-9 volts) is via a 30 cm long cable on the receiver component.

In the normal operating mode, the outputs are switched in response to the buttons pressed on the handheld transmitter.

The servo function can be used to control the steering of a vehicle. The vehicle steering responds by to the activation of a button on motor 2. After the button on the transmitter is released, the receiver automatically "resets" the straight-ahead movement of the vehicle. This is made possible by a miniature sensor (not part of the kit) connected to the inputs "A" and "B" on the receiver being activated by a "spur" on the steering when the vehicle moves in a straight line. The instructions describe the parts that are required for this "spur" (see above).

In the tread drive mode, the receiver automatically controls both motor 1 and 2 simultaneously. This mode is used for vehicles with treads instead of tires, where each tread is equipped with its own motor. For straight-line or reverse movement, both motors are switched in the same direction. When turning to the left or right, the motors turn in opposite directions. In other words, the vehicle can turn around its own axis.

But the receiver can do more! Each motor can be operated at two speeds (full power/half power).

Since the transmitter can use buttons “1" and “2" to switch between the two receivers, it is possible to control a King of the Road with receiver “1" and three motors. Motor 1 provides the drive power, motor 2 controls the steering, and motor 3 raises and lowers the stake bed on the trailer. At the "end of the shift", a tracked vehicle equipped with receiver “2" can then be driven onto the bed with the same hand held remote control unit.

Teach-in…

or, the simple and easy way to program a robot.

Teach-in: this term means roughly the same as "instructing" or "educating". In this process, a robot is directly controlled by the user via an input device Goystick, mouse). As the robot is controlled, it stores all the movements so that, once it has learned them, it can quickly repeat them at high speed and along optimized paths. The user directly controls the robot and does not have to enter numerous coordinates manually. This greatly simplifies programming and significantly shortens programming time.

INDUSTRIAL ROBOTS

After wiring the robot, start the teach-in program (included in the set). However, the program will only run on 32 bit systems such as Windows 95.
By the way, this program was written in C++, the same language that any computer games you may have, as well as many other applications are written.

You can now control the motors with your mouse, and save the various positions. Once your program is complete, the robot will automatically carry out the stored sequence of motions.

You yourself do not need to learn any commands, but instead, simply need to move the mouse. Our tests have shown that programming is really fun!

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Mailbox

Once again, many thanks to all those who sent in photographs of fischertechnik models they developed themselves, even though we unfortunately don't have room to show them all.

Peter Thiel from Hünstetten, sent us these pictures of his fantastic super models, and we can" resist sharing them with you. Mr. Thiel also exhibits some of his models at local toy stores to demonstrate what can be done with fischertechnik.
The photographs show a space shuttle being held aloft by a giant auto-crane which is, in turn, shown in greater detail in the other photograph.

The fact that fischertechnik can help you get good grades is demonstrated by Johannes M6rike from Pliezhausen. For his biology class, he built a pneumatic biceps/triceps arm from fischertechnik components, to visually simulate the function of a human arm. Real bionics.

Robert Reiter from Berchtesgarden was visiting his grandfather in the Ruhr. He became so fascinated with the headgear at the local coal pits that he was barely back home when he built one of his own.

Christoph Hederer from Renningen thought up this reading lamp as a result of need, because his earlier one was simply too bright. As a result, Christoph was often discovered late at night reading a suspenseful book when he should have been sleeping. With his fischertechnik lamp he doesn't have this problem anymore because, on the one hand, the lamp is not as bright and, on the other, the light is shielded. No doubt a good idea for other club members ...

Janosch Woschek from DinkelsbOhl sent us a picture of his radar station. The radar screen turns.

One of our youngest fans is undoubtedly Johannes from Plochingen. His father used fischertechnik to build him a system that lets Johannes make ducks waddle forwards and back. As the picture shows, he's completely fascinated.

Gregor Heres from Fulda sent us this photograph of his LLWin-controlled, fully automated car plant. The production process for a car: the vehicle is drilled, welded, painted, and then dried. Gregor used mainly older parts from Start 100, Statik, Motor + Drive, Electromechanics, Electronic, Sensoric, Computing, Special 2000 sets, and the Icarus Solar Sailor.

This friendly robot was built by S6nke Neumann from Schneverdingen. The model is equipped with a hydraulic arm, a swiveling head with eyes that light, and a base driven by 2 S-motors. Control is via a home-made joystick.

This sturdy ATV was built by Jonas Mathioudakis from Mönchengladbach. The car looks a lot like the Hummer driven by Arnold Schwarzenegger.

Statistics boring?

Did you know that the club already has more than 10,000 active members? Our oldest member was born in January, 1900 (!) thus making him nearly precisely 98 years older than our youngest member (born 01/98). fischertechnik keeps you young!!!
In fact, the club has a surprisingly high percentage of "old hands". Nearly 10% of our members are older than 40. The largest group is formed by children and adolescents between 10 and 15 (44%). With a 5% representation, the number of Female members is very small. The club is represented in 47 different countries including Malaysia, Iceland, Argentina, Iran, Egypt ... At nearly 20,000 km, the New Zealand members are located furthest from Waldachtal (the home of fischertechnik). 90% of the club members are German. With more than 900 members, Holland is the "strongest bastion" (with its own Club Netherlands) of fischertechnik outside of Germany, followed by Switzerland, Austria, and the US.

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Internet news:

As of October 1, our Internet page (www.fischertechnik.de) has a new look: the home page with an integrated online store from which you can order any current kit. For organizational reasons, payment can only be accepted on a last name basis. Unfortunately, this payment method also makes it impossible to fill orders placed via the Internet from outside Germany.

Now we would like to present some of the more than 100 home pages worldwide dealing with fischertechnik. Look for other addresses in future issues of the club news.

www.knobloch-gmbh.de
Aside from complete parts overview, this home page from Knobloch containsMany interesting facts and information about fischertechnik. In addition, you order individual parts directly. At this point, we would like to note that Knobloch (Weedgasse 14a, D55234 Erbes-Budesheim; Tel.: 49/6731 44005; Fax: 44660) has taken over individual parts service for all of Germany. In other words, if you need a part, contact Knobloch directly.

www.knobloch-gmbh.de/fischer/kay
This is the page created by Kay-Uwe Muller, whom you all remember. It contains numerous tips, tricks, links, and software downloads. This site is recommended for all computing users.

http://ourworld.compuserve.com/homepages/ulrichmueller/swsplit.htm
Ulrich Muller is a programmer and has developed drivers for the fischertechnik interfaces in both Virtual Basic and C++.

www.gamelan.de/ftl01/index.htm
This is the home page of Thomas Löbbert. Here you will find a discussion forum, older assembly instructions (!), software to download, and much more.

www.bkohg.comlfischer.html
Here you can find information about fischertechnik from Bonig + Kallenbach, Dortmund, related to Macintosh users.

www.staudinger.toplink.de
This is the home page of fischertechnik's partner, Staudinger plan + simulation for Industrial Model Building.

http://utopia.knoware.nl/users/cdeweerd
This is the home page of the fischertechnik Club Netherlands. Ideal for learning Dutch...

www.allgaeu.netlfischertechnik
This home page of Franz Santjohanser can be described as the fischertechnik archive.

Note: fischertechnik is not responsible for the content of these Internet pages.