

Light detector equals human eye for ability to 'see'

by Hugh Westrup
A group of inventors at the University of Waterloo has designed a tiny electronic component that "sees" almost as well as the human eye.

The new component, no bigger than the head of a pin, is called a VLSI microchip. Each microchip holds 1,024 photodetectors—miniature circuits that sense the presence of light. When light strikes a photodetector, the light energy is converted into electrical energy.

According to one of the inventors, Professor

A new threshold

Savvas Chamberlain, the chip is capable of sensing even a very faint amount of illumination, such as starlight. It has about the same ability as the human eye, he says.

The most remarkable feature of the Chamberlain chip is its very large response range. The chip can pick up light both from a very bright source (such as a spotlight) and from a very weak source (such

as a candle). In other words, the chip will be able to "see" the two objects at the same time, even though they differ in brightness by a factor of 10 million.

This is no mean feat. The devices that are currently on the market have nowhere near this capacity. Most cannot detect two objects simultaneously when one object is more than 1,000 times brighter than the other.

Because present devices have small response ranges, they suffer from "blooming" or "saturation". Most people know what blooming is from watching television. It often occurs when a person on camera lights up a cigarette. Instead of seeing the burning red tip of the cigarette, the viewer will only see a flash of light that looks like a bright star.

Blooming happens because the TV camera is not equipped to accurately register a high-intensity dot of light (the burning cigarette) at the same time that it is focussing on objects which are giving off much less light.

Dr. Chamberlain says his invention can be used in a number of ways. "It can be helpful to astronomers who are studying the light from distant stars," he says. It may also prove useful in fibre optics communications systems in which messages are converted to pulses of light and sent through thin glass rods or "fibres". The microchip could be installed as a light detector at the receiving end of an optical fibre.

Dr. Chamberlain's microchip is an outgrowth of research he has been doing with a

former graduate student, Dr. Asmin Husain. They started out to investigate the "subthreshold effect".

The subthreshold effect occurs when an electronic device is less than four-thousandths of a millimetre wide. Even when such a device has been "turned off"—when there is no energy being supplied to it—a small amount of electricity will still flow through its circuits. It's as if a toaster were unplugged but continued to toast bread.

Dr. Chamberlain and Dr. Husain used the subthreshold effect to increase the response range of the microchip. Dr. Chamberlain explains: "To understand how this works you must think of each photodetector on the chip as a tiny bucket. When light in the form of electrons hits the chip

it fills each bucket."

An ordinary photodetector "bucket" will fill up quickly when exposed to high intensity light, thus giving the chip a small response range. "However, if a leak is put in the bottom of the bucket, you can keep on filling it forever," says Dr. Chamberlain. "You never have saturation."

When Dr. Chamberlain and Dr. Husain understood the subthreshold effect they, in effect, learned how to puncture a hole in the bottom of the bucket. So, they could develop a photodetector that does

not become quickly saturated by exposure to bright light.

Dr. Chamberlain received funding from the Department of National Defence to design the microchip. The department may one day use the chip in laser communications systems. "An atmospheric disturbance, such as fog or rain, can act like an obstacle and change the intensity of laser light," says Dr. Chamberlain. "If the intensity changes by more than 1,000 times, an ordinary device won't be able to read the light."

Sizeable donation

Br. 68 makes presentation to our Sally Ann's

A cheque in the amount of \$600 was presented, Friday night, to Lt. Ray Braddock of the Midland Salvation Army.

The presentation was made on behalf of Branch 68 of the Royal Canadian Legion, Penetanguishene.

The money is to be used, according to Lt. Braddock, to help fund this year's Christmas Cheer Campaign.

Last Christmas a total of \$30,000 was raised along with an additional \$10,000 worth of food and toys.

The Salvation Army expects to pack 450 hampers this year, each worth about \$60.

Almost one call a day

Last month Midland smoke-eaters responded to a total of 27 alarms.

According to Fire Chief Hal Belfry, 12 of those alarms were general ones while the other 15 were "silent alarms."

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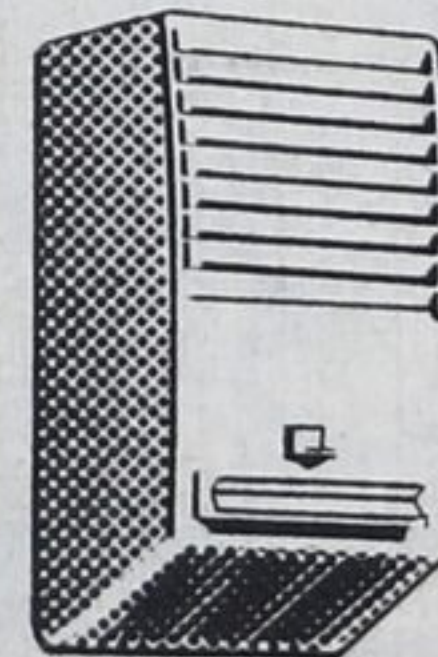
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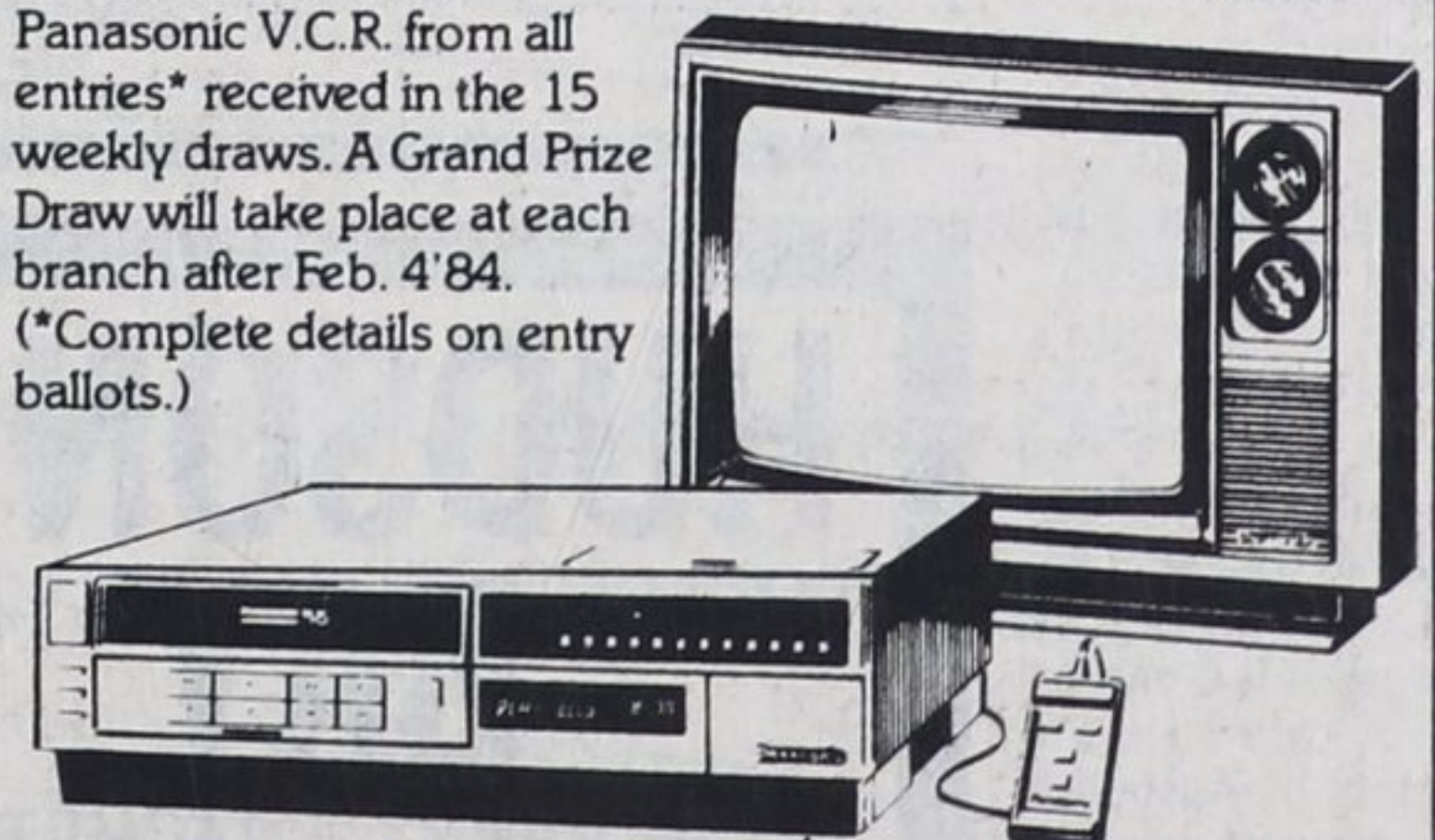
Each week to Feb. 4'84, there will be a separate contest. With every \$100 deposit you make to a Savings or Chequing Account, you'll receive one entry.*

Grand Prize Draw!

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One lucky customer in each branch will win a Panasonic 14" colour TV and a Panasonic V.C.R. from all entries* received in the 15 weekly draws. A Grand Prize Draw will take place at each branch after Feb. 4'84. (*Complete details on entry ballots.)

Approx. value \$1,200.00



Building permits tell story

A total of 23 building permits were issued in Midland last month for a total value of \$196,200.

In October of 1982, there were 17 issued for a total value of \$51,750. To date, 201 permits

have been issued this year for a total value of \$3,007,290.

During the same period in 1982, 141 permits were issued for a value of \$1,083,845.

And how was your month?

Last month, Midland police investigated four house break-ins and nine shop break-ins in town.

During the same month, thefts over \$200 amounted to nine while

thefts under \$200 were listed at 32.

Meanwhile, value of property stolen was set at \$27,712 while value of property recovered was listed at \$9,199.



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