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Texas Instruments Online Challenge

Challenge Description:

To do the Texas Instruments Online Challenge, you have to find an electronic device that you're willing to take apart. After you have found an interesting device, you take it apart and describe what you find inside.

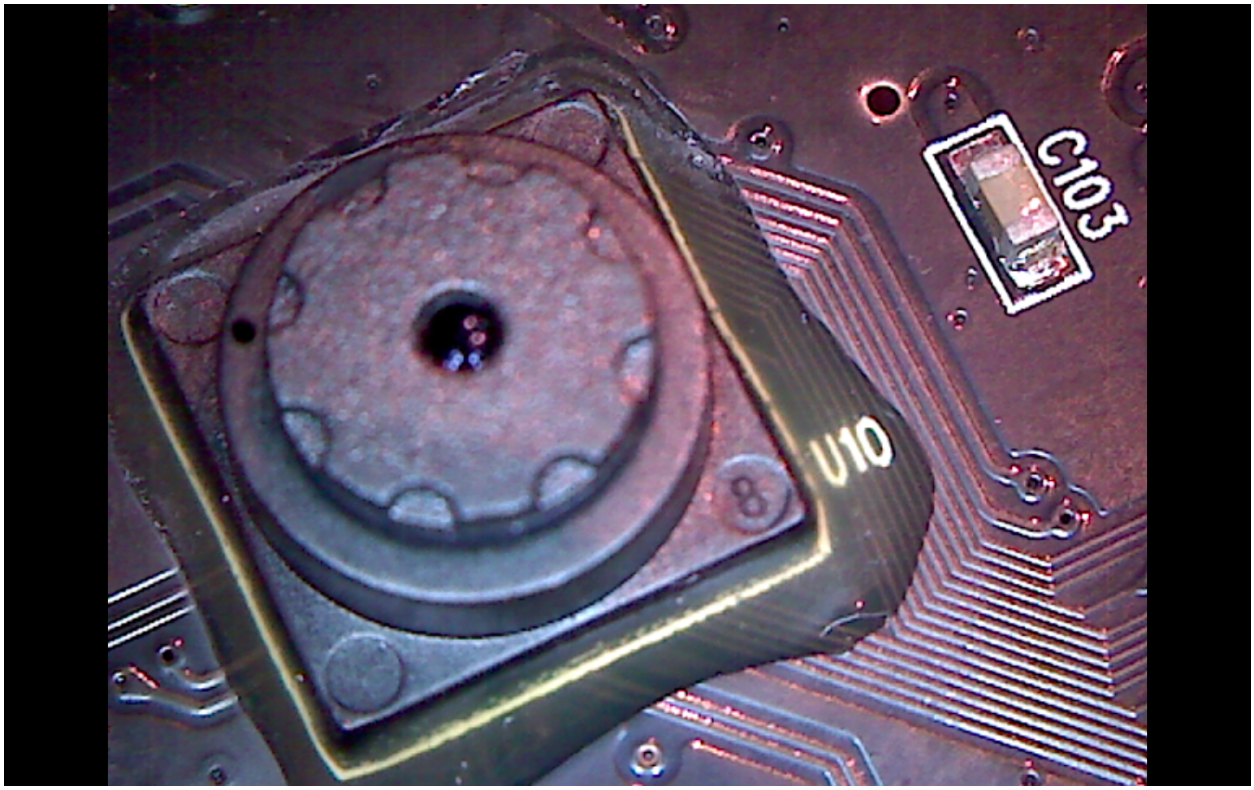
Introduction:

It's amazing how something that can do so much required so little. In doing the Texas Instruments Challenge, we decided that we were going to use the D-LINK home security system model DCS-930L. What we hadn't expected was that the entire system was on a single circuit board. That single circuit detected sudden movement, heard the sounds of a break-in, and take pictures of what was going on. That single circuit also sent all of this information to its owner via email. That one circuit accomplished everything the system needed to be a competent home security system under any circumstances.

Key Components:

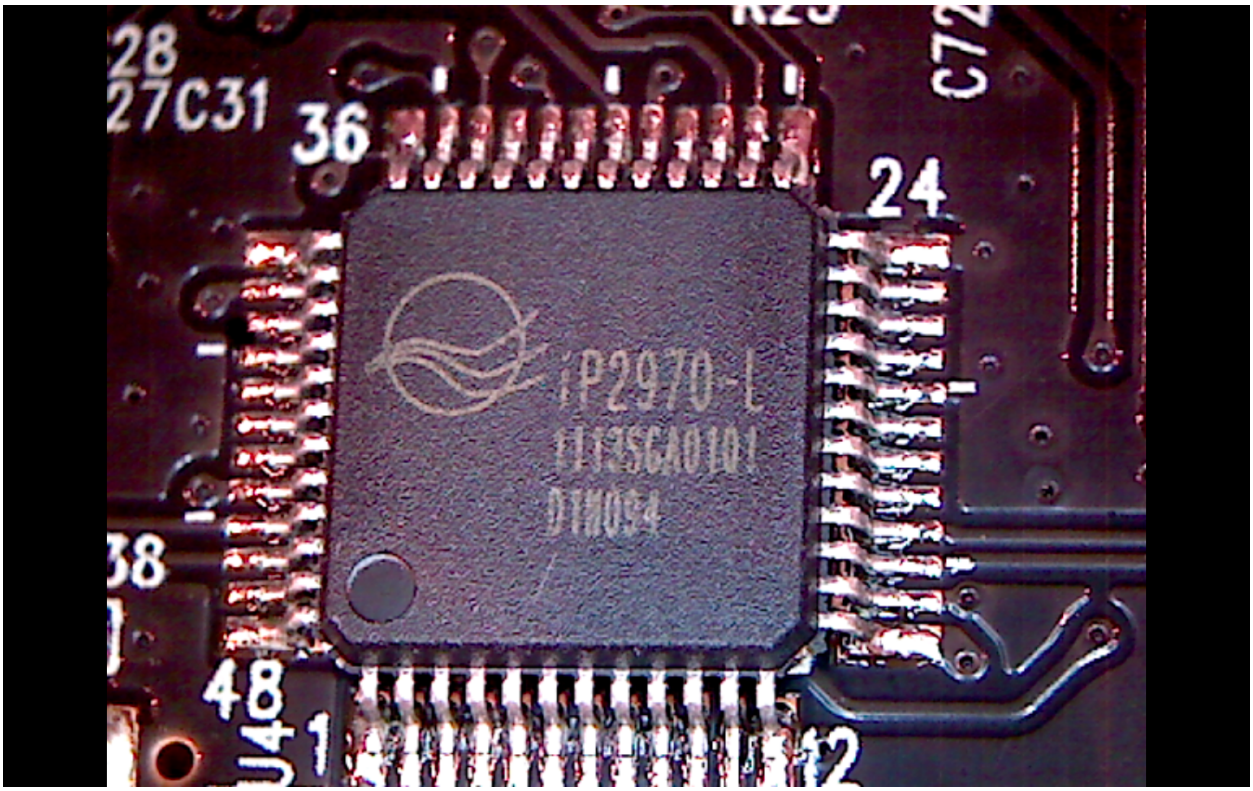
-Camera	-Picture Access Chip
-Camera Controller	-Wifi Chip
-Program Access Chip	-Microphone

Camera



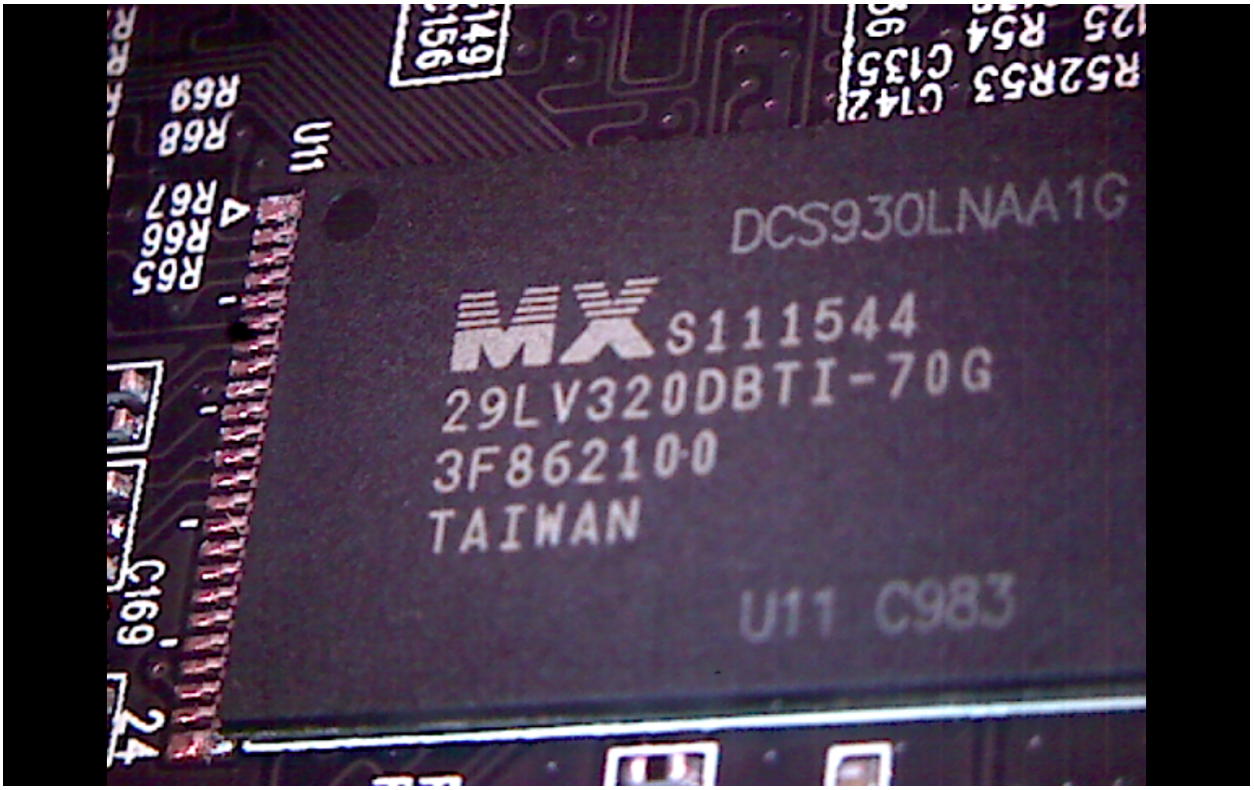
Above is the camera sensor used in the DCS-930L. Because the only lead we had to follow was the name “U10,” we were unable to find the initial manufacturer of this camera. We deduced that the camera was used to detect movement by sensing large irregularities in its field of view, and to take pictures of these irregularities. After that, we thought that the camera would use the communications chip and the wifi chip together to send those pictures via email to its owner.

Camera Controller



The above chip is the camera controller. It sends the instructions to the camera to keep alert for irregularities. If there was an irregularity such as a movement in its field of view, the camera took pictures of it. Our research showed that this chip is sold by a company called iPassion. The company iPassion, designed, manufactured, and sold this chip. This chip was important because it was the brains of the camera. The camera needed it to function properly.

RAM Program Access Chip

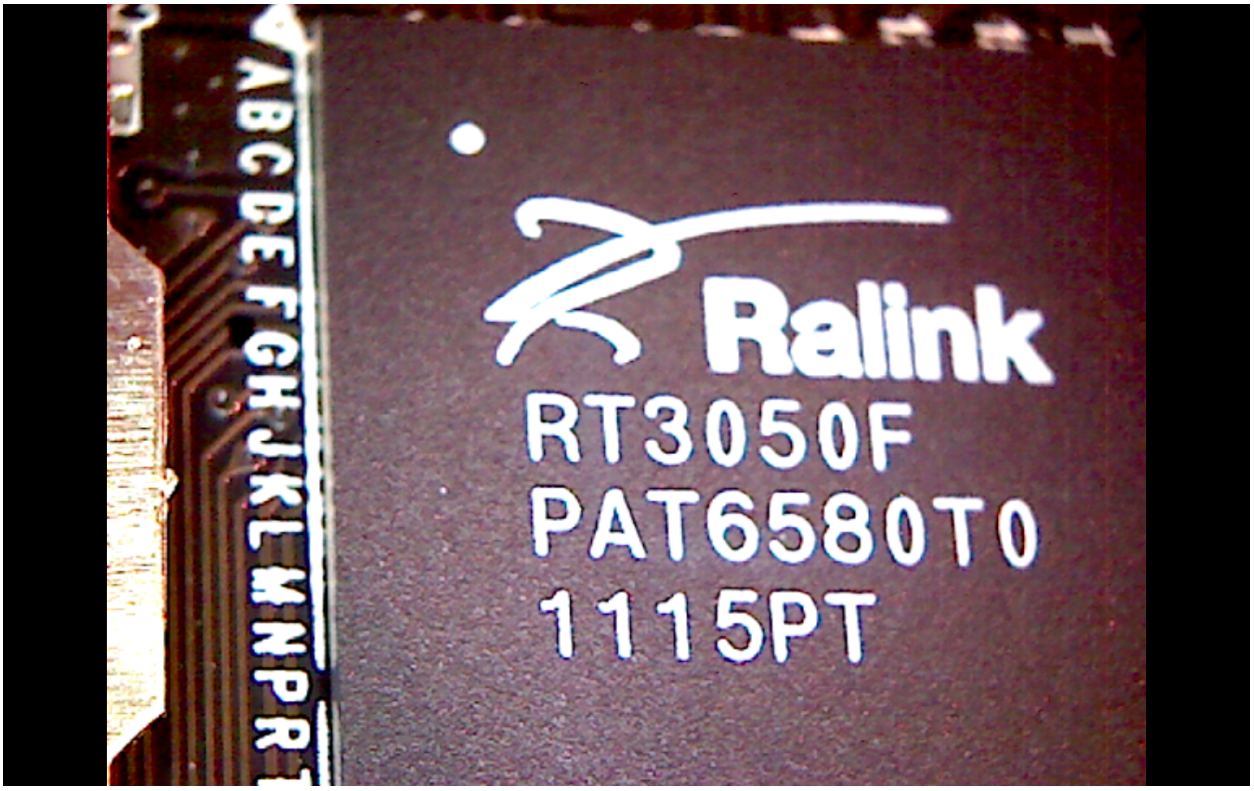


We deduced that the chip above**,** a 32 Mbit flash storage unit, was used to store the programs used by the camera and/or the microphone. Our reasoning was that evidence on the datasheet we found about this chip indicated that it was used for storing programs. (See Sources) A company called Macronix designed, manufactured and sold this chip. This chip was extremely important to the system functioning because it was the storehouse of all the programs used in the system. Without it, the system would be unable to function.

RAM Picture Access Chip

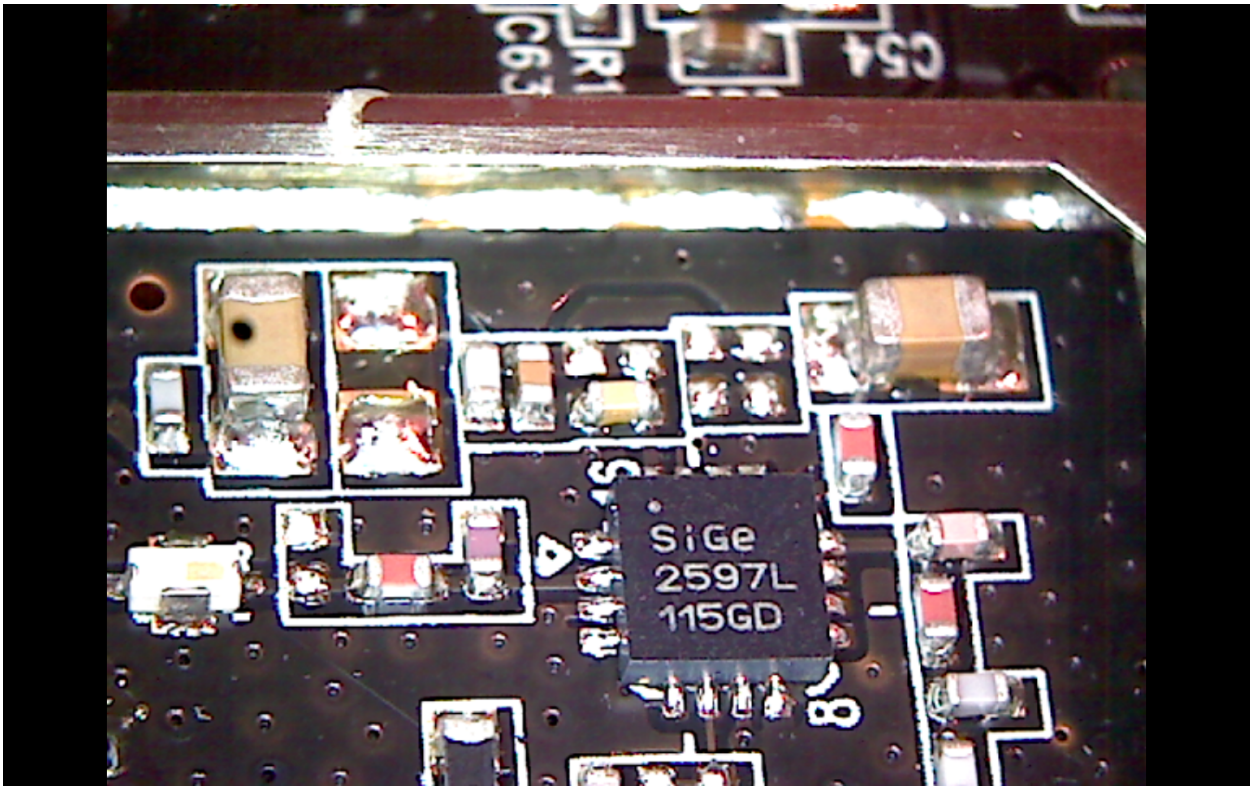
We discovered that this chip was probably used to store pictures, as shown on the datasheet we found on it. (See Sources) Evidence on the datasheet indicated that the chip shown above must store pictures. This chip was designed, manufactured and sold by a company called Elite Semiconductor Memory Technology (or ESMT for short). This chip was really important because it was the system's 'long term memory.' It was used for 'remembering' pictures in case they needed retrieval.

Wifi Chip



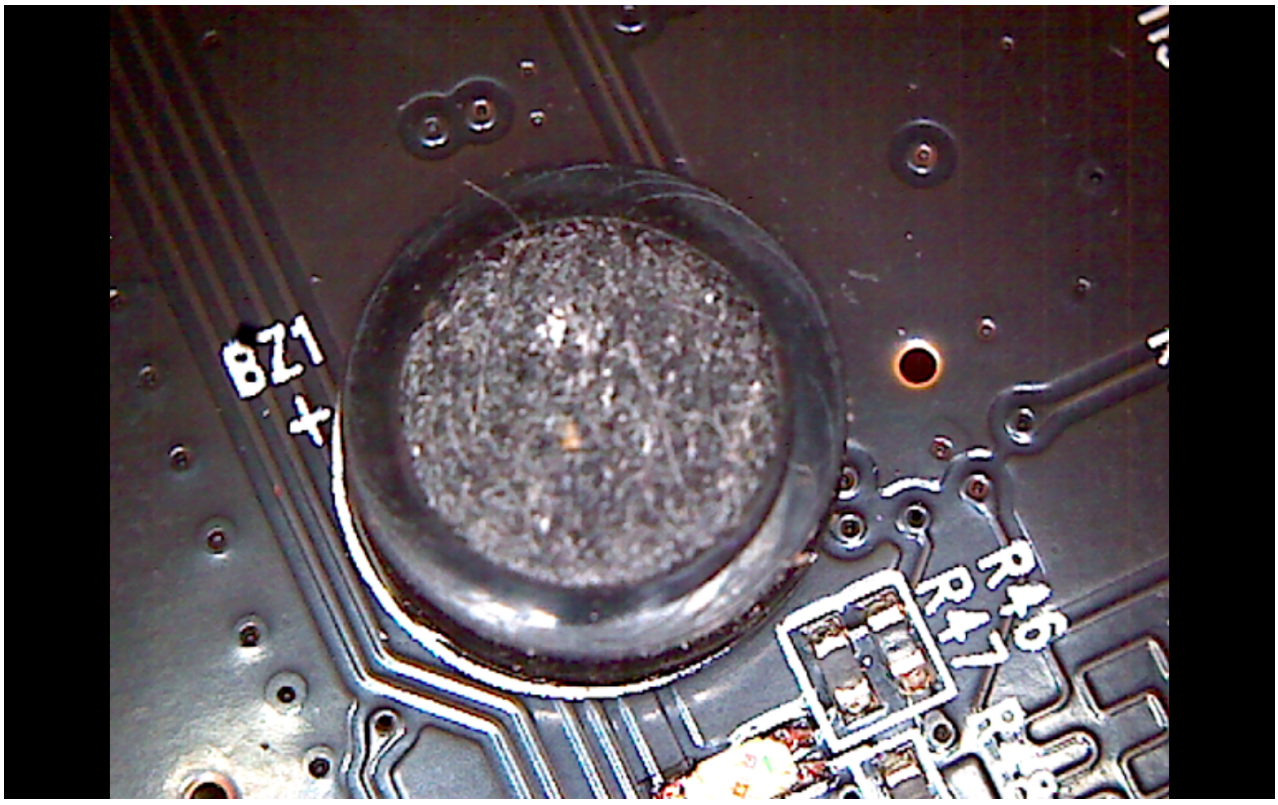
Our research showed that the chip above was the system's connection to the internet. (See Sources) This chip was designed, made and sold by a company called Ralink. The system probably used this connection to send notifications and pictures to its owner via email if there is any kind of disturbance. This chip was vital for maintaining a connection for the system to communicate with to the owner.

Communications Chip



The chip above was used to communicate information. (See Sources) It is sold by a company called Rankle East Electronic. This chip is important because it is used by the system to send notifications or pictures to the system's owner. Without it, the system would be unable to notify its owner if something is going wrong.

Microphone



We were unable to find the company that manufactures this microphone. We did not have any leads or otherwise. The microphone was used in the system to detect sudden loud sounds, like glass breaking, to detect a break-in. The microphone was a very important part of the system, as it could ‘hear’ where the camera could not ‘see.’

Conclusion:

The description on the Texas Instruments Challenge asks the competitors to find an old machine, computer or robot, crack it open, and describe what you find. What the description didn't say was how illuminating, how challenging it would be. To get the descriptions on the parts above, we had to become junior detectives. We had to find a lead and follow it until we solved the mystery. This project challenged us to learn, to struggle, to discover. In conclusion, this project was intended to teach us. We learned.

Sources:

Communications Chip: http://www-03.ibm.com/ibm/history/ibm100/us/en/icons/siliconchip/

Picture Access Chip Datasheet (RAM):
http://www.esmt.com.tw/DB/manager/upload/M12L2561616A(2A).pdf

Program Access Chip Datasheet (RAM):
http://pdf.datasheetcatalog.com/datasheets/700/474791_DS.pdf

Camera Controller Datasheet: http://www.ipassion.com.tw/pdf/DSH_iP2970_1.2.pdf

Wifi Chip Datasheet:
http://www.tracermcc.ru/foto/bender/RT3050_5x_V2.0_081408_0902.pdf