Vidya Vikas Education Trust's

Universal College of Engineering

Approved by AICTE, DTE, Maharashtra State Goverment and Affiliated to Mumbai University
Accredited with B+ Grade by NAAC | Recognised as Linguistic (Gujarati) Minority Institution

COMPILED AND DESIGNED BY:

Ms. Sampada Pimpale

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Department Vision:

To be recognized for practicing the best teaching-learning methods to create highly competent, resourceful and self-motivated young electronics engineers for benefit of society.

Department Mission:

- To nurture engineers who can serve needs of society using new and innovative techniques in electronics.
- To improve and apply knowledge of electronics subjects through participation in different technical events.
- To enhance carrier opportunities of electronic students through industry interactions and in plant training.
- To install the passion and spirit among students to pursue higher education in electronics and entrepreneurship.

72nd Republic Day celebration on 26th January 2021

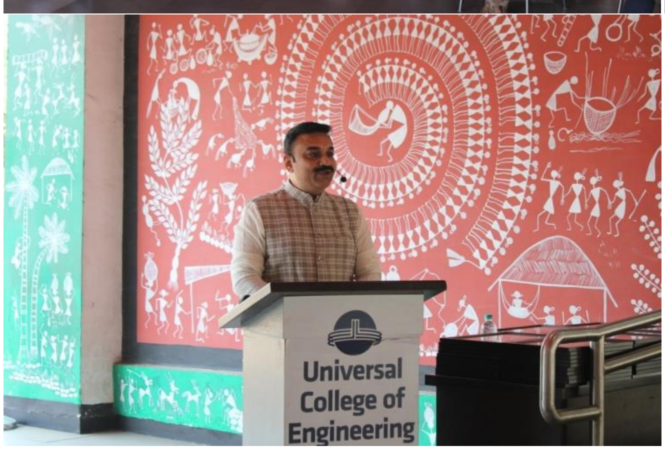
India celebrates Republic Day annually on 26th January, and this year country celebrated its 72th Republic Day to mark the day India became a sovereign republic. While India gained independence from the British in 1947, but it wasn’t until 26 January 1950 that the Indian Constitution came into effect and India became a sovereign state, declaring it a republic. This day celebrated with much pomp and fervour all over India, and in India’s capital Delhi, parades, tableaus and spectacular displays by the defence forces are showcased at Rajpath. The Indian flag is also hoisted all over the country.

In our college, this time slightly different ceremony took place on republic day. This year due to pandemic, students were not allowed, but all the staff gathered into college premises, by following all the rules laid by the Government.

This year, all the staff got felicitated by a token of appreciation by campus director Dr. Jitendra B. Patil.

Some of the glimpses of republic day celebration at college premises.





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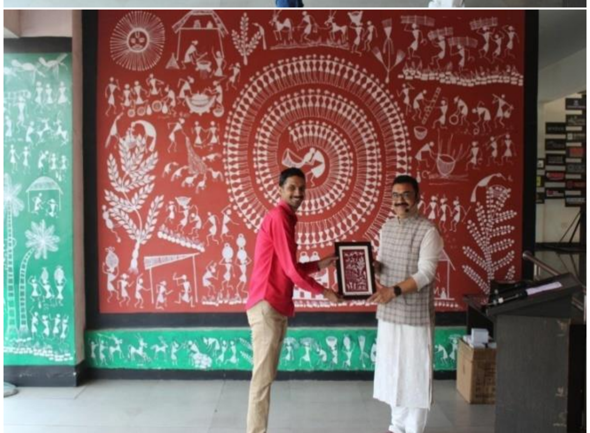



Can Solar Electric Vehicles (sEVs) Actually Become a Reality?

One of the prevailing issues with solar electric vehicles (sEVs) is range. What design obstacles must be overcome to make this future vehicle tech a widespread reality?

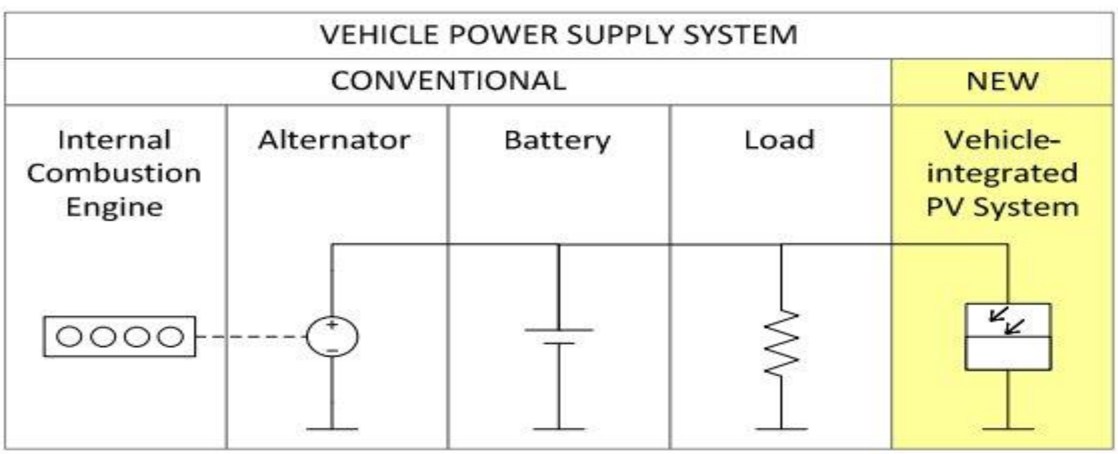
As the cost of solar cell technology decreases and efficiency increases, the notion of solar-paneled vehicles has even gained traction among big-name car manufacturers. For instance, Hyundai offers a version of its Sonata hybrid with integrated solar panels. Toyota likewise teamed up with solar manufacturer Panasonic to outfit the "Prius Prime" with solar panels.

While thin-film solar cells and vehicle-integrated photovoltaics have significantly advanced in recent years to make these early prototypes possible, several design challenges hinder sEVs "solar range" and subsequently, their widespread adoption.

What Is VIPV?

The advancement of thin-film solar cells and module technology has given rise to the concept of vehicle-integrated photovoltaics (VIPV), where solar cells mounted on the vehicle are used to power some of the vehicle’s electronic equipment. The generated power can be used for powering electronic control units, displays, air conditioning units, etc.

As shown below, the VIPV concept can be applied to an internal combustion engine (ICE) vehicle.



VIPV powering an ICE vehicle. Image used courtesy of Ludwig Kronthaler

However, considering the range anxiety and the scarcity of EV charging stations, developers are now turning to solar modules to extend the driving range of EVs as much as possible.

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The (Many) Stumbling Blocks to Solar Range

The electrical energy generated by the VIPV system, and consequently the additional solar range we can expect, depends on several different factors such as the driving pattern, the EV consumption, roof area, vehicle location, and climate conditions.

The driving pattern might differ significantly between different users. For example, an EV that is usually parked in an open area and receives negligible shading can generate much more power compared to the one that might be parked in an underground parking lot for a few hours at midday.

Limited roof area, which is the primary location for solar cells, can restrict solar range. Image used courtesy of Energy Sage

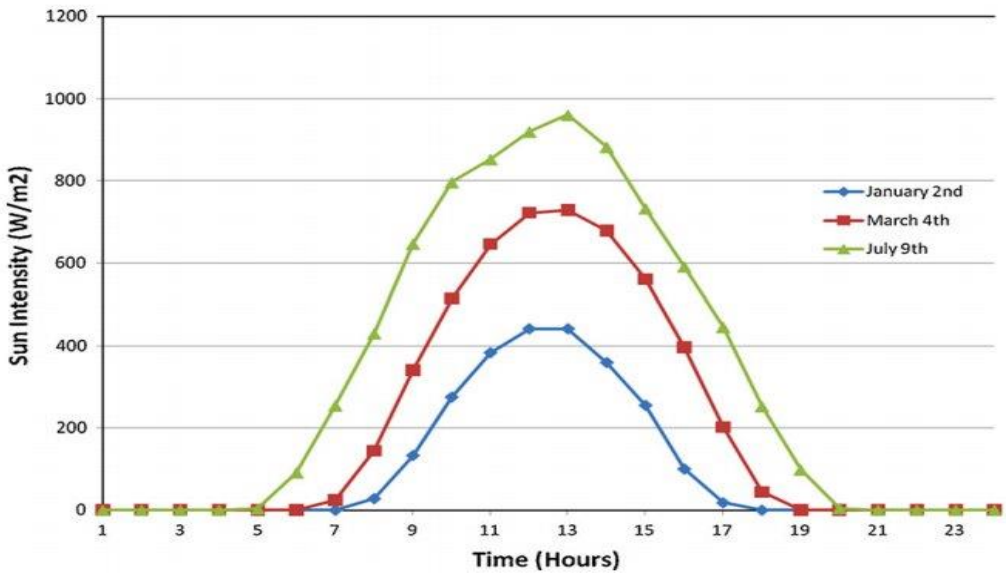
The roof area is the primary option for integrating the solar cells and determines how many solar cells can be easily integrated into the vehicle. The roof area of today's EVs can be in the range of about 1.7 to 2.3 m^2. The energy consumption (in terms of kWh/km) determines how efficiently the vehicle uses the available energy. With today's EVs, the energy consumption is in the range 13 to 24 kWh/100km.

Some other important factors that affect the solar range are the solar modules' peak power, the inverter efficiency, and the battery charging efficiency. Besides, when the solar power is available, the battery shouldn't be fully charged so it can store the captured solar energy.

A Theoretical Breakdown of Solar Range

By integrating a solar module with a peak power of 250 W/m^2 on an EV with a roof area of 2 m^2, the vehicle can garner 500 W of maximum power. With a battery capacity of 40 kWh, the sEV still needs 80 hours to fully charge the battery.

Realistically, however, these modules won't receive maximum sunlight all day. The following figure shows how the daily sunlight intensity varies in three different months of the year in Newark, New Jersey.



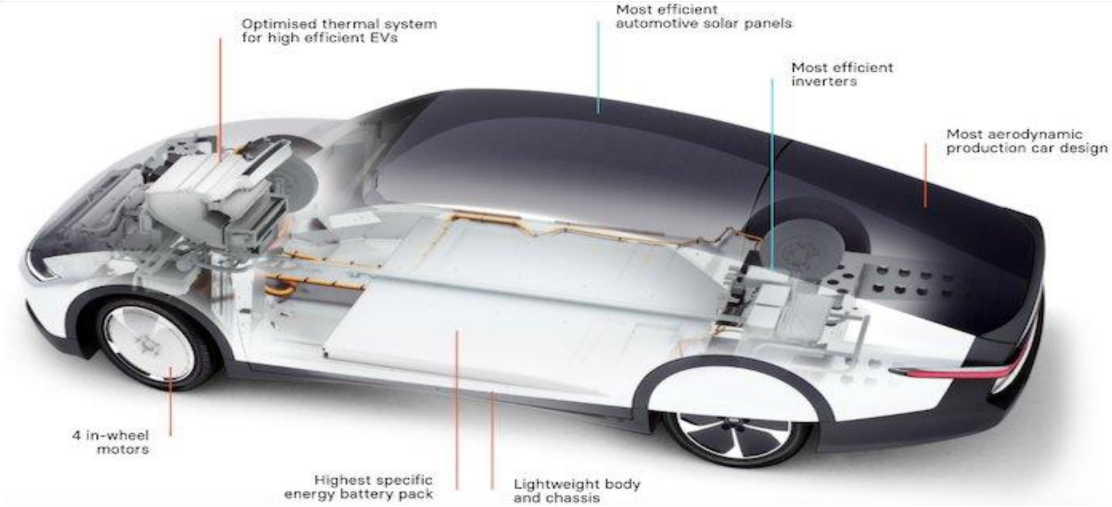
Sun intensity in Newark throughout January, March, and July. Image used courtesy of Dunbar P. Birnie

This chart illustrates the need for local sunlight intensity to have a realistic estimate of the extended range. There are a few studies from different parts of the world that take this local information into account and assess the performance of a VIPV system. According to these studies, the power generated by a VIPV system can account for only about 13–23% of the yearly average driving distance of a typical user.

Lightyear Gets Creative With Extending Solar Range

There are two main approaches to increase the solar range: integrating solar cells into other surfaces of the vehicle body (in addition to its roof) and developing new solar cell technologies with a higher efficiency.

For example, Lightyear One, a prototype all-electric solar car, integrates solar back-contact cell technology into both the roof and hood of the car. This provides a total area of 5 m^2—an increase of more than two times compared to a conventional EV.



Key features of the Lightyear One. Image used courtesy of Lightyear

The company claims that Lightyear One is two to three times more energy-efficient (83 Wh/km) than the electric vehicles currently on the market and its large solar panels are capable of adding an hourly 12 kilometers of range so users won't need to charge on a daily basis.

Other Methods to Stretch the Power of the Sun

Although the sides of Lightyear One do not include any solar cells, it is possible to use these areas for further extending the solar range of an EV. Lightyear chose not to include solar doors because this could increase the production complexity of the car. Besides, with solar doors, cables and glasses would need to be added to the sides of the car, making it heavier.

Note that the energy yield of solar doors is relatively limited because these cells are vertical and don't have a favorable orientation for maximum sunlight exposure. Moreover, only one side of the car is exposed to the sunlight at each time.

Interestingly, there are special types of organic solar cells that can be integrated into the transparent surfaces of an EV. These cells are partially transparent but still capable of capturing power. Vehicle manufacturers must also consider that in addition to being highly efficient, the panels integrated into the body should be durable and aesthetically pleasing.

The Challenges of Curved Solar Panels

It should be noted that the solar panels integrated into the body of a vehicle are necessarily curved. With a curved panel, the cells do not experience a uniform irradiance. This partial shading leads to an electrical mismatch between the cells and degrades the efficiency of the PV array.

With a curved module, careful investigation of the electricity yield is required for optimized performance. This can further complicate the design of the body of the vehicle. Advanced controls and solar predictions might even be required in future solar-powered EVs.

Source: https://www.allaboutcircuits.com/news/solar-electric-vehicles-sevs-actually-become-reality/

New Image Sensors Find Use in Brain Imaging, Security Cameras, and Even Selfies

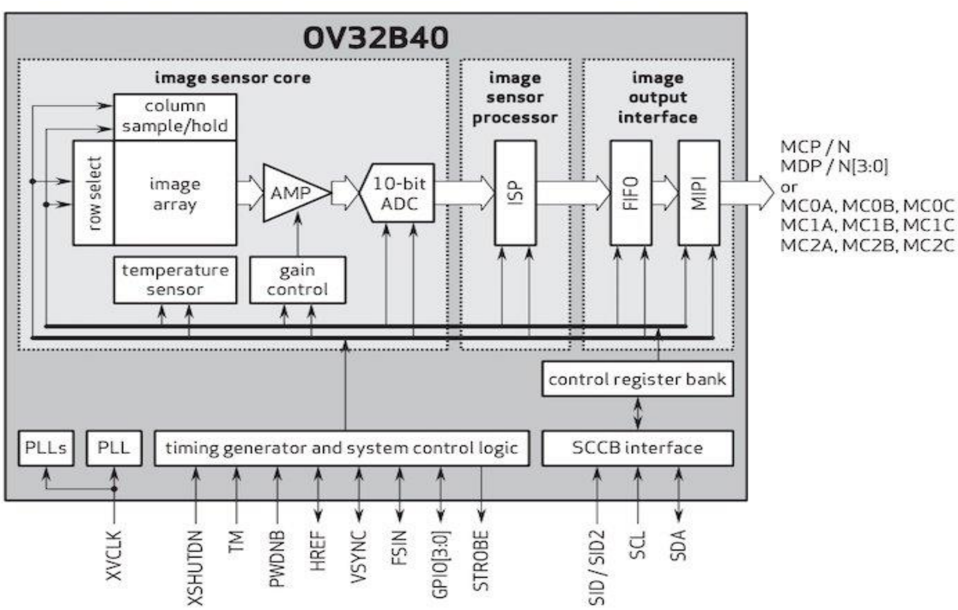
A new crop of image sensors shows how device makers have been thinking out of the box with on-chip hardware "re-mosaic," curved image sensors, and more.

An Image Sensor for the Perfect Selfie?

OmniVision, a leading manufacturer of advanced imaging solutions, recently released an image sensor for smartphones, the OV32B.

One of the most impressive aspects of this sensor is its size in relation to performance: it has a compact ⅓” optical format, which leads to an approximate diagonal size of the image sensor being only 5.5 mm, but still giving 32 megapixel (MP) resolution with a pixel size of 0.7 microns. This is a helpful feature for smartphone designers since they have limited space to work with.

The sensor also supports 2- and 3-exposure HDR (high-dynamic-range) timing for up to 8 MP video modes and still previews. OmniVision says this creates a more visually-impactful picture by adding more contrast and color to the end product.



Functional block diagram of the OV32B40. Image used courtesy of OmniVision (PDF)

For color optimization, the sensor offers a 4-cell color filter array and an on-chip hardware re-mosaic that provides a 32 MP Bayer output. This means that the image sensor is arranged in a way that neighboring pixels each have a different color filter on them—either red, green, or blue.

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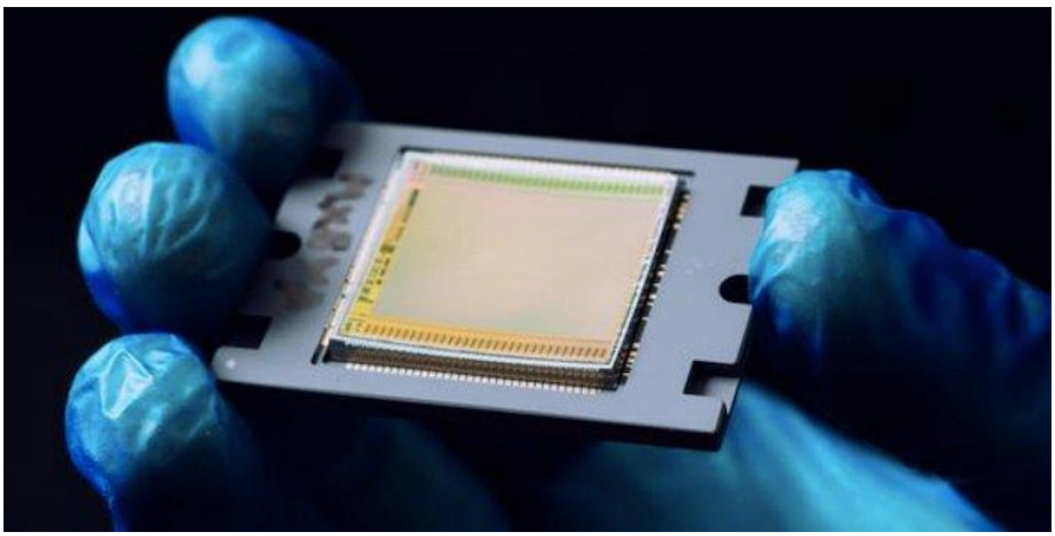
The sensor then uses near-pixel binning in low-light conditions, increasing the pixel size to 1.4 microns and increasing pixel sensitivity to four times the original value. OmniVision touts that this feature allows the image sensor to capture high-quality selfies, even at night.

Curved Image Sensors

Imaging a wide area is a challenge because naturally flat optics tend to curve the surface of the image. For this reason, extra hardware must be added to correct these inaccuracies. There is, however, another option that utilizes curved image sensors, which naturally correct the issues associated with flat optics.

This year, French startup Curve-One announced its own curved image sensor—the first of its kind to be commercially viable, according to the press release. While Curve-One is not the first to make these curved image sensors—Sony created a pair in 2014 and CEA-Leti is creating a 20 MP prototype—the ability to be commercially manufactured is a notable capability.



The curved image sensor. Image used courtesy of Curve-One

The company claims its optics can reduce the hardware amount to one-third of the requirement for flat optic sensors. Additionally, curved sensors reduce the number of errors and misalignments in the complete system, which may provide more consistent results.

Curve-One discusses how its manufacturing method is bio-inspired, mimicking the eye's retina. These curved image sensors are being used in the Meso-Cortex project, a project that requires high-resolution images of the human brain.

Shedding Light on Security

In addition to OmniVision's selfie-centered image sensors, the company is also honing in on security systems as well. Another sensor, the OSC04C10, features low power consumption, selective conversion gain, staggered HDR, and exceptional low-light capability, according to the press release.

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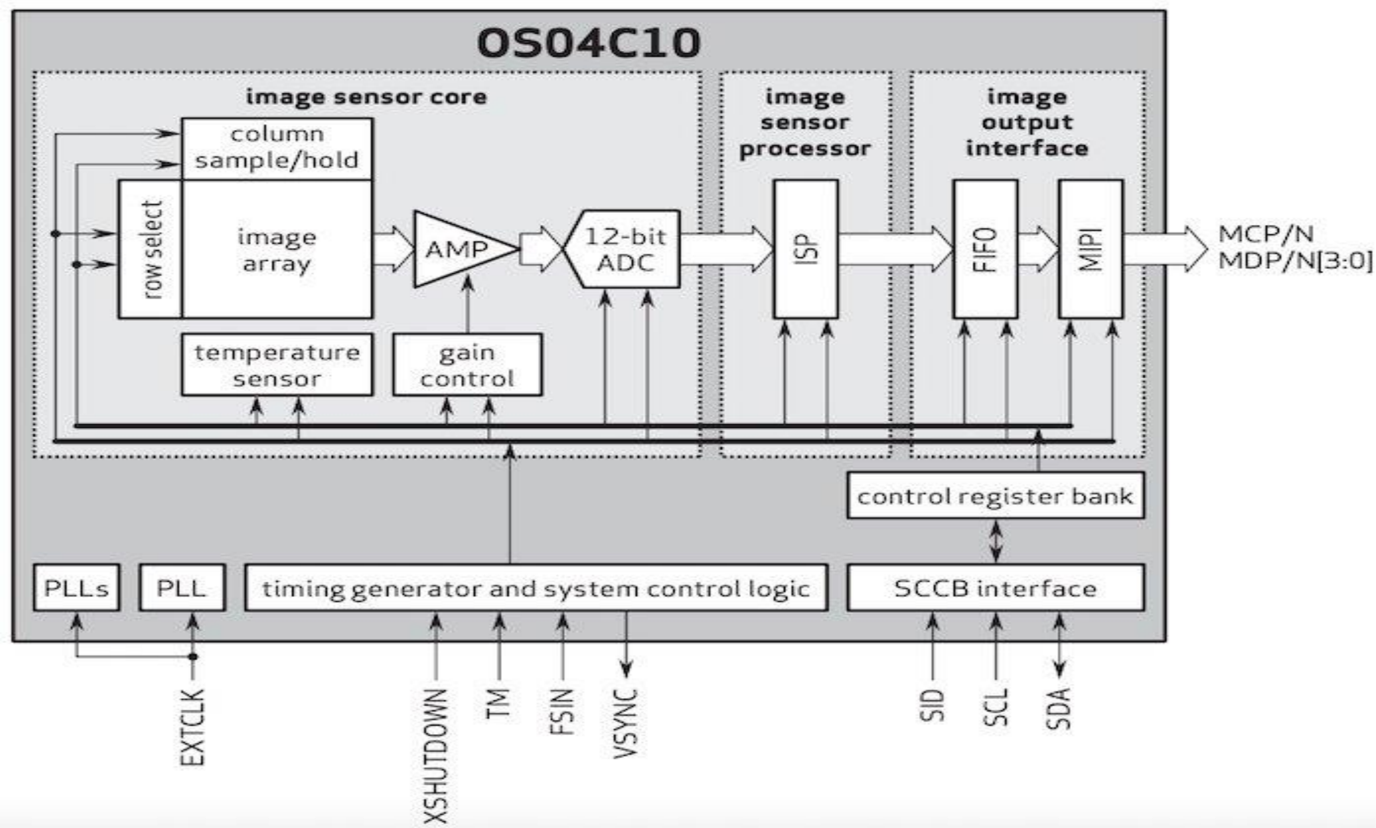
The sensor is also said to measure near infra-red (NIR) light (850 to 940 nm); since this kind of light is not visible to the naked eye, it enhances images in low-light conditions. OmniVision says the OSC04C10 is able to capture NIR light without compromising the color precision of the resultant image, too.



Functional block diagram of the OSC04C10. Image used courtesy of OmniVision (PDF)

The sensor has 2.0 micron pixels with 4 MP resolution, specifically a 2688 x 1520 resolution within a 16:9 aspect ratio. It is said to provide this high resolution at 60 fps (frames per second). In order to accommodate security applications where the system is continuously on, there is an ultra power mode for this sensor that consumes 98.9% less power than when the sensor is in its normal operating mode.