Why USB3, USB 3.0, USB 3.1

USB3、USB 3.0、USB 3.1 を選ぶ理由
なぜならば:
新しい方式
サポート
スピード
サイズ
電力と発熱
プライス
その他
USB3 Vision を選ぶ理由: XIMEA を選ぶ理由

その理由は、:

新しい方式

広く普及している USB (Universal Serial Bus) 技術の次世代である USB 3.0 は、あらゆる面で大きな飛躍を遂げました。例:

USB 2.0 はホスト指向 (マスター - スレーブ) アーキテクチャを使用しており、一度にデータが一方向にしか流れないのに対し、USB 3.0 では 5 本のワイヤ (合計 9 本) が追加され、ユニキャスト デュアル シンプレックス データ インターフェイスを利用して双方向のフローを実現します。

USB 3.0 には非同期通知もあり、デバイスは転送の準備ができるとホストに信号を送ります。これにより、システムのオーバーヘッドが大幅に削減され、USB 2.0 のポーリング メカニズムと比較して **低CPU負荷に**なります。

さらに、バルク転送のストリーミングのサポートやトークン/データ/ハンドシェイク シーケンスの効率向上により、システム効率が向上し、消費電力も削減されます。

XIMEA: 進歩を最大限に活用するために、当社のカメラ ラインには最新のセンサーとコンポーネント (FPGA など) のみを使用し、洗練された技術の可能性を最大限に引き出しています。

それは、グローバルシャッターと圧倒的なパラメータを備えた、より高速で大型の最新の CMOS と CCD 搭載を意味します。

サポート

USB3 の前身は非常に人気があり、簡単に構築できるサポートと受け入れのプラットフォームを提供します。

ハードウェアとソフトウェアのベンダーは、インターフェイスの利用を促進するために必要なすべてのソリューションを提供する準備ができています。
マザーボード、チップセット、ホスト コントローラー、ケーブル (ネジロック コネクタ)、ハブ、ライブラリ、または運用システム – すべてが揃っています。
これにより、USB 2.0 やその他のインターフェースから USB 3.0 (USB Implementers Forum (USB-IF) によって管理) への切り替えも簡単になります。特に、USB3 は **USB 2.0 と後方互換性**があるためです。

XIMEA: USB3 Vision にはさらなる利点があり、コミュニティ内でより良い条件と信頼性を推進するための影響力を生み出します。そのため、USB3 Vision 技術委員会 (Automated Imaging Association または AIA が主催) のメンバーである XIMEA は、USB 3.0 カメラとアクセサリ、ライブラリ、Windows、Linux、ARM、macOS の最も広範な相互運用性、および USB3 Vision 標準への準拠を確保するよう努めています。

スピード

Among other improvements, USB 3.0 adds a new transfer mode called "SuperSpeed" (SS), with a theoretical transfer rate of 5 Gbit/s.

The effective bandwidth is around 400 MByte/s. which is still 10 times faster than USB 2.0, and 5 times than 1394b (Firewire).

A successor is underway called USB 3.1 Gen2, which will provide speeds up to 10 Gbit/s (1.25 GB/s, called "SuperSpeed+") thus easily surpassing CameraLink.

All this speed requires appropriate hardware – chipset, motherboard, host adapter, cables and you can learn more about it **HERE.**

XIMEA: In the question of speed we push the pedal to the limit having the fastest USB3 model that gives 500 fps and where others claim to have incredible speed with 2Mpix at 141fps, XIMEA delivers 170 fps.

This is also true when using different libraries like for example Matrox MIL where our cameras are able to achieve 90 fps with 4 Mpix and competing cameras struggle at 82 fps.

サイズ

USB3 technology due to mentioned popularity and modernization factors also enables to use of new, smaller components (FPGA) and one device needs fewer of such already small components overall.

This results, besides other benefits, in a more compact size of footprint and of course also lighter weight which are parameters important in mobile applications and miniaturization trend.

Affected are also accessories like lenses or cables that are getting smaller as well, making it easier to design robust applications and sturdy housings or enclosures.

Size is further reduced by removing the need for intermediary equipment like for example **Frame grabbers** – you can forget about them for good.

XIMEA: Where you need a small size, XIMEA is your extreme measure. Last resort when everyone else is too big – the first company to provide single planar board version of the camera.

We produce the smallest USB3 cameras worldwide (26x26x21mm, 27g) and are able to provide special OEM customization services which would reduce the footprint and increase robustness even more.

電力と発熱

USB3 Vision に組み込まれたより優れた電力管理ルールは、コンパクトな設計と新しいコンポーネントとともに、システムのエネルギー消費に大きな影響を与えます。

これは、熱放散量の低さと密接に関係しており、センサーの不要な動きや画像品質の低下を回避するのに役立ちます。

温度センサーはイメージャーの近くまたはイメージャー上に配置され、出力の制御に役立ちますが、USB3 カメラが限界に達することはめったにありません。

ユーザーにとってさらに快適にするために、電力とデータは電源を取り除いた一本のケーブル (最大 4.5W) を介して転送されます。将来的には、USB バッテリー充電で最大 7.5 W が可能になります。

XIMEA: XIMEA カメラは最小であるため、エネルギー消費と熱放出が最も少ないのは当然ですが、一部のモデルが 1W 未満であるという事実は、依然として例外的です。

これで十分だと言う人もいるでしょうが、XIMEA は現在、ケーブルが 10W を供給し、要求の厳しいほとんどのセンサーにも十分な電力を供給できる将来のオプションに取り組んでいます。
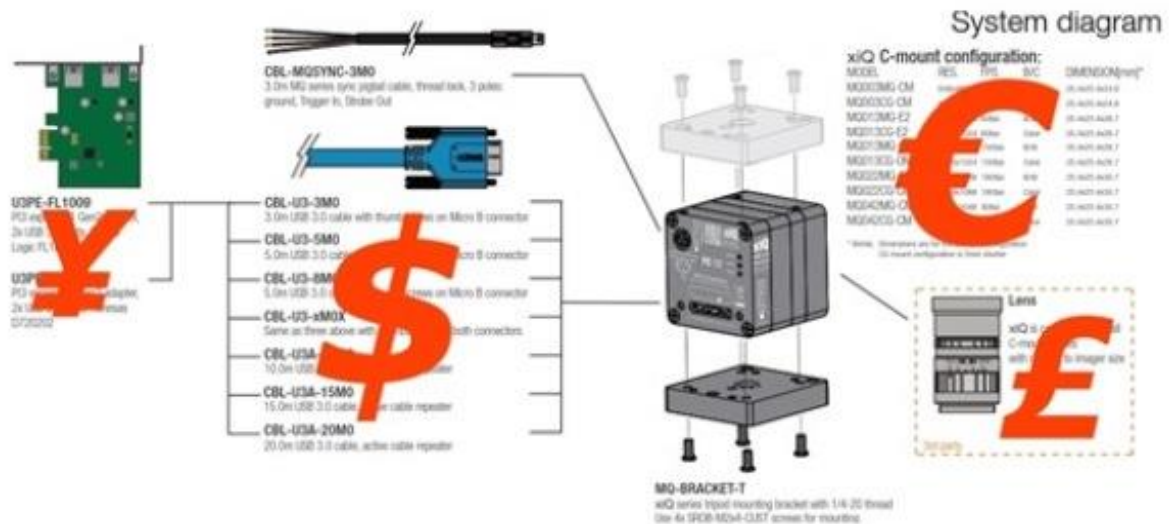
プライス

要約すると、上記の各要素は最終製品のコスト削減に役立ちますが、USB3 への切り替えによる顧客の節約はカメラだけにとどまりません。
フレーム グラバーと電源が無くせると、回収プロセスが強化され、より安価とはいえケーブルの使用も減らせ、コスト効率の高い新しいレンズとホスト カードが継続使用できます。

この評価計算に、**Plug&Play**プラグ アンド プレイ アーキテクチャの簡素化された統合作業を加えると、システム全体のコスト削減の全範囲が実現します。
このような計算を行う際には、USB 3.0 カメラの初期価格は、同等の競合 GigE または CameraLink モデルよりも低いことを念頭に置く必要があります。

XIMEA: もう 1 つの単純な真実は、価格がすべてではないということです。安いものは安すぎることもあります。そのため、XIMEA は価格競争には関与しません。
そうは言っても、当社は常に小規模なスタートアップを支援し、さまざまな OEM 企業に最適なオプションと信頼性の高いソリューションについてアドバイスするよう努めています。info@ximea.com までお問い合わせください。
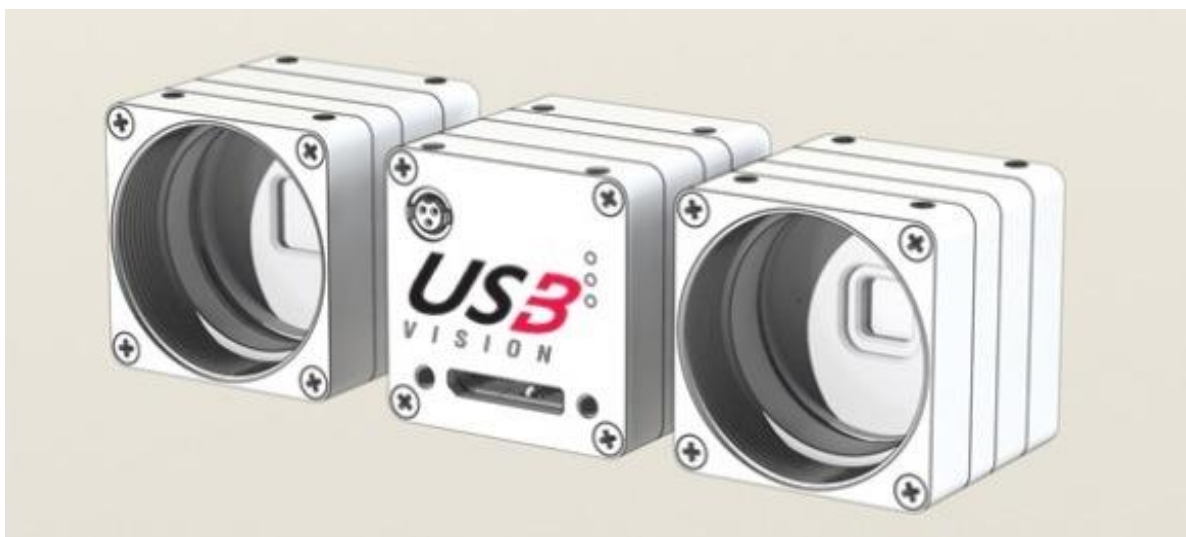
その他

言及する価値のある理由としては、USB 3.0 の利点により、多くの新しいアプリケーションで USB 3.0 が使用可能であり、使用されることが予想されます。ロボット工学、3D スキャン、UAV、バーチャル / 拡張リアリティー、動作追跡などです。

USB3 の重要な機能は、複数のカメラの優れたサポートです。理論上、ネットワーク上で最大 255 台のユニットを相互接続できます (同じバス上にカメラがさらに接続可能)。

また、USB 2.0 や GigE と比較して CPU 付加が低いという要素も見逃せません。これは、複雑なアプリケーションや高速処理で役立ちます。

最後に、インフラストラクチャ設計に役立つすべてのコンポーネントの互換性と信頼性を保証する USB3 Vision 標準準拠も重要です。

Why USB3 Vision? Because XIMEA

Why USB3, USB 3.0, USB 3.1

Why USB3, USB 3.0, USB 3.1
Because of:
NEW WAY
SUPPORT
SPEED
SIZE
POWER and HEAT
PRICE
MISCELLANEOUS
Why USB3 Vision? Because XIMEA

Because of:

NEW WAY

The next generation of widely popular USB (Universal Serial Bus) technology, USB 3.0 made a huge leap forward in every way. For example:
Where USB 2.0 uses host-directed (master - slave) architecture allowing data to flow only in a single direction at a time, USB 3.0 adds five wires (nine overall) and takes advantage of unicast dual-simplex data interface making the flow two-directional.
USB 3.0 also has asynchronous notifications, where the device signals to the host when it is ready for transfer which considerably reduces the overhead of the system and ensures **low CPU usage** in comparison to the polling mechanism in USB 2.0.
Further improvements include support of streaming for bulk transfers and increased efficiency in token/data/handshake sequence, enhancing system efficiency and also lowering power consumption.

XIMEA: To underline the advancements we use only the most modern sensors and components (like FPGA) for our line of cameras taking full potential of the sophisticated technology.
That means the newest CMOS and CCD which are faster and bigger with Global shutters and overwhelming parameters.

SUPPORT

The predecessor of USB3 being immensely popular provides a platform of support and acceptance which is easy to build on.

Vendors of hardware and software are ready to provide all necessary solutions to progress the utilization of the interface.

Motherboards, chipsets, host controllers, cables (screw lock connectors), hubs, libraries or operational systems – everyone is onboard.

This also ensures easy switch from USB 2.0 and other interfaces to USB 3.0 (managed by the USB Implementers Forum (USB-IF), especially since USB3 is **bakward compatible to USB 2.0**

XIMEA: USB3 Vision provides further benefits which create leverage in the community to push for better conditions and reliability. Therefore being a member of the USB3 Vision Technical committee (hosted by Automated Imaging Association or AIA) XIMEA strives to ensure the widest interoperability of USB 3.0 cameras with accessories, libraries, Windows, Linux, ARM, macOS and compliance to USB3 Vision Standard.

SPEED

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POWER and HEAT

Better power management rules that are incorporated in USB3 Vision along with compact design and new components strongly influence the energy consumption of the system.

This in turn is closely related to the low amount of heat dissipation and helps to avoid unnecessary motion of the sensor and degradation in imaging quality.

Temperature sensors are placed near the imager or on it aiding in the control of the output, even though the USB3 camera only rarely gets to the limit.

To make it yet more comfortable for the user power and data is transferred through single cable (up to 4.5W) removing the power supply. In the future USB Battery Charging will allow up to 7.5 W.

XIMEA: It is only logical that XIMEA cameras being the smallest will consume the least energy and emit the least heat, but the fact that some models go under 1W – is still exceptional.

Some would say this is enough, but XIMEA is currently working on a future option where the cable would be able to provide 10W and supply enough power even for most demanding sensors.

System diagram
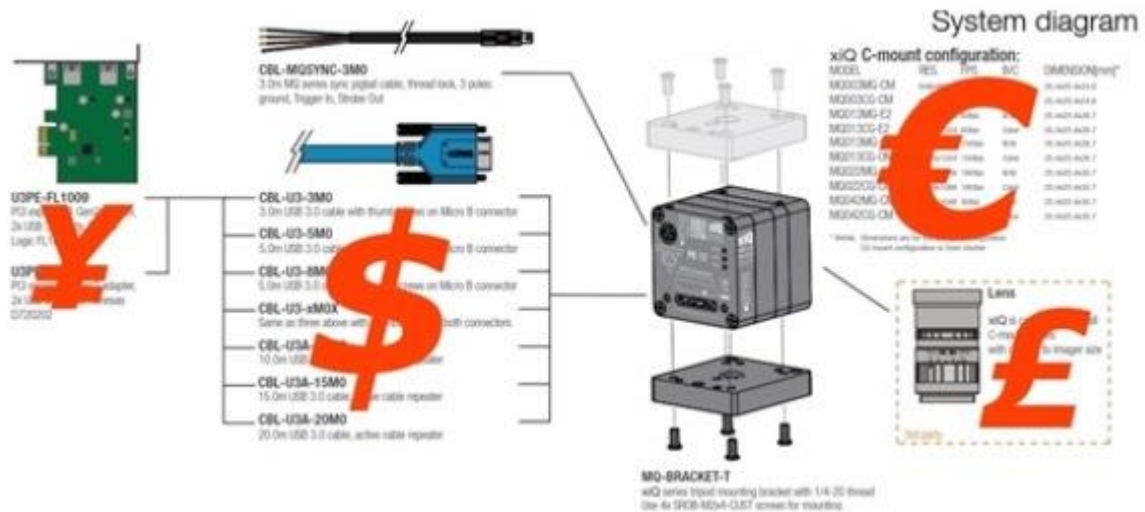
PRICE

In summary, each of the mentioned factors helps to reduce the cost of the final product, but customer's savings with switching to USB3 will not stop with the camera.
Losing Frame grabber and power supply intensifies the payoff process which continues with using fewer cheaper cables as well as new, cost effective lenses and host cards.

Add to the equation the simplified Integration efforts of **Plug&Play** architecture and you realize the full range of overall system cost reduction.
While doing such calculations you need to keep in mind a given - that initially price of a USB 3.0 camera is lower than equivalent competitive GigE or CameraLink models.

XIMEA: Another simple truth is that price is certainly not everything and sometimes cheap is too cheap, which is why XIMEA is not interested to engage in price wars.
This being said, we always try to help smaller startups and advice different OEM companies regarding optimal options and reliable solutions. Just ask our info@ximea.com
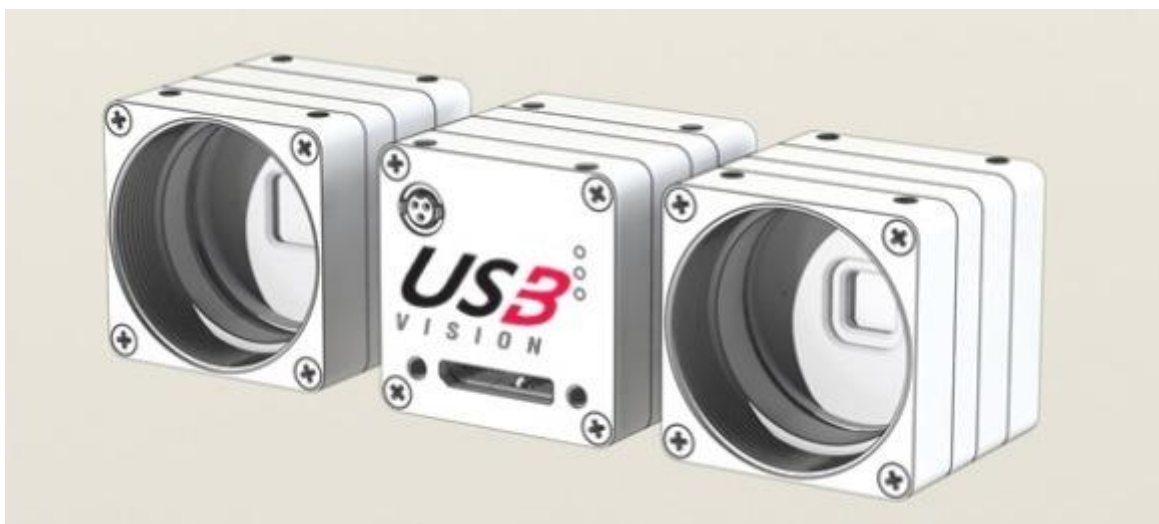
<u>MISCELLANEOUS</u>

Worth to mention reasons include - many new applications where USB 3.0 can and will be used because of its advantages. Like Robotics, 3D scanning, UAV, Virtual / Augmented reality or Movement Tracking.

An important feature of USB3 is exceptional support of multiple cameras – theoretically, up to 255 units can be interconnected on the network (with more cameras on the same bus)

Not to neglect is also the factor of CPU usage which is lower when compared to USB 2.0 and GigE and that comes in handy by complex applications and high speeds.

Last, but certainly not least is the USB3 Vision Standard compliance that ensures compatibility and reliability of all components aiding in infrastructure design.

Why USB3 Vision? Because XIMEA