GX

MAKING MOTION POSSIBLE

HOW A PRINTED CIRCUIT BOARD REVOLUTIONISED THE WORLD'S FIRST MODULAR DOLLY SYSTEM.

THE CHALLENGE

In 2016, Motion Impossible had mechanically engineered a groundbreaking camera dolly system but lacked the electronic knowhow to control it for smooth, accurate movement. Recognising the limits of their expertise, they approached GX to devise a custom spec motor controller.

THE APPROACH

Following comprehensive market research, GX identified a powerful off-the-shelf controller to do the job, so the project shifted – towards a bespoke printed circuit board (PCB) for both the chassis and hand controller of the latest Motion Impossible product: Agito.

THE CHALLENGE

The Agito's new custom PCB resulted in a control system that was completely tailored to specialist filming requirements, launching a commercially viable dolly system. Post GX involvement, Motion Impossible's product sales revenue increased threefold.

In 2016, Motion Impossible was working on the world's first solution for remotely moving and stabilising cameras on the ground. With applications in challenging environments, controlling this robotic dolly system smoothly and accurately for commercial filming became the biggest challenge.

The team had mechanically engineered the original M-Series model in house, but found they had reached the limits of their capability when it came to the electronics necessary for creating a more professional user interface and control system for the dolly. Motion Impossible's CTO Andy Nancollis had a long-standing working relationship with the team at GX and knew mechatronics engineer Richard Bebbington had the skills to bring their vision to life.

Motion Impossible was struggling with a supply chain for a suitable motor controller – the products on the market were designed for hobbyists and didn't offer the functionality required to control a serious piece of kit. The initial brief was for GX to create a motor controller that would be robust in variable circumstances (ie. in extremes of weather or large crowds) and able to produce slow, accurate, smooth movement without interference across the radio link. Convinced that a more advanced off-the-shelf model would be the right fit for

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Andy Nancollis,
CTO and Co-Founder,
Motion Impossible

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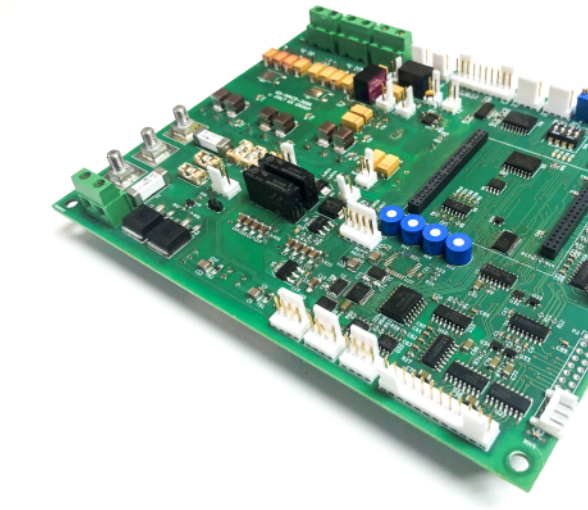
Thanks to the incredibly broad skillsets and knowledge among the team at GX, the scope of the project naturally expanded. With a motor controller that utilised a better feature set identified, the client decided to reassign the budget and the project brief shifted towards the design and development of a printed circuit board (PCB) with a professional interface for filming. By then, Motion Impossible had begun work on the next generation of dolly system: Agito. The two projects fell in line and it made sense that the new PCB was intended for Agito. The precise brief GX received commissioned hardware – one custom PCB to live on the dolly chassis and another in the hand controller – and the accompanying software, to create “the electronic brain”. As the equipment would need to be transported internationally, Richard offered further advice on high-power batteries that were pre-approved for flying.



“The electronics are the heartbeat of everything and infinitely complex”, says Andy. The control system GX designed was completely tailored to the client’s filming needs – from capturing cinematic action on sports tracks to the natural movement of wildlife on the African savannah. GX’s value engineering input has launched Motion Impossible’s product sales revenue, which increased threefold in the 18 months following the kit’s release. It was this meeting of minds that made the impossible possible.

TECHNICAL DATA

ELECTRONICS

Developed the multi-purpose “brain” for the filming dolly and custom remote hand controller that provides the control features and feedbacks filming professionals need.

Built an initial set of prototype boards with custom software running on embedded microcontroller modules, combined with rapid prototype parts and a mixture of custom and off-the-shelf items to build fully functional prototypes for testing.

Designed second-generation boards to offer maximum expandability and flexibility for software development, allowing for new features and capabilities in the future.

Prepared electronics to withstand electric vehicle issues, including battery management, safe shutdown in the event of failures and accurate control at both low and high speeds.

SOFTWARE

Initial prototype used software based on a variant of the Arduino ecosystem of microcontroller boards – the Teensy3.5 from PJRC.

The second generation used a different platform – the VM2 series of controllers from MicroRobotics (now Venom Control Systems), for greater flexibility with the ability to either use MicroRobotics’ own multitasking “Venom2” operating system or for the boards to programmed “bare-metal” in C++.

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