DuetDrive: Smart Tandem E-Bike

Deep Innovation Report

Executive Summary

DuetDrive introduces a connected, electric-assist tandem bicycle designed to encourage collaborative active travel across the distinct terrain of Bournemouth, Christchurch and Poole.

By utilizing intelligent dual-torque sensors and integrated communication, the system lowers the physical and social barriers to shared cycling, making local journeys accessible to riders of mismatched physical abilities.

The Better Everyday

What if two people could share a single electric journey where physical differences vanish and the ride feels entirely effortless and collaborative?

- DuetDrive is a premium, connected electric tandem bicycle designed with an intelligent dual-torque sensor system that dynamically balances power assistance based on each rider's input. The design integrates an onboard wireless intercom and digital dashboards, resolving the traditional communication friction and mismatched physical effort of classic tandem riding.
- Imagine a bright autumn afternoon in Westbourne, where an active senior and their adult child set out together toward Poole Quay. Instead of one rider struggling to keep pace or both shouting over traffic, they glide quietly up the steep coastal hills, chatting effortlessly via their headsets while the smart motor adapts to their individual pedalling strengths.
- The enduring human need here is shared outdoor mobility and companionship without the frustration of physical inequality. Currently, partners of different fitness levels use separate standard bicycles, which often leads to one person pulling far ahead, leaving the other isolated, exhausted and reluctant to cycle again.
- By transforming tandem cycling into a balanced, connected team experience, DuetDrive could redefine what people expect from local active transport rentals. It could inspire similar co-operative interfaces in other areas of public life, from shared cargo deliveries to accessible leisure craft in Poole Harbour.

Who It Could Matter To

Shared active travel succeeds when it accommodates different physical stamina levels and turns joint journeys into shared achievements.

The Active Grandparent

- A retired resident living in Christchurch who wants to stay physically active and spend quality time outdoors with their teenage grandchildren.
- They encounter DuetDrive during a weekend visit when looking for a fun, low-impact way to travel together along the coast.
- They gain the confidence to embark on longer rides, knowing the electric assist will balance their grandson's high energy with their own joint-friendly pace.

The Sightseeing Couple

- Visitors staying in Bournemouth town centre who want to explore the wider coastline without relying on cars or crowded summer buses.
- They see the tandem e-bike at a seafront hub and decide to ride to the historic Poole Quay for lunch.
- They enjoy a seamless, conversational journey where they can easily coordinate navigation and photo stops using the integrated digital dashboard.

The Vision-Impaired Explorer

- A local resident with partial sight who misses the freedom of cycling but cannot safely navigate the streets on an independent bicycle.
- They find the service through a local accessibility partnership and book a tandem session with a sighted guide rider.
- They experience the thrill of coastal cycling again, feeling completely secure with the guide controlling the steering while they both contribute pedal power.

What This Could Change for BCP

Connecting the distinct hubs of three towns requires active transport options that make long, hilly coastal journeys feel short and inviting.

- The strongest local connection lies in BCP's unique geography of distinct towns like Boscombe, Lansdowne and Christchurch, which are separated by rolling coastal topography and steep chines. A fleet of smart tandem e-bikes directly addresses these elevation challenges, turning the hills between neighbourhoods into scenic routes rather than physical barriers.
- This change could dramatically increase year-round local tourism and active recreation, shifting visitors away from congested seafront car parks. By making shared cycling comfortable for all age groups, it supports BCP Council's sustainable regeneration ambition by connecting retail districts without adding vehicular traffic.
- A potential ripple effect is the growth of a new micro-mobility ecosystem, encouraging local bike shops and tech start-ups from the Silicon South network to develop custom accessories or software integrations for inclusive cycling. Over time, this could position the region as a national leader in accessible active travel innovation.
- The primary trade-off involves the allocation of public space, as tandem e-bikes are longer and wider than standard bicycles, potentially causing congestion on busy shared-use promenades during peak summer periods. Local planners would need to decide whether to restrict tandem usage during high-density hours or designate specific lanes for larger micro-mobility vehicles.

Who Must Connect

Turning a high-tech tandem concept into a reliable regional amenity requires aligning public spaces, commercial operators and local tech talent.

- A specialized micro-mobility operator would lead the service, partnering directly with a regional manufacturing start-up or an established e-bike manufacturer to build the custom dual-torque frames. They would depend on this technical partner to maintain the complex digital dashboards and integrated communication headsets.
- Local cycling clubs and accessibility advocacy groups would actively shape the service, ensuring the frame adjustments and seating arrangements meet the needs of riders with diverse physical capabilities. Their hands-on feedback during early designs would prevent the bikes from feeling too heavy or intimidating for novice riders.
- BCP Council would act as the crucial enabler, granting permits for dedicated parking bays at key transit hubs such as Bournemouth station, Boscombe pier and Poole Quay. This spatial support ensures the larger tandem bikes do not block pedestrian footpaths and are easily accessible where journeys naturally begin.
- A shared-benefit funding model could involve sponsorships from significant local finance and insurance employers, who could fund the initial fleet as part of their corporate wellness and environmental commitments. These corporate partners would receive discounted ride credits for their staff, creating a stable, year-round commuting user base.
- The missing link is a coordinated connection between the bike operator and local hospitality businesses, who must actively promote the service to their guests as a premium way to travel between venues. The mobility operator must make the first move by offering local hotels and guesthouses a simple booking widget and marketing materials to kickstart this partnership.

Why This Fails

Innovative mobility concepts only survive when they overcome the harsh realities of coastal weather, complex maintenance and rider coordination.

- **Corrosive Coastal Wear** leads to rapid mechanical degradation because salt air and sand quickly wear down the sophisticated dual-torque sensors and digital dashboards. The early warning sign of this failure would be an unexpected spike in sensor errors and communication dropouts within the first month of seaside operation.
- **Mismatched Rider Anxiety** occurs if the digital interface and wireless intercom feel too complicated or require tedious setup before a ride can begin. You would notice this early warning sign when rental data shows high booking abandonment rates and customers spend more time troubleshooting on the pavement than riding.
- **Seasonal Revenue Deficit** threatens financial viability if the expensive tandem bikes sit idle during the cold, wet winter months, failing to generate enough income to cover year-round storage and maintenance costs. The early warning sign would be a steep, unsustainable drop in usage starting in late October, with no corresponding interest from local winter commuters.

One Experiment to Start

Before investing in a fully custom connected fleet, you must discover whether riders actually value the shared torque-balance experience.

- The single most important uncertainty is whether the dual-torque sensor system and wireless intercom truly resolve the communication and physical imbalance pain points of tandem riding. If users find the collaborative technology confusing or unnecessary, the high premium cost of manufacturing these specialized e-bikes cannot be justified.
- To test this, you could run a weekend trial in Westbourne using two standard tandem bicycles retrofitted with basic force-measurement pedals and simple two-way radio headsets. Pairs of riders with different fitness levels would be invited to ride a scenic route with notable elevation changes, sharing their feedback on communication and physical effort immediately afterward.
- Keep going if riders report that the communication headsets and balanced pedalling effort made them feel more connected, confident and willing to tackle hills they would normally avoid on separate bikes. Stop or rethink if participants find the headsets distracting, feel the tandem format is too unstable on shared paths, or prefer the independence of individual standard e-bikes. Either way, you will learn if the integrated communication and power-balancing are the essential features that drive value.
- **Next step:** A local micro-mobility advocate could partner with a technical researcher from Bournemouth University within the next 90 days to acquire two second-hand tandems and design the basic retrofitted sensor kit for the initial weekend trial.