THE URBAN EXPLORER

Exploration has always been made easier by the use of vehicles.
These vehicles have always had to be capable of easily traversing many kinds of terrain.
They haven't always been able to conquer stairs.

Traditional All-Terrain Vehicles (ATVs) are often large, with track or multiple wheel drive. This means that they are very capable across large distances of rough countryside, but would be unsuitable for exploring an urban setting, where agility is far more important, and there are new challenges, unique to our built environments. Maybe 'Most-Terrain Vehicle' would be better.

The VEX Urban Explorer aims to fill this gap, and also play to the advantages of the VEX system. It focuses on being light and agile to enable it to get almost anywhere, while acting as a 'drone', travelling independently of its controller. It sends constant feedback about its environment from its two cameras, allowing for a stereoscopic video feed, as well as giving further 'depth' information from the ultrasonic rangefinder. The two on board flashlights work in conjunction with the cameras to ensure that even in low lighting, useable information is received.

The main drivetrain of the robot consists of two separate chassis'; with a pivoting arm between them, allowing them to 'walk' over each other when necessary, such as up stairs or over obstacles. To allow this to happen without the robot falling over, the robot also has a second arm attached to the microcontroller, batteries and sensors, to act as a counterweight. The drivetrain is powered by eight high-power motors, ensuring that even if one or more wheels lose traction, those that remain will still have enough strength to move the robot to a better position. To provide the necessary voltage, the robot uses three batteries, two connected via power expanders, with one battery for each of the chassis' and the other for the connecting arms' motors.

The Autodesk Inventor software played a large part in the design of this robot. The ability to use assemblies and sub-assemblies dramatically reduced the workload, thanks to the symmetrical nature of the robot. This also allowed us to quickly make changes throughout the whole robot, as the design evolved. Another feature that helped in this respect was the ability to quickly and easily 'Replace' components. Being able to do this allowed temporary parts to be put in and for work to continue, while a different, new part is made or modified to better fit a certain purpose.

Designing the Urban Explorer in Inventor allowed for the plan to be finished much more quickly. It means the finished design can be shared and shown much more easily, while proving that the design would work – without any further modifications – and making the job of building it much quicker, more efficient and allow for the best use of resources.