The software controlling the rover will be built entirely in-house by a team of Engineering and Computer Science students. This will take the form of a distributed software framework, in which control and autonomy are shared across a network of nodes, together with a message passing protocol which allows efficient communication between those nodes and a graphical user interface for remote monitoring of the rover.

Compared with more traditional, centralised models, in which robots are controlled by a single CPU, this system will be more resilient and less susceptible to the failure of critical components. Our aim is to eliminate single points of failure entirely, and build a robot that will be able to continue operating under extremely hostile conditions. While the nature of the system will make it inherently robust, the level of redundancy can be tailored to the requirements of the robot.

A key requirement is that the software framework is scalable and flexible enough to handle a variety of tasks. While the robot will initially be directed via a telemetry system, our design will allow for greater automation to be incorporated in the future. Ultimately the vehicle will be fully autonomous, with the decision-making distributed across several nodes.

Our work to date has been focused on building a reliable communications system for passing information between nodes. To this end, we are implementing a general purpose messaging system, which will enable two-way communication between any pair of nodes in the network.

An important aspect of the communications system will be its ability to continue functioning even in the event that some nodes are no longer operational. For this reason, we are working to ensure that even if a node has high latency or is no longer able to perform its primary functionality, it will still be able to propagate messages for other nodes through the network reliably and quickly, resulting in the minimum possible impact on the overall system.