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# Designing a Mars Rover with McGill Robotics: Team Proposal

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*McGill Robotics, a student-run organization at McGill University, brings together students from various departments to design robots for international competition. McGill Robotics' first ever Mars Rover team is making huge progress as it prepares to compete in the Mars Society's 2015 [University Rover Challenge](#), next May.*

## I. Team Structure

McGill Robotics comprises more than 150 students grouped into three different teams: the Autonomous Underwater Vehicle (AUV) design team, preparing to compete in the RoboSub competition; the Mars Rover design team, preparing to compete in the University Rover Challenge; and the Business team which is in charge of branding, sponsorship, and finances.



*Figure 1.1: The McGill Robotics team.*

This year is the Mars Rover team's first. The team contains 70 members, almost all recruited last October after a month-long recruitment process, during which applicants had the chance to work in teams in order to create a simple robot that plays a game – a great way to showcase their passion to learn about robotics and work in a team. These undergraduate and graduate members are mainly from the engineering,

science, and management faculties of McGill University.

The Mars Rover team is structured in three main divisions: mechanical, electrical, and software. Every of these divisions are then separated into sections containing up to 10 members each. Every section leader reports directly to the other sections and its respective division leader, who further reports to the other division leaders and the project manager. Maintaining such a structure is very important in a large group like the Mars Rover team, as it eases the communications across the whole team, and allows an efficient work distribution.

## II. Team Resources

The success of the design teams of McGill Robotics mostly depends on the generous support from multiple external sponsors. Various companies are continuously being contacted for material or monetary sponsorship and are informed of our activities through our custom sponsorship package, which includes five levels of sponsorship. In addition, the continuously updated and detailed Mars Rover annual budget is always available upon request. To keep its sponsors and large community updated on its projects, McGill Robotics

produces bi-weekly newsletters, and the team regularly posts updates on its numerous social media accounts. The Business Team constantly ensures a professional follow-ups with our previous and new sponsors<sup>1</sup>. It also keeps track of our income and expense records.

The workspace of McGill Robotics is divided into three sections: an office space for meetings and office work; a working bay which is mainly used for robot assembling and tool storage; and a manufacturing bay containing basic tools such as saws, press drills and soldering stations. The team also has access to the more advanced machining tools such as lathes, mills and CNC machines.

### III. Project Management Plan

A strong management strategy is a necessity for the Mars Rover team. After a month-long recruitment process, every team member went through an interview and chose what division and section he or she wanted to be part of, regardless of their academic background. When the team was formed and section and division leaders were selected, the whole team started working on the actual project, which is divided into many phases: research, design, manufacturing and assembling, and testing. Each of these phases are broken down into many tasks and deadlines for every aspect of the project, which are all listed on the team's main Gantt chart and timeline.

Since the Mars Rover team is mostly made of first-year students, every division leader organizes custom and simplified tutorial sessions for every phase of the project. Passing knowledge from more experienced to newer members is taken very seriously in

all the teams of McGill Robotics for sustainability purposes.

Throughout the whole process, the team uses the [Podio](#) project management platform, which eases team communications. Podio allows the team to distribute every member into different workspaces, depending on what section/division they're part of, helps us create tasks, follow-ups, and meetings. All McGill Robotics leaders (project managers, division leaders, and section leaders) must schedule meetings with specific goals every week and then archive the minutes for future reference.

All of the McGill Robotics files are saved and shared on cloud servers such as [Google Drive](#) and [Digital Ocean](#). Other technical cloud servers such as [Autodesk Vault](#) and [GitHub](#) are also used for version control and data management.

The team has now completed its final models, which have been reviewed by McGill professors, industry experts, and Canadian Space Agency engineers. The team has entered in the manufacturing phase for mechanical components and custom electrical boards, while the software division is running virtual simulations to test their algorithms. In short, the Mars Rover project of McGill Robotics is making great strides as it prepares to compete in the 2015 edition of the University Rover Challenge.

*You can follow live updates of our progression on our [Facebook](#), [Twitter](#), [Youtube](#) and [Instagram](#) pages and you can obtain more information on our [website](#).*

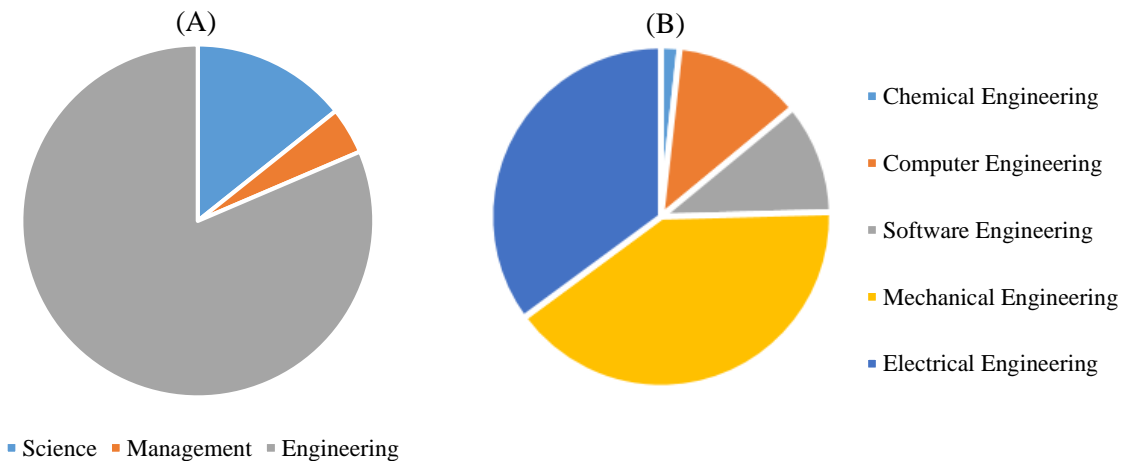
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<sup>1</sup> You can view our sponsorship package here: <http://www.mcgillrobotics.com/Sponsorship%20Package%20McGill%20Robotics.pdf>

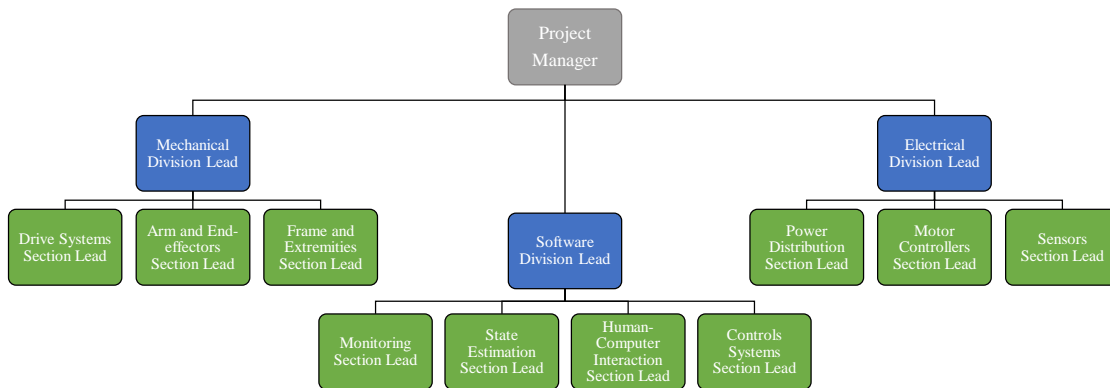
#### IV. Relevant Diagrams, Schemes and Images



*Figure 4.1: Recruitment process. (A) Early team brainstorm; (B) Demonstration of an innovative rock-paper-scissors robot with image recognition; (C) Formal presentation of the final product to an audience.*



*Figure 4.2: Mars Rover team member distribution (70 in total) by (A) faculties and (B) engineering departments (among engineering students).*



*Figure 4.3: Mars Rover leadership communication structure. The team is divided into three divisions, which are then further divided into sections. This eases the communications across the team and allows an efficient work distribution.*



*Figure 4.4: The mechanical, electrical and software systems were reviewed through different design reviews with McGill professors, Canadian Space Agency engineers, and industry experts.*



*Figure 4.5: The CAD model of McGill Robotics' very first Mars Rover. The rover is currently being manufactured.*