

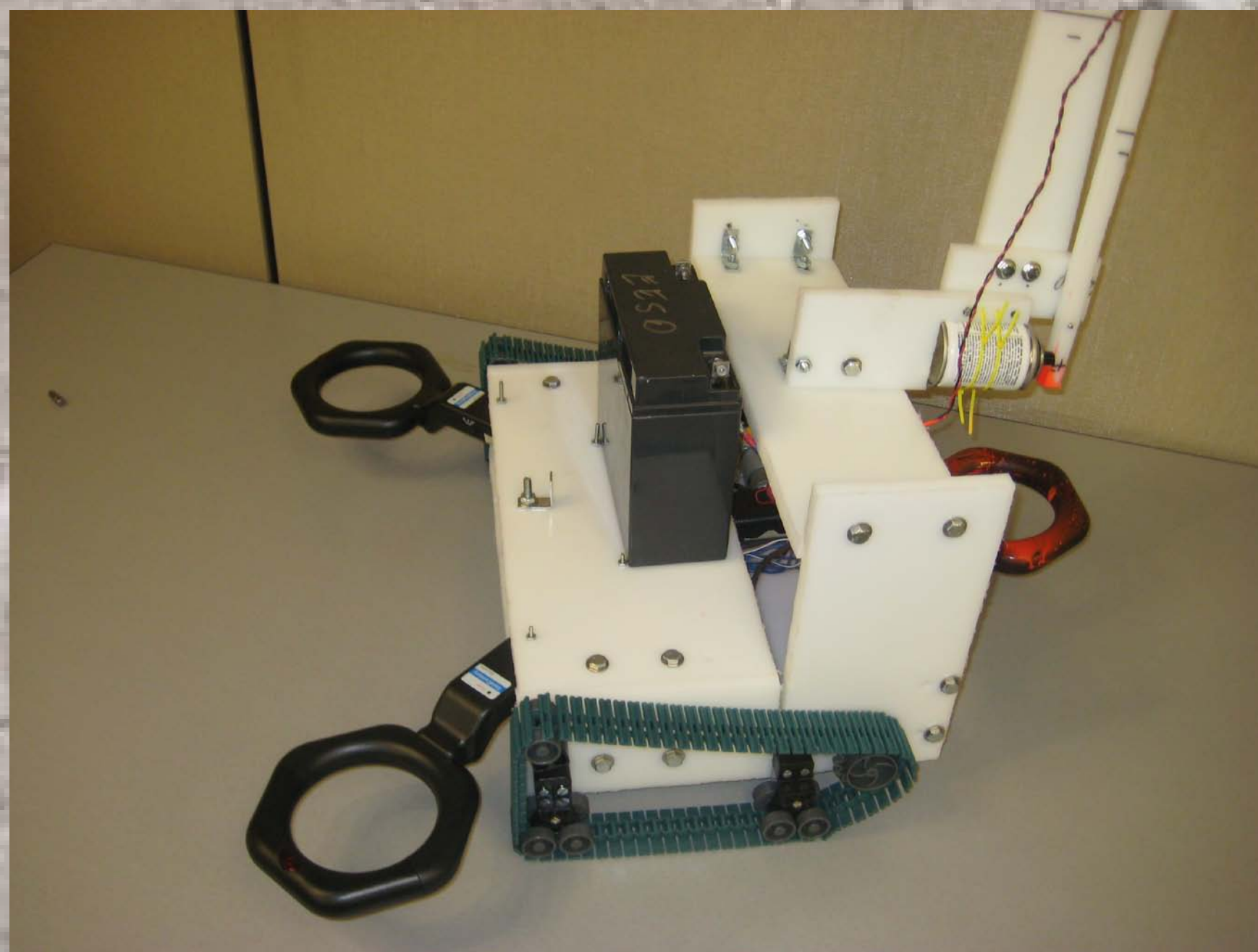
Robot Rangers

Problem:

Hidden land mines kill thousands of people each year, but it is difficult to find and destroy them. For the safety of many people in areas plagued by landmines, it is crucial to develop a solution that can remotely detect land mines and mark them so they can be later disarmed without resulting in loss of life.

Solution:

The development of a wirelessly controlled robot that detects mines with metal detectors keeps humans away from the danger of the land mines. An accurate and visible marking system makes the location of the mines known. The robot should avoid detonating mines while searching and have a wide search path in order to reduce the time of operation.



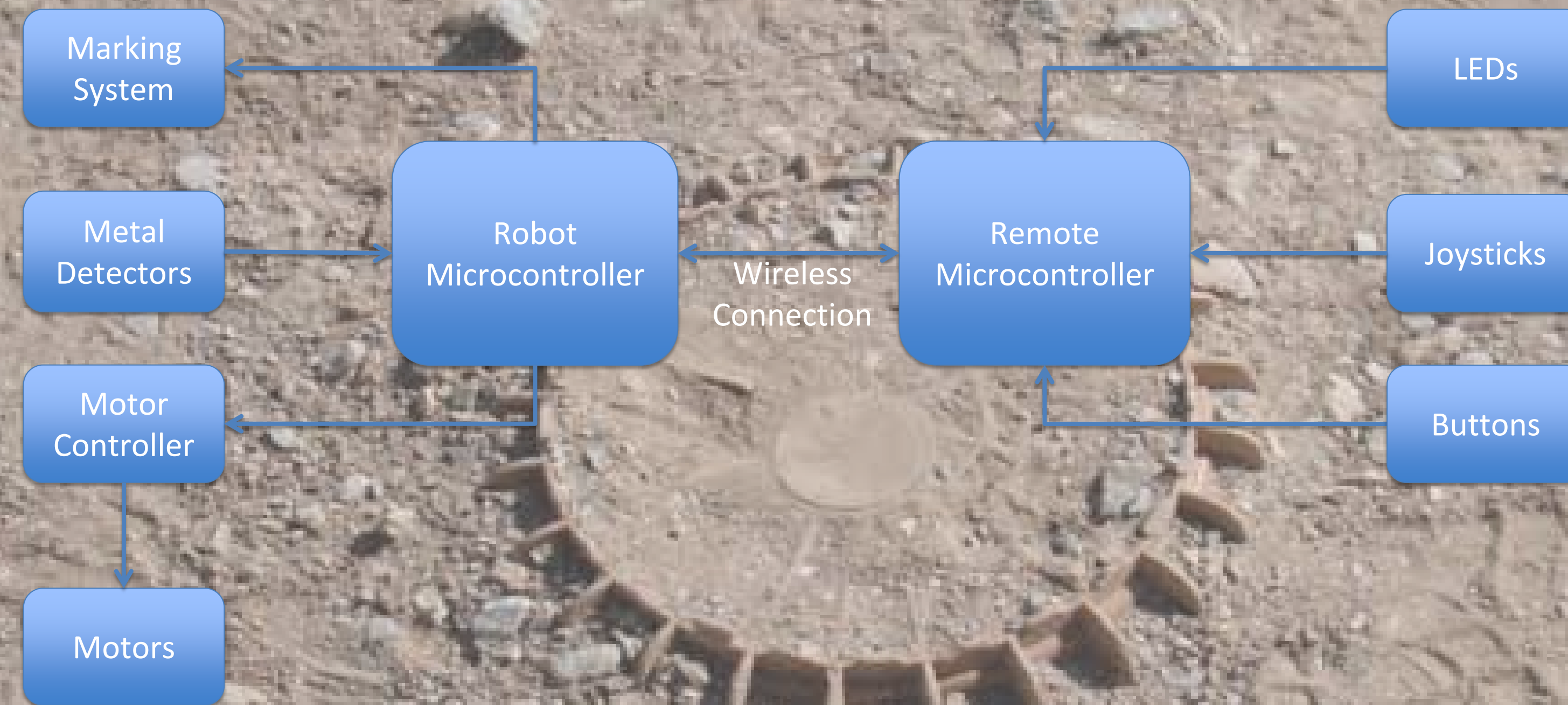
Motors:

Two motors are controlled through motor drivers that receive individual input from the user. Both motors have full forward and full reverse capabilities, as well as variable speeds, which allows the robot to have normal drive operation and excellent turning radii.

Metal Detection:

Three metal detectors – two in the front and one in the rear – provide an extended range of metal detection. The front two detectors provide security so that the robot will not run over any mines, thus preventing accidental detonation.

System Block Diagram

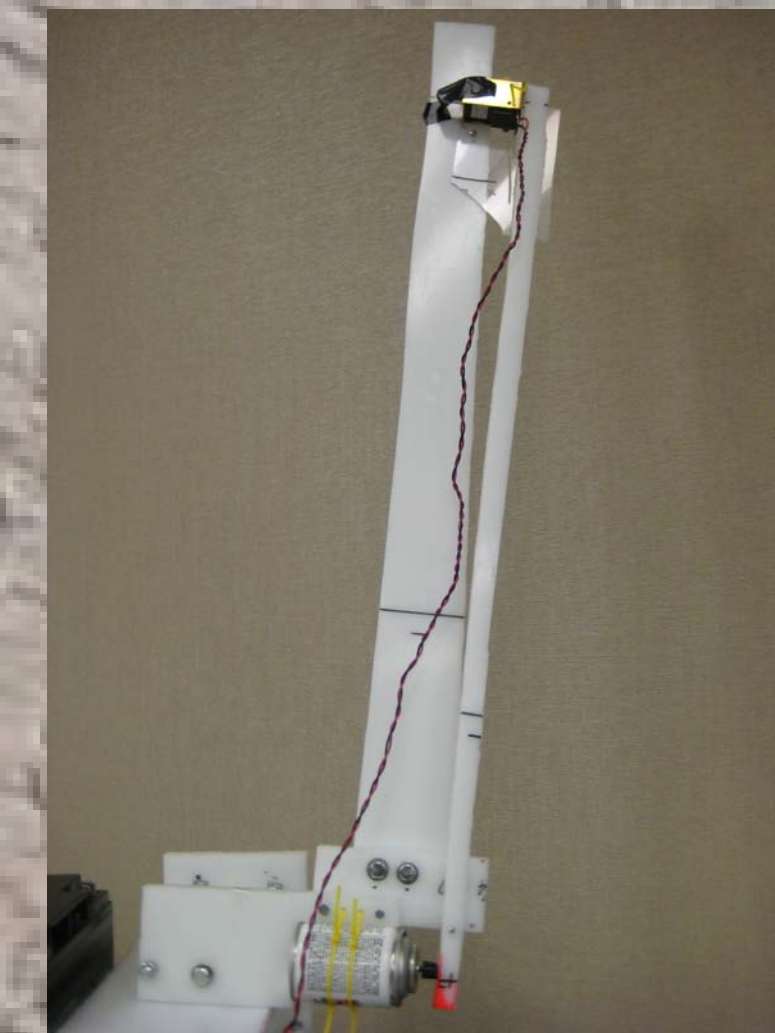


Future Enhancements

- Autonomous Detection System
 - Keep people further away from the dangers of land mines
- Increased accuracy and range in detection
- More compact frame with higher ground clearance
- Increased wireless communication range
- Enhanced user interface
- Water and weather proof frame
- Improved power management and voltage monitoring

Marking System:

The marking system consists of a solenoid and paint can located over the rear metal detector. Upon detection of a mine, the user moves the robot so that the mine is underneath the rear metal detector. Once aligned, the user depresses a button that activates the solenoid and accurately marks the mine's location.



Remote Control:

The remote control gives the user the ability to operate the robot from a safe distance. Three LEDs, one for each metal detector, illuminate when a metal object comes within the detection range. One button allows the user to mark a detected mine's location. Two joysticks connected to potentiometers control the drive of the robot. Another button can reset the motor control boards in case of a fault.

Wireless Connection:

The robot and remote control are connected through radio transceivers running IEEE 802.15.4 protocol. The robot and remote update each other with their data 10 times per second. When the wireless software detects a loss of connection, it automatically reestablishes communication between the robot and the remote control.