

## **Initial Specification for Gemfinder Mining Robot**

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### *ABSTRACT*

This specification outlines the requirements for a mining robot to exploit gem mazes on Red Planet and elsewhere. It is proposed that the target hardware for the mining robot will be either ASIC or CPLD based and NOT CPU based.

## 1. Problem Overview

- A planet has many geological gem mazes;
- A maze covers a square km. or so, on a 10 cm grid;
- A maze cell is 10 cm by 10 cm and gems lie at cell centres;
- There is a path from every maze cell to every other;
- On average one in 64 cells has an overhead opening;
- On average one in seven cells has a single gem;
- There are no gems under overhead openings;

## 2. Design Requirements :

The design for a gem-mining beetle ASIC will have the following inputs:

Version 1 : INPUTS	
Description	Name
A nominal 1 MHz single-phase clock	CLK
Wall sensors	WL, WR, WF, WB (wall to left right forward behind)
Light sensors	LL, LR, LF, LB (light left right forward behind)
Low-battery indicator	BLOW
Gem sensor	GEM
Opening sensor	OPEN (when under an opening)

All signals are active high and the light sensor outputs are mutually exclusive. The beetle ASIC must produce the following (mutually exclusive) signals:

<b>Version 1 : SIGNALS</b>	
<b>Description</b>	<b>Name</b>
move forward	MF
move backward	MB
turn 90° clockwise	TC
turn 90° anticlockwise	TA
pick up a gem	PICKUP
throw gem up and out of opening	THROWUP
jump up to surface and shutdown	SHUTUP