ThembaBot: Mine Surveying Robot

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Purpose The project aimed to design a simple, ergonomic and cost-effective robot equipped with different sensors for use as a surveying tool in shaft mining to improve safety for workers. Procedure The robot was designed using Fusion 360 Autodesk CAD software. The design was modular and incorporated a processing layer, a sensory layer and the robot roof. All structural components were 3D printed. A microprocessor with a servo control board was used to control the motors. Data/Results The prototype yielded good results in terms of structural integrity and functional capacity. The design is robust and incorporates both wired and wireless control mechanisms. It moves on a variety of terrains including rocky and sandy substrates. The lights and camera are more suited to underground conditions. Temperature readings had a 2°C accuracy range. Humidity readings had a 2% margin of error. The distance sensor works up to 500 cm with a 20 cm accuracy range. The carbon monoxide sensor accuracy was within 7000 ppm. The accelerometer velocity value was within 7m. s -1 either way whilst the radar is accurate up to 4 m. Conclusion The engineering goals were met. The robot moves on rocky and sandy terrains and is relatively cost-effective. The sensors make the robot suitable for detecting unsafe conditions in shaft mines.

Awards Won:

Second Award of $2,000