ALL TERRAIN WHEELCHAIR

element...

DESIGNER: TIM MORGAN SUPERVISOR: PROF. ROGER ORPWOOD MODERATOR: PROF. TONY MILES

BRIEF

- **CURRENT MANUAL WHEELCHAIRS**

LIMITED OFF ROAD ABILITY AND ILL SUITED TO ROUGH TERRAIN

- **FOUR WHEEL DOWNHILL RACING WHEELCHAIRS**

EXCELLENT OFF ROAD PERFORMANCE BUT LACK PRACTICALITY

- **DESIGN AN ALL TERRAIN WHEELCHAIR WHICH ACHIEVES GOOD OFF ROAD PERFORMANCE WHILST MAINTAINING PRACTICALITY**

BACKGROUND

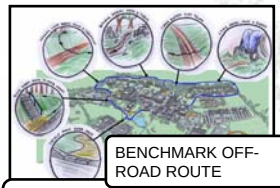
- **USER CENTRED RESEARCH**

WHEELCHAIR TESTING

STORYBOARDS AND USER PROFILE

DESIGN

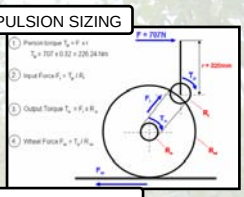
INITIAL CONCEPTS



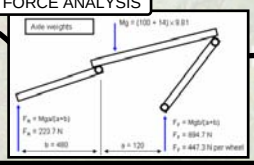
BENCHMARK OFF-ROAD ROUTE

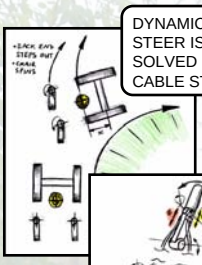
TESTING OF MODIFIED WHEELCHAIR

PROPULSION SIZING

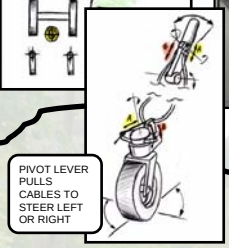


FORCE ANALYSIS





DYNAMICS: OVER-STEER ISSUE SOLVED BY DIRECT CABLE STEERING



PIVOT LEVER PULLS CABLES TO STEER LEFT OR RIGHT

MANUFACTURE OF FULLY OPERATIONAL PROTOTYPE FEATURING ALUMINIUM CONSTRUCTION, AIR SHOCKS, DISC BRAKES, CHAIN DRIVE, CABLE STEERING

ADJUSTABLE, AIR SPRUNG, INDEPENDENT SUSPENSION FRONT AND REAR ALLOWS ARTICULATION OVER ROUGH TERRAIN & COMFORTABLE RIDE

PROPULSION SYSTEM CONSISTING OF RATCHET LEVERS & CHAIN DRIVE. LEVERS ALSO FEATURE BRAKE LEVERS WHICH OPERATE DISC BRAKES

DIRECT STEERING OPERATED BY CABLES AND PIVOTTING LEVER

ROBUST ALLOY CHASSIS

HEAVY DUTY WHEELS & TYRES

PROTOTYPE TESTING

SLALOMING

UP & DOWN KERBS

UP & DOWN STEEP SLOPES

ROUGH TERRAIN

TESTED BY TARGET USER WITH GREAT SUCCESS. IN BACK TO BACK TESTS, STANDARD WHEELCHAIR FAILS OBSTACLES

CONCLUSIONS

- PROTOTYPE REPRESENTS SIGNIFICANT IMPROVEMENT IN OFF-ROAD PERFORMANCE
- PRODUCT PROVIDES WHEELCHAIR USERS WITH THE FREEDOM TO EXPLORE OFF-ROAD
- EXCELLENT FEEDBACK FROM TARGET USER & IMPROVEMENTS PROPOSED
- PATENT FILED TO PROTECT UNIQUE FEATURES

UNIVERSITY OF BATH
Department of Mechanical Engineering
FACULTY OF ENGINEERING AND DESIGN

PROJECT No. SPD 132

SPECIALIST DESIGN GROUP 2007