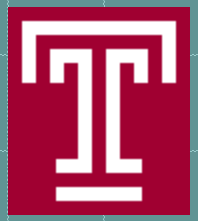
Digital Wireless Data Communications With a Semi-Autonomous Rover



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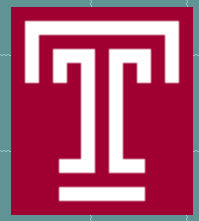

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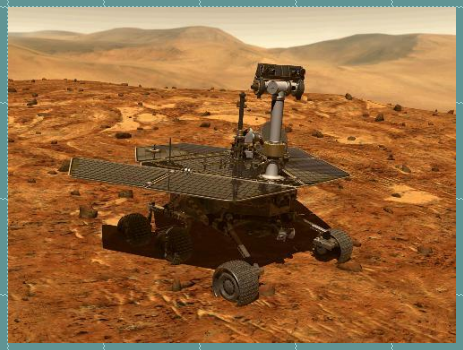
Technical Advisor: Dr. Dennis A. Silage, K3DS

Introduction

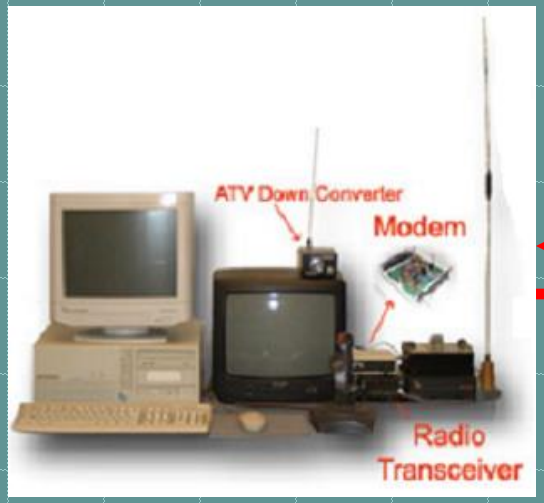
Sojourner - *NASA*



Spirit and Opportunity - *NASA*

Andros - *Remotec*

Project Overview



Communication protocols

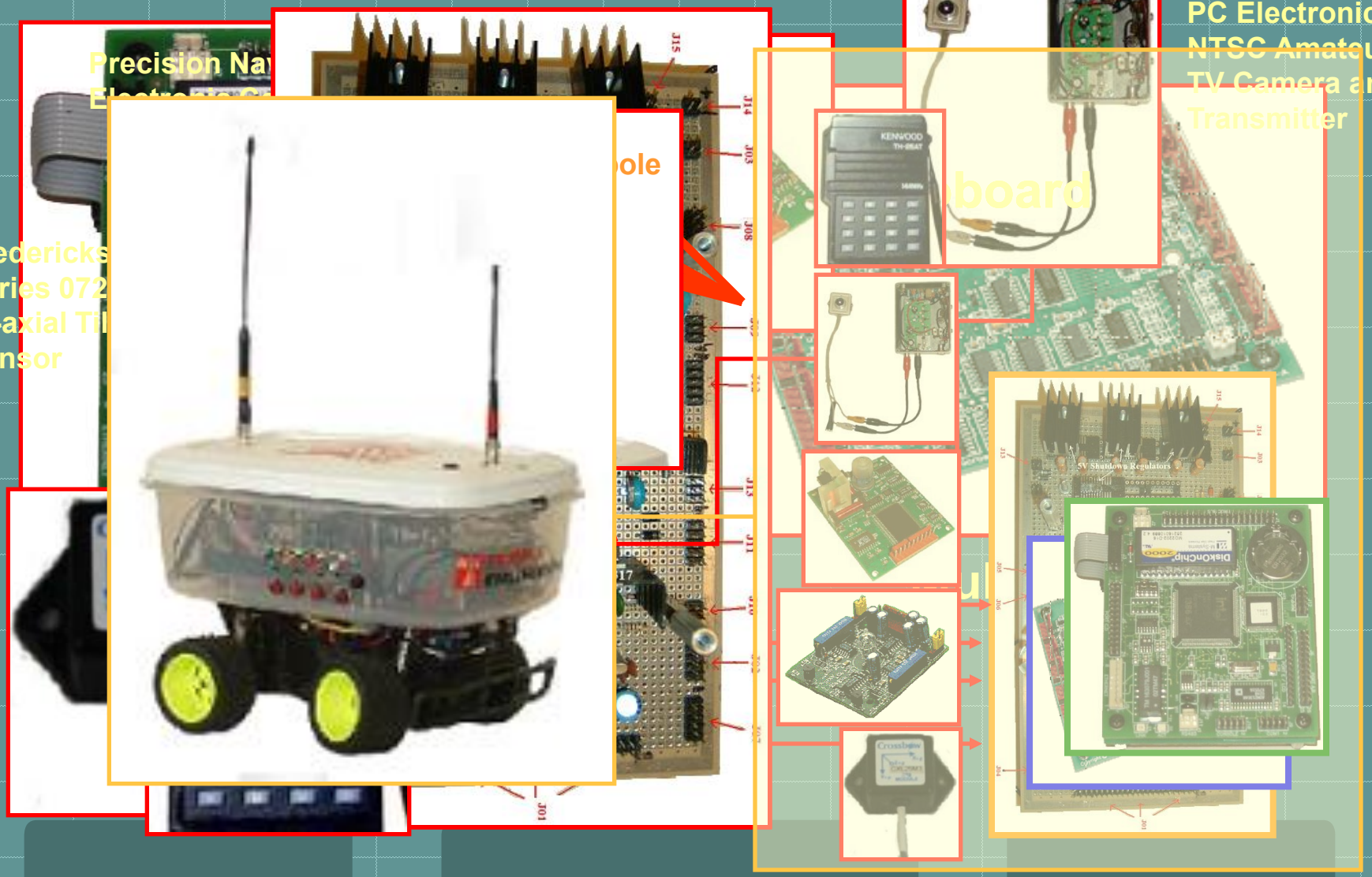
Base Station

- Command
- Control

Rover

- Data gathering
- Surveillance
- Exploration

Rover Hardware



Rover Power Supply

Thirty-Three 1.2V NiMh Cells

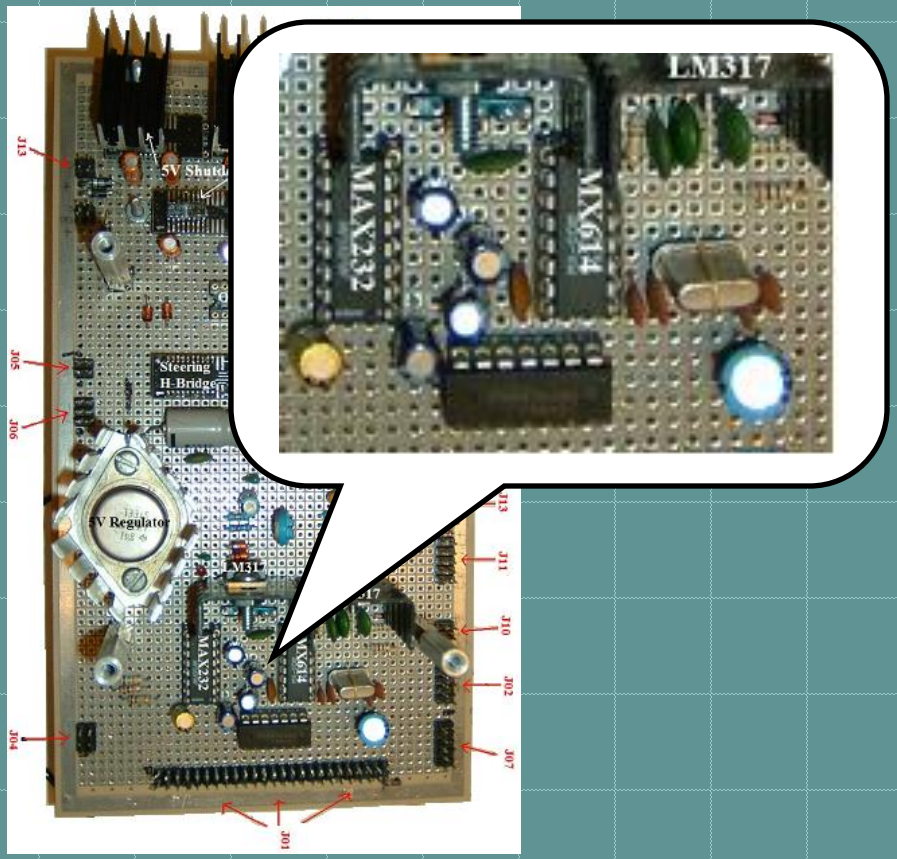
LogicFlex, Modem, Sensors 10.2V	Transceiver 10.2V
Amateur TV Camera and Transmitter 13.2V	Motors 7.2V

Base Station Hardware

- PC – mouse, keyboard
- Joystick
- Baseband modem
- Kenwood TM721A
  146.58 MHz Simplex
- Monopole antenna
- ATV down converter
  426.25 MHz
- TV monitor

Modems

- Custom-built
- Baseband FSK
- MX 614
- MAX 232

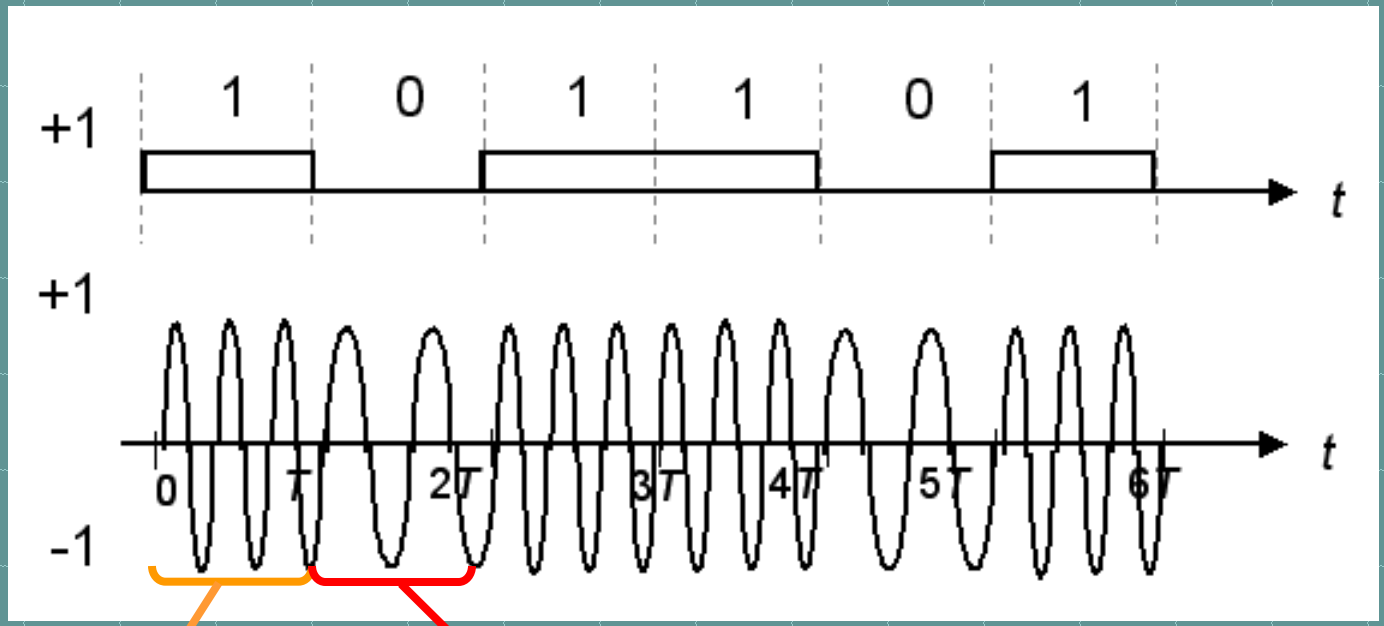


Rover

Base Station

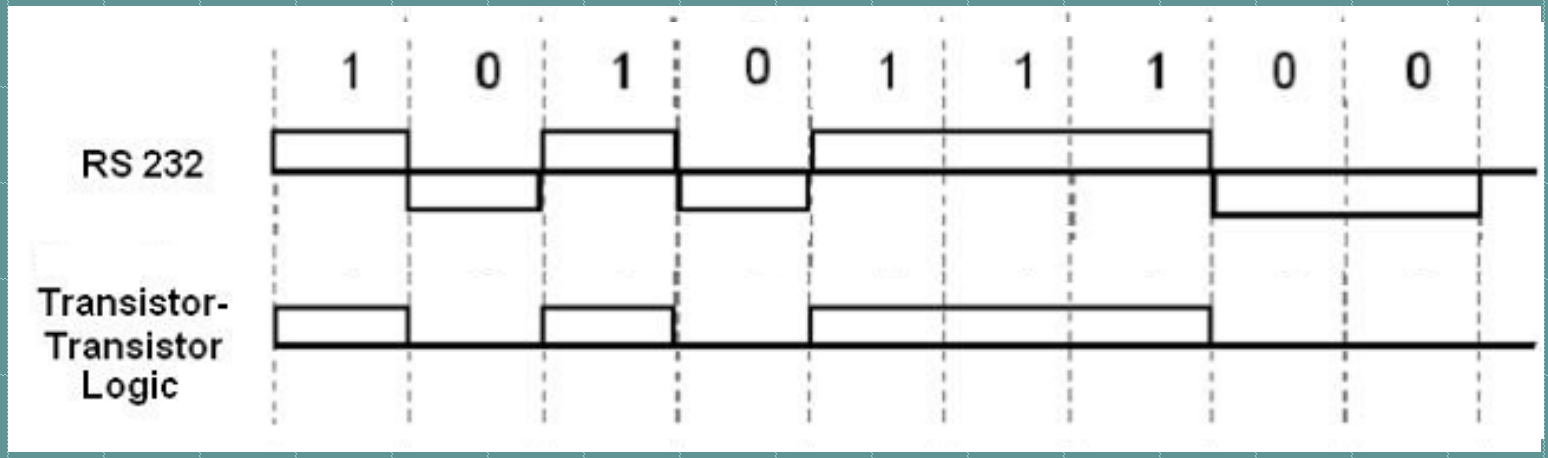
MX 614

Frequency Shift Keying – baseband modulation

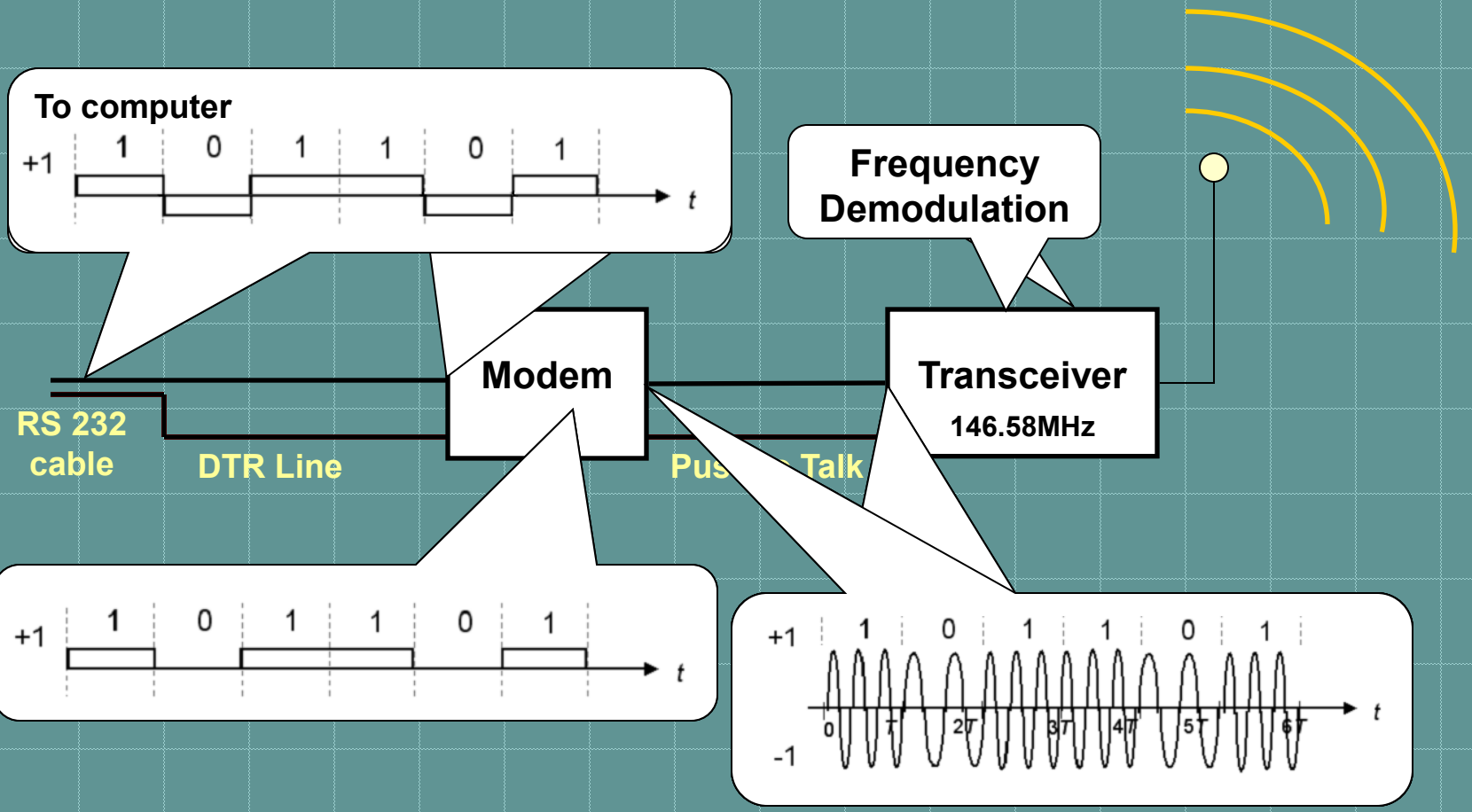


MAX 232

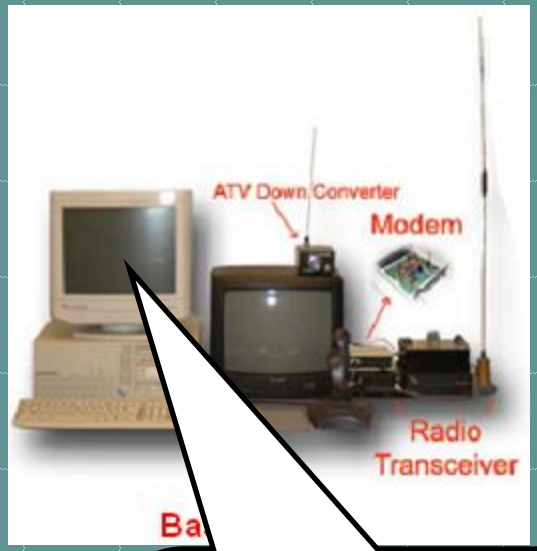
Bipolar Bipolar



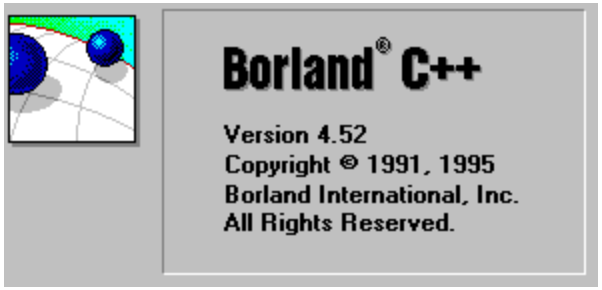
Communication Sequence



Software Applications



Rover Operations Application

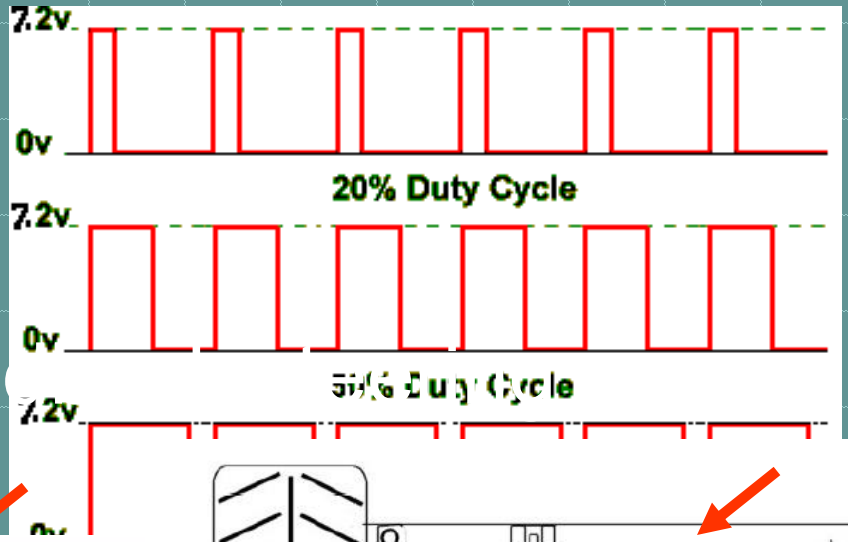


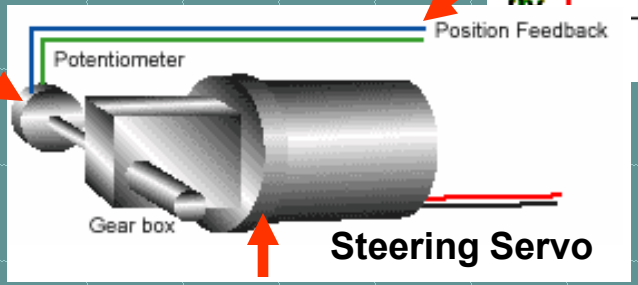
Rover Interface Application

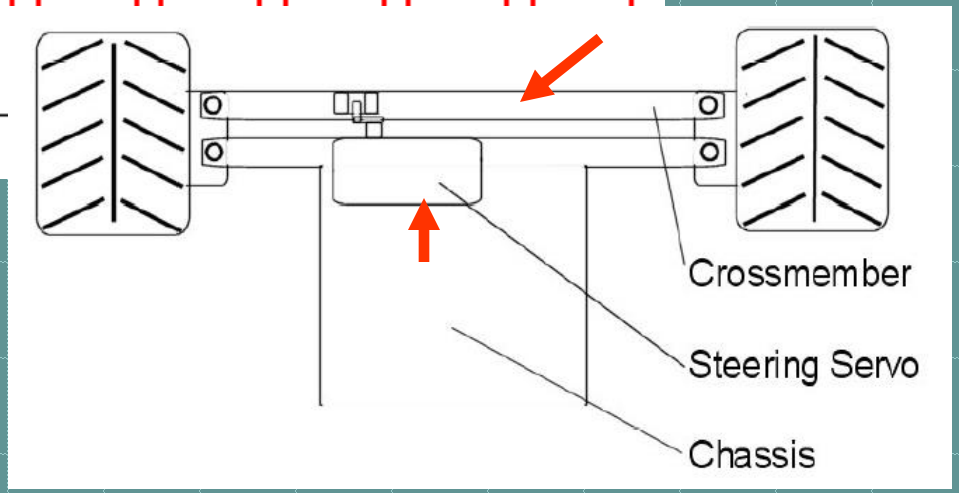
Microsoft Visual Basic

Rover Mobility

- PWM
- Position fee





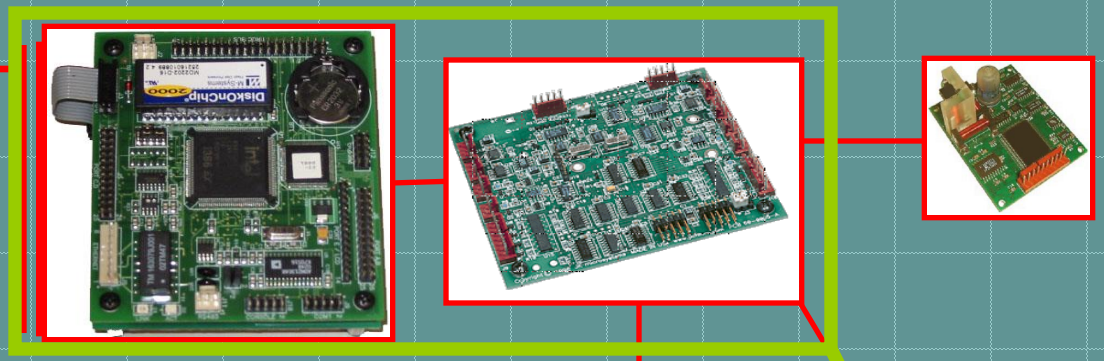


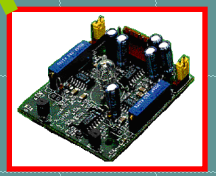
Autonomous Routines

- Autonomous station identification
  - Transmit call sign every ten minutes

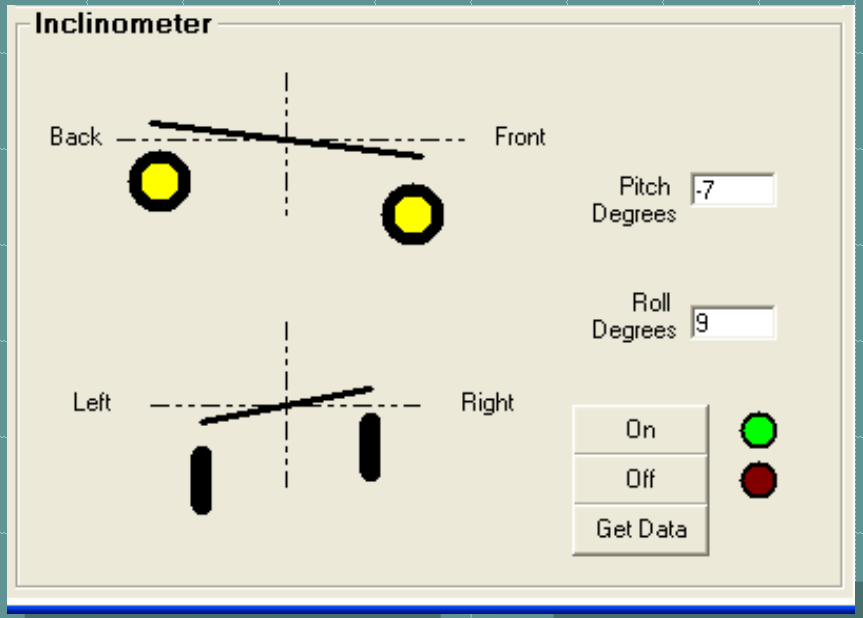
- Quiet Mode
  - Shutdown sensors if no communication has been initiated for three minutes

Sensors

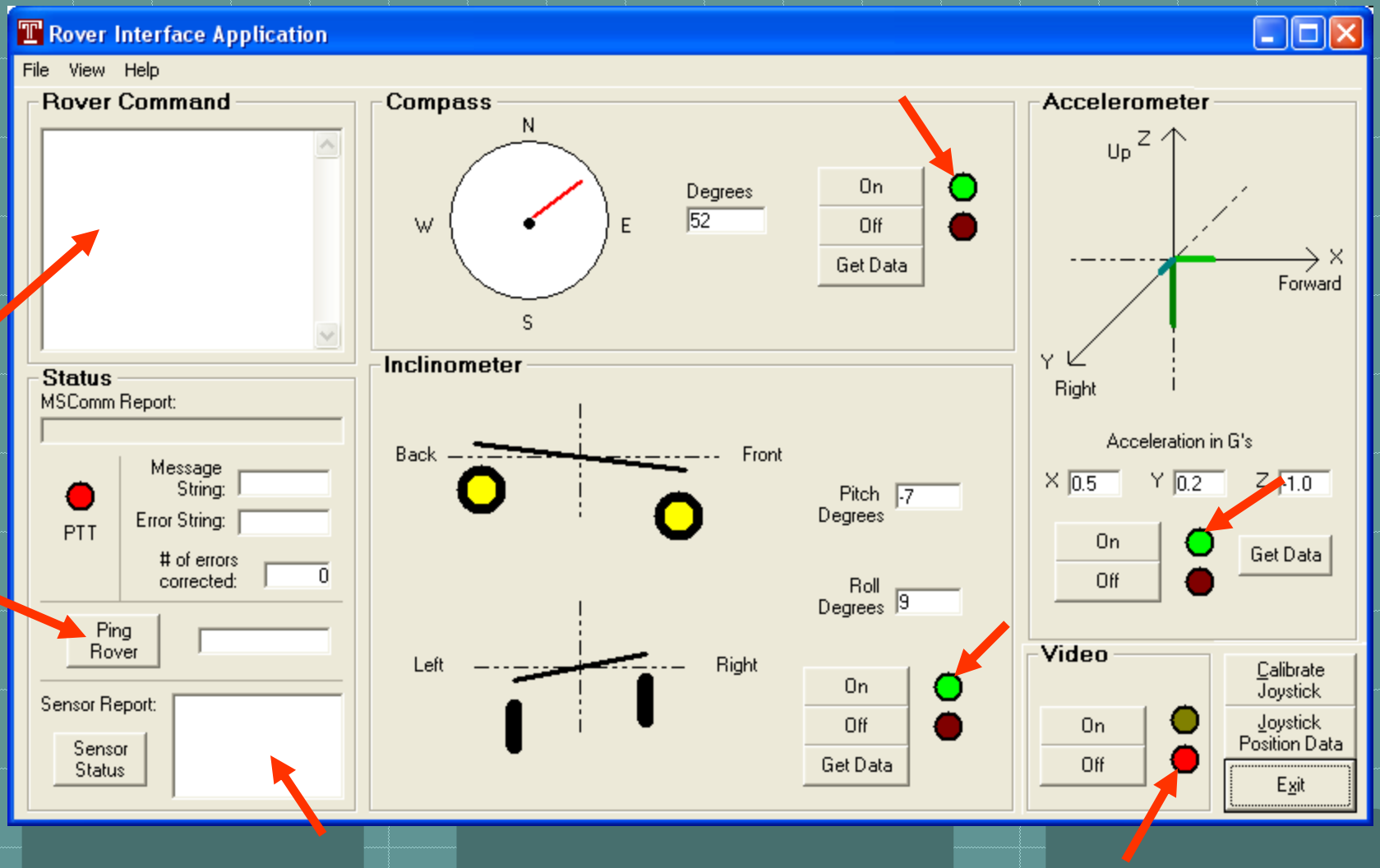




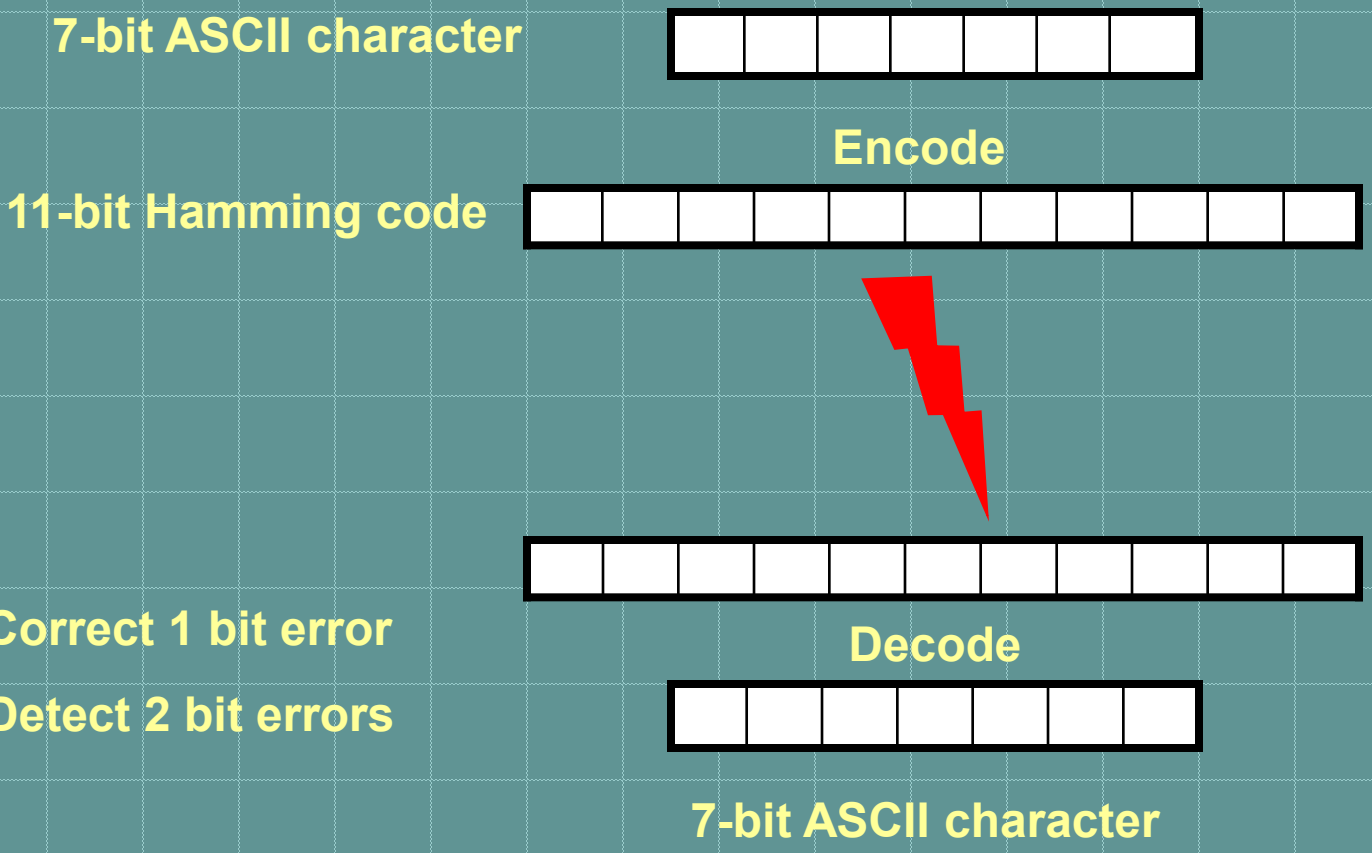
Poll ADC
mV



Rover Interface Application



Forward Error Correction



- Correct 1 bit error
- Detect 2 bit errors

Client/Server Relationship

Half-duplex channel

Collision

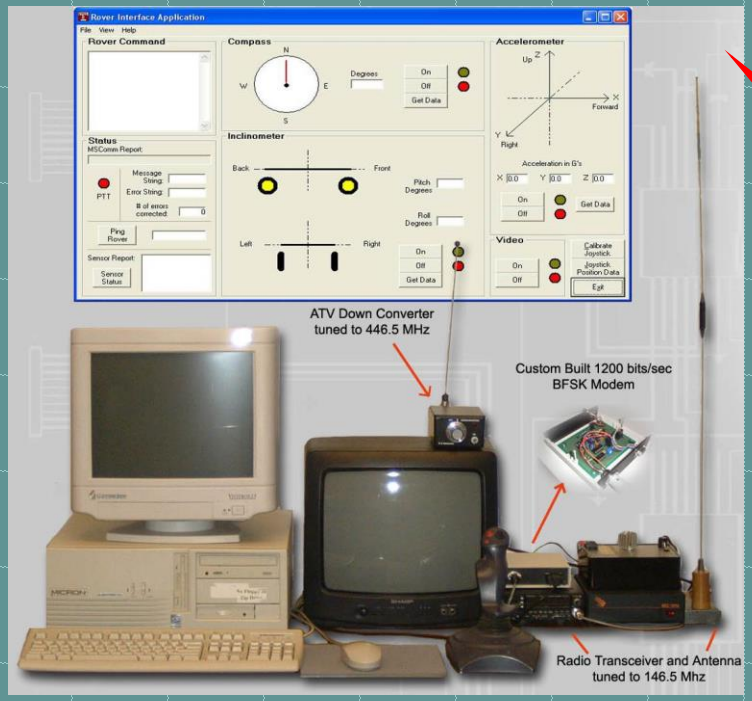
Client

Server

Video Demonstration

Video Demonstration

Conclusion



Base Station and its components

Rover and its components