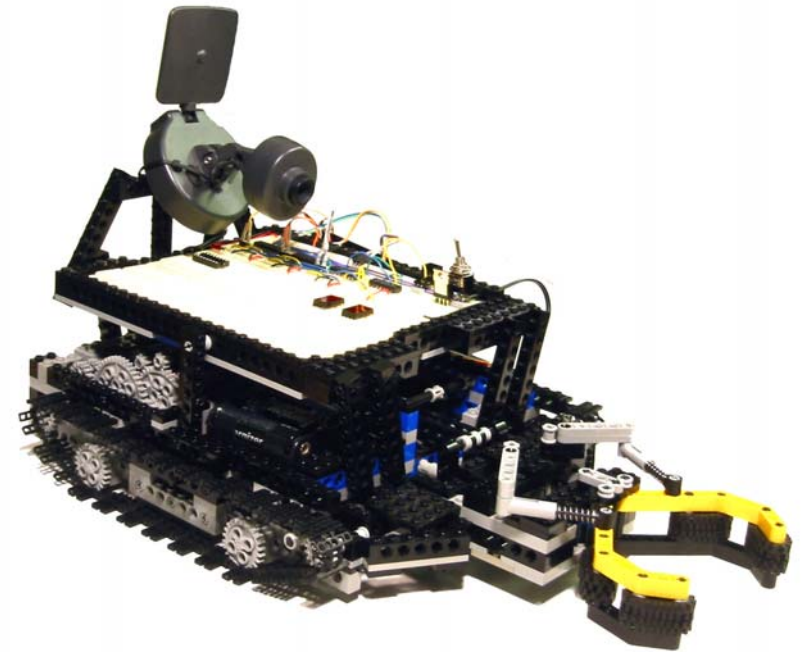


# Wireless Rover

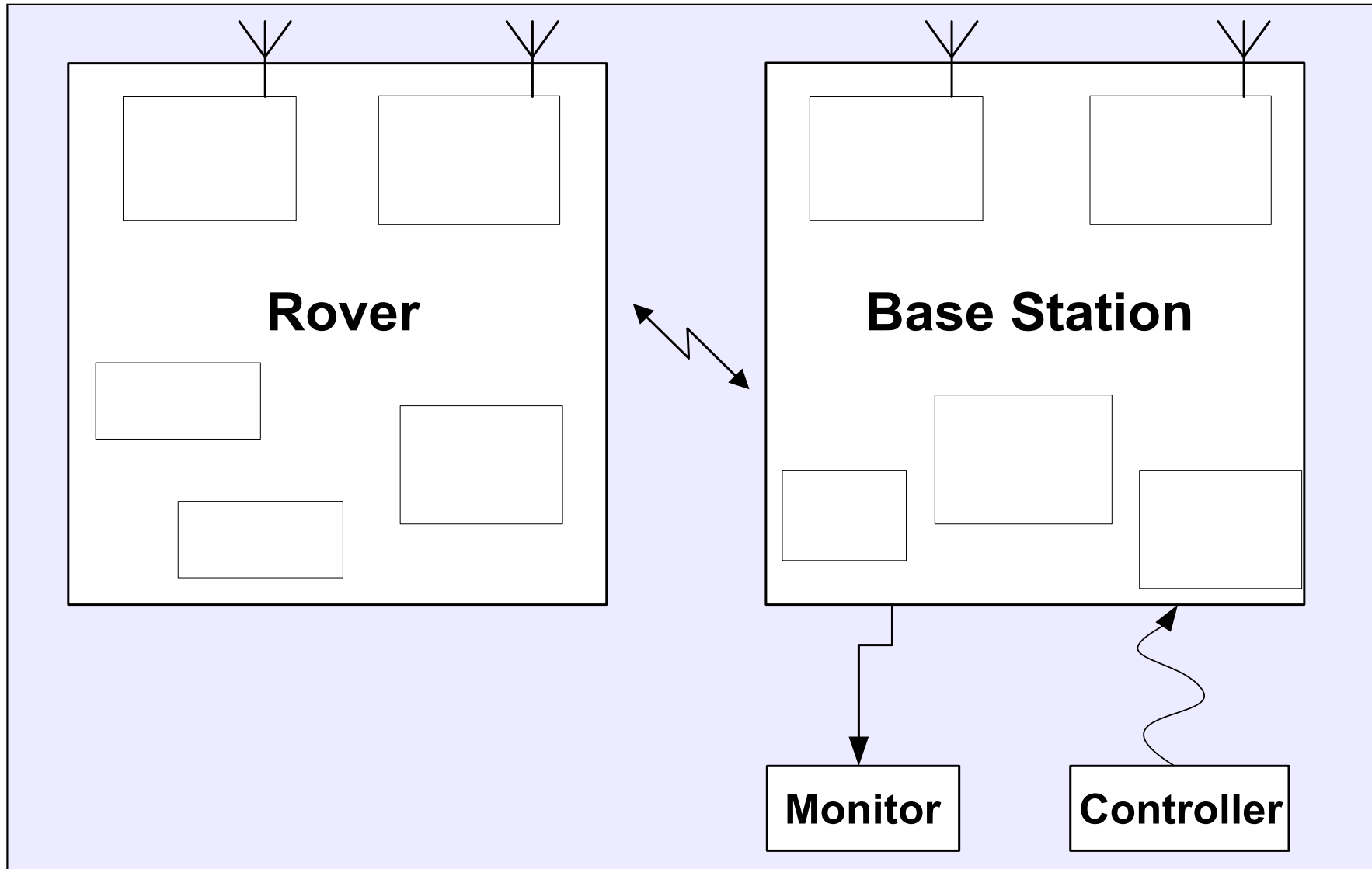
Ryan Damico, Carl Mahler, Ryan Manuel



# Presentation Overview

- System Organization
- Base Station
- Rover
- Wireless System
- Video Processing
- Q&A

# System Overview



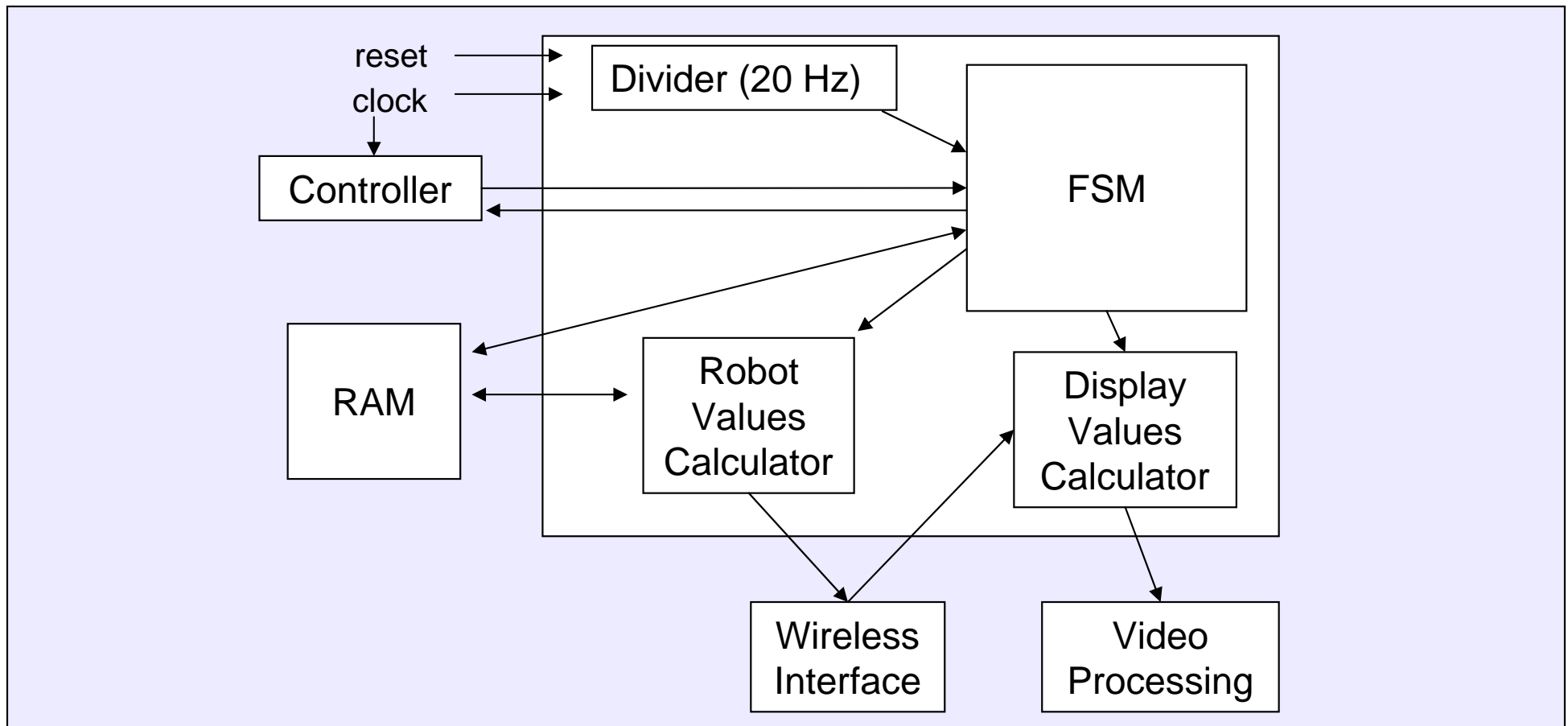
# Base Station

## Goals

- Provide control to the robot through a PlayStation 2 controller
- Store a history of the robot's movements
- Be able to reverse that history on command

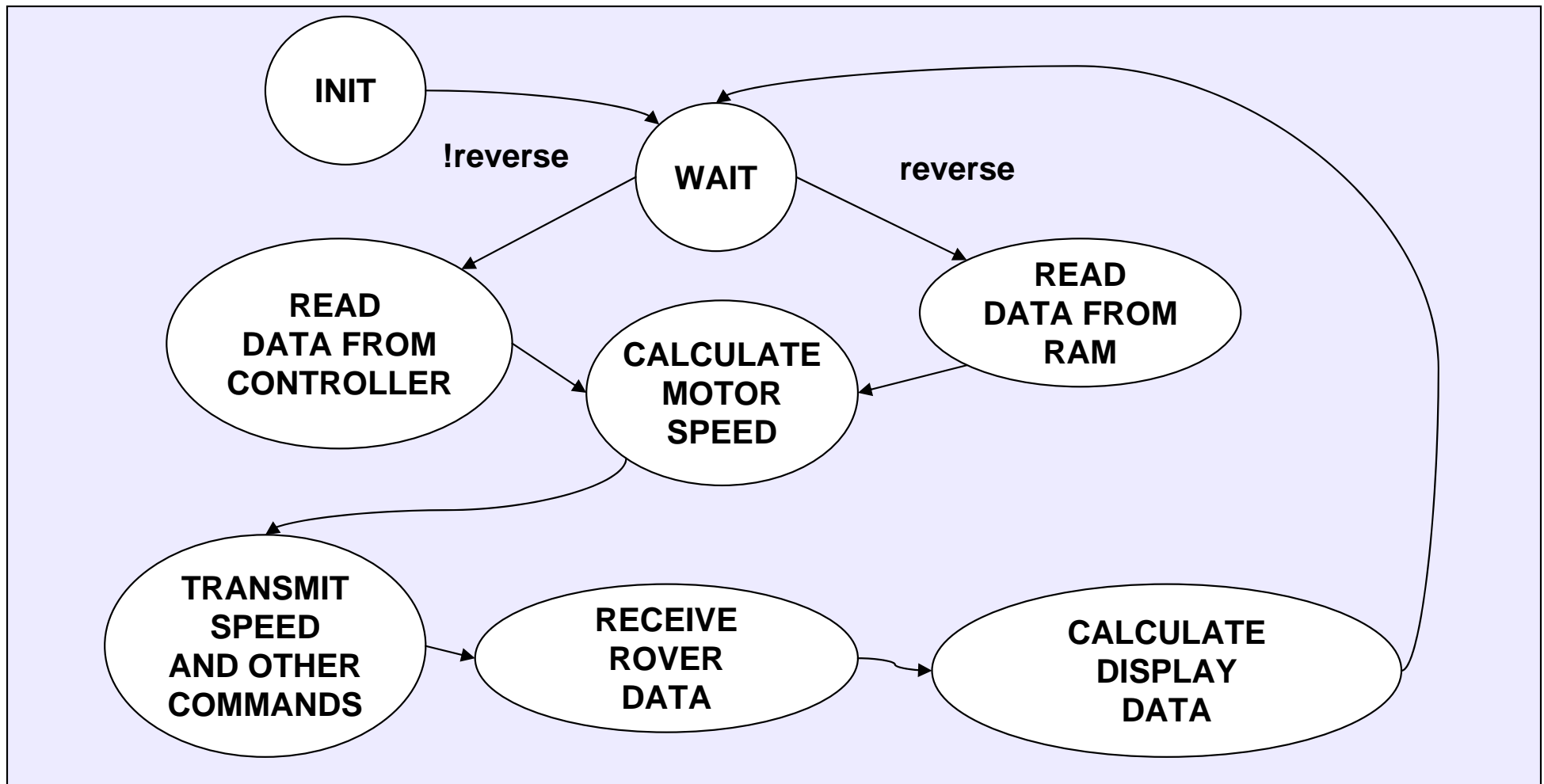
# Base Station

## Block Diagram



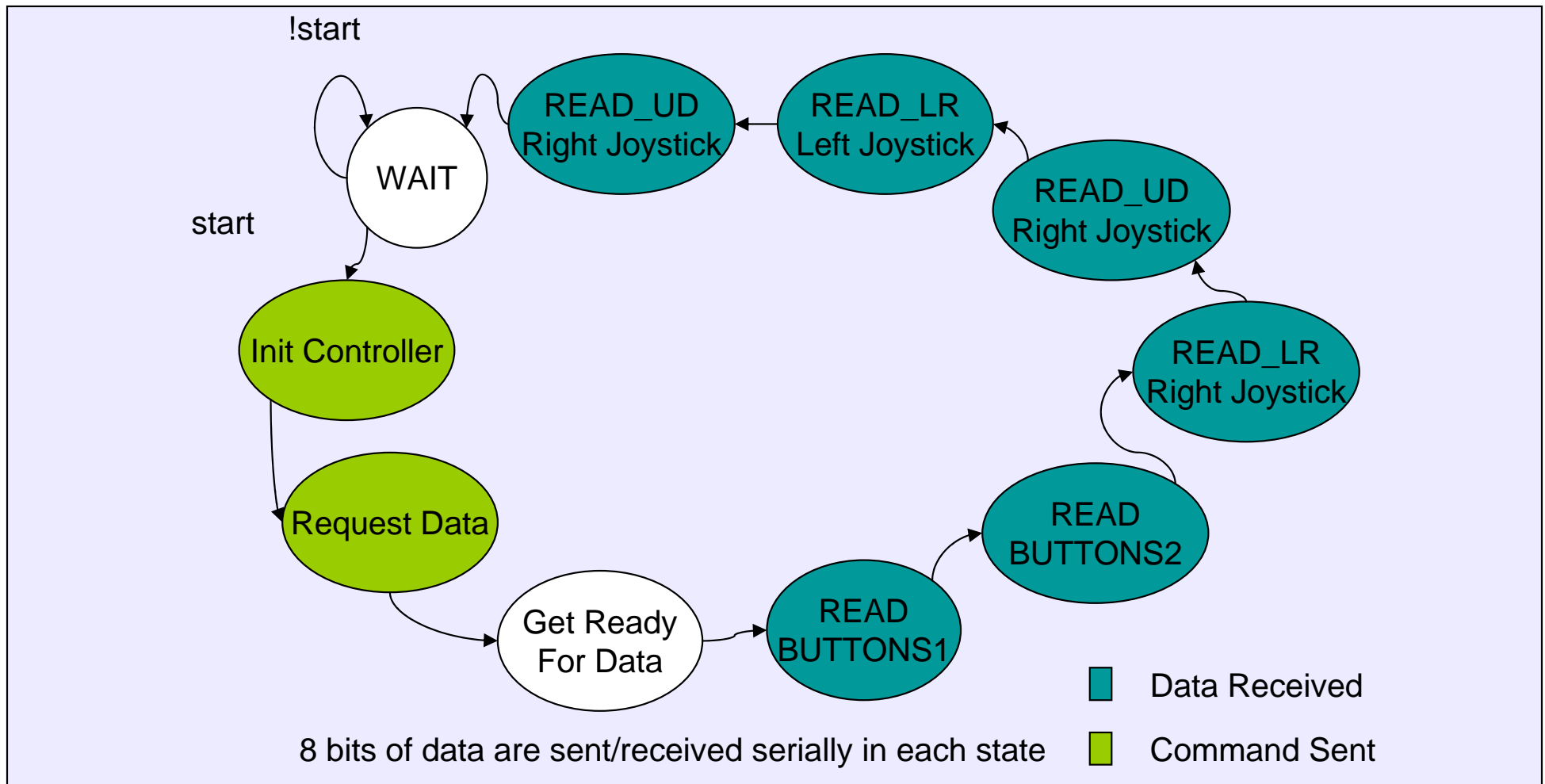
# Base Station

## Base Station FSM



# Base Station

## Controller FSM



# Base Station

## Storing Robot Histories

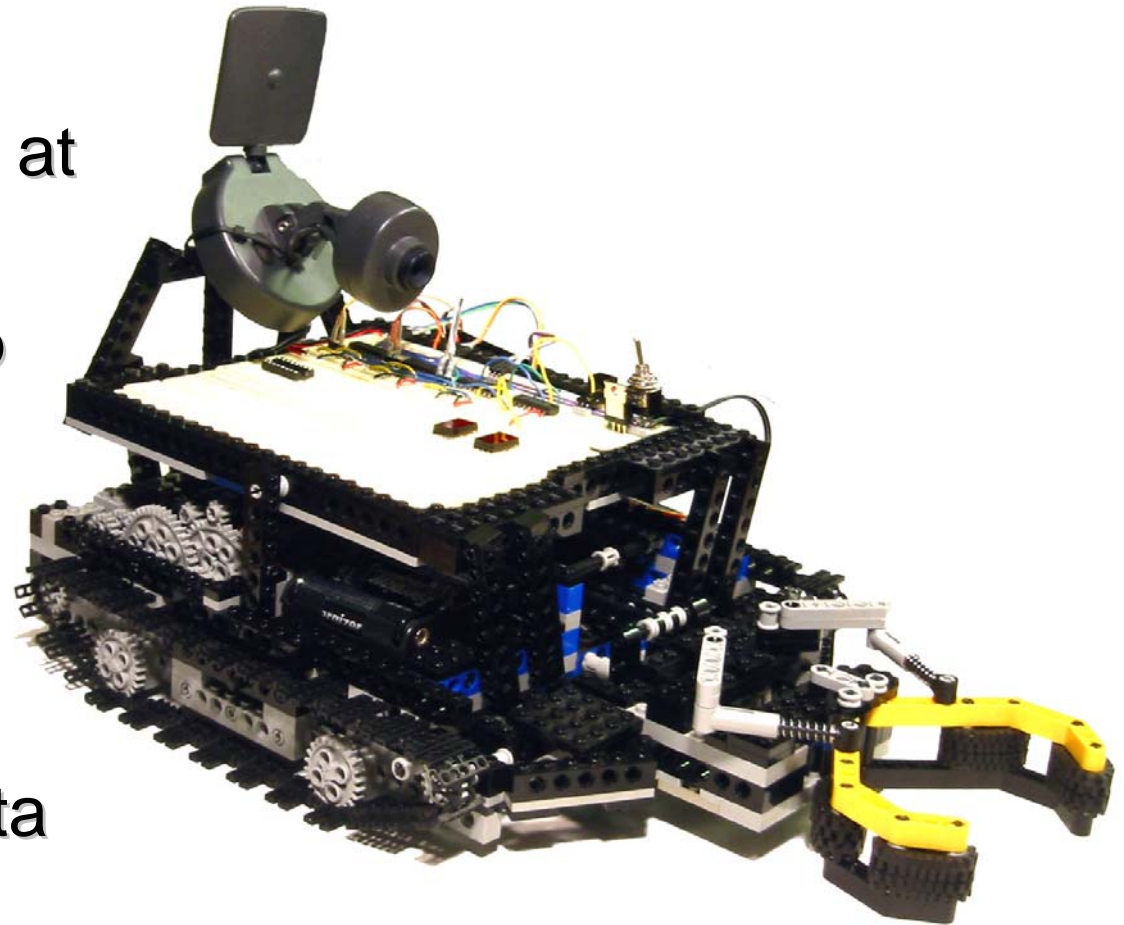
- History is placed in RAM in a Stack (LIFO)
- To decrease storage space, store speed of motors and number of cycles at that speed
- To reverse history, commands are repeated in reverse order from memory



# Rover

## Specifications

- Full range of movement at varying speeds
- Gripping claw to pick up and retrieve objects
- Receives remote commands
- Transmits video, telemetry, and sensor data



# Rover

## RoverCam



# Rover

## Sensor and Command Data

### INPUTS

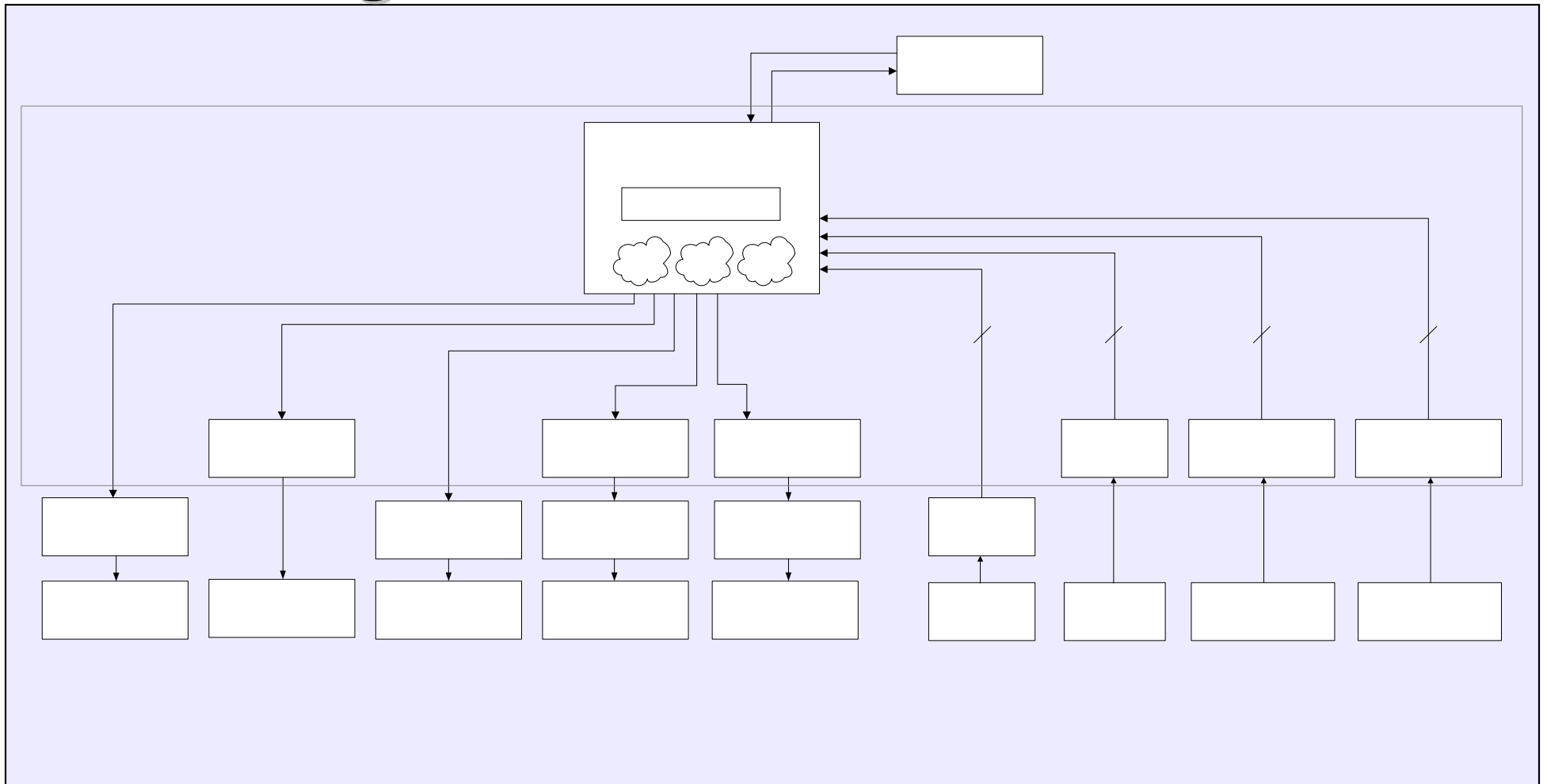
- Temperature
- Heading
- L motor speed
- R motor speed

### OUTPUTS

- L motors
- R motors
- Claw motor
- Claw servo
- Search light
- (Video)

# Rover

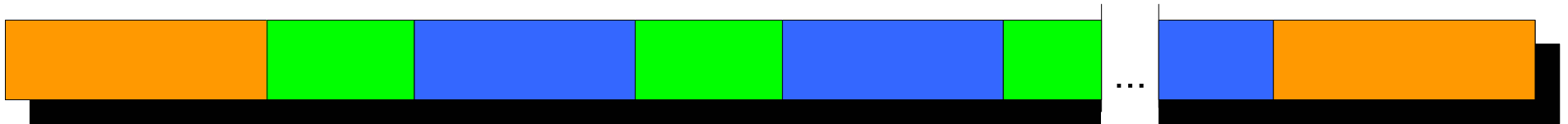
## Block Diagram



# Wireless System

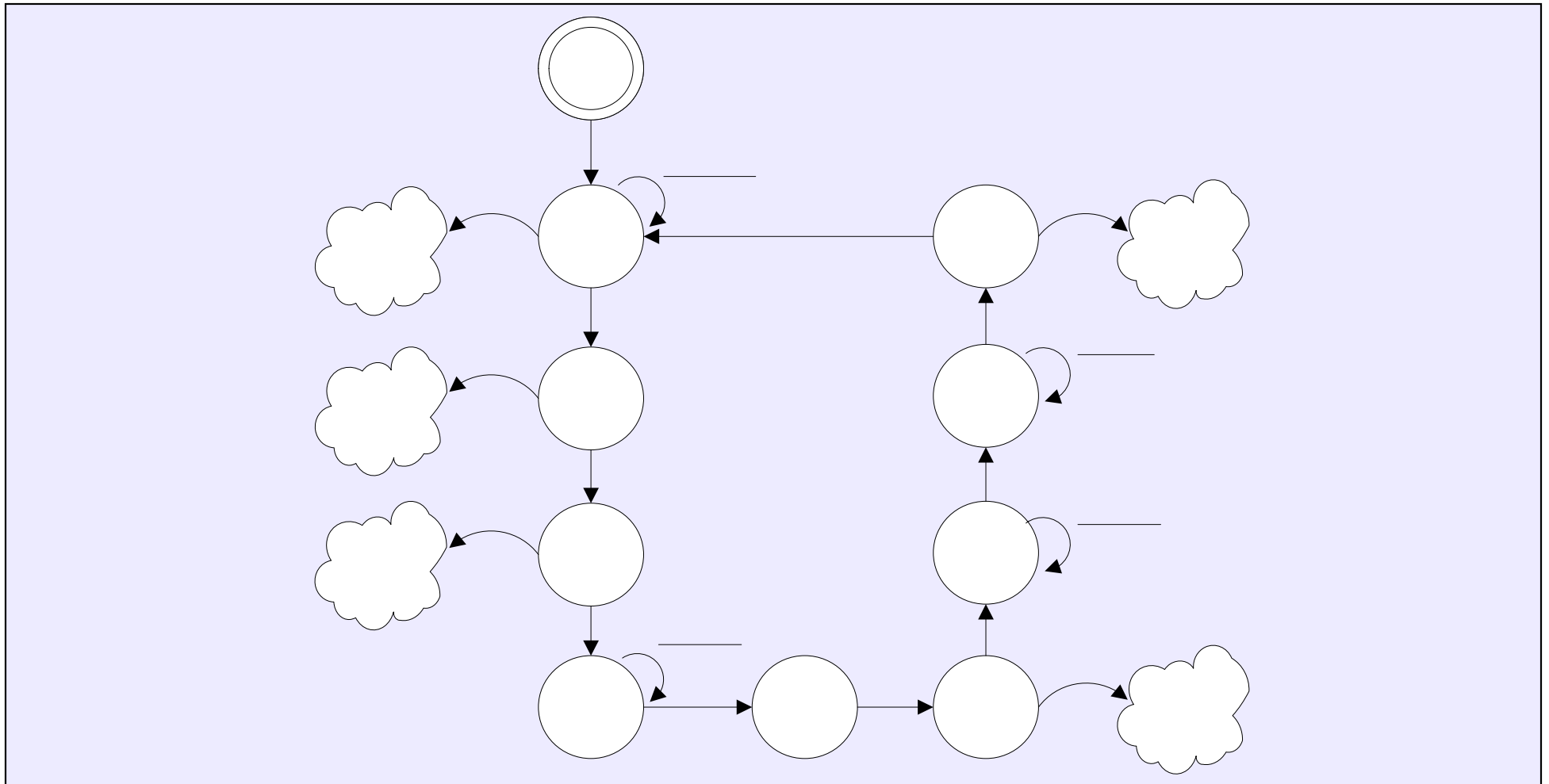
## Transmission Protocol

- Serial transmission
- Start and end frames signify the beginning and end of a transmission
- Tags identify the destination of a data block



# Rover

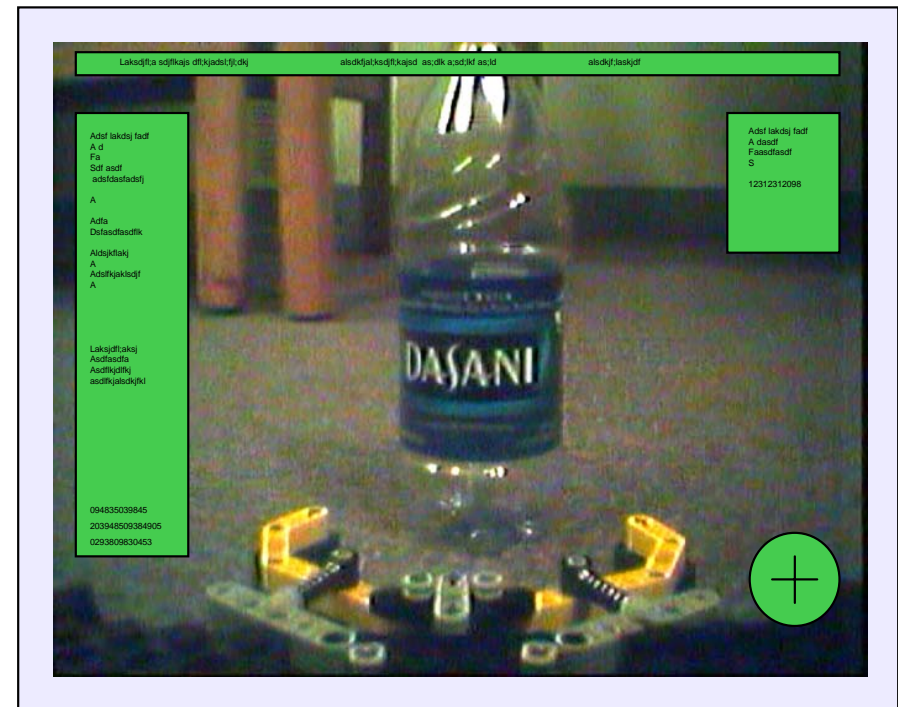
## Control FSM



# Display

## Overview

- Provide visual display for the operator with two components
  - Camera Feed from rover
  - "Box" overlay containing measurement data
- Mix two components with transistor mixing circuit
- Output individual signals to RAM for storage and backtrack



# Display

## Video Extraction

- Camera with wireless Tx mounted on rover
- NTSC video received as composite signal
- Signal timing (vertical and horizontal sync) extracted using GS4981 chip
- Send timing to composition section
- Send original signal to mixer and RAM



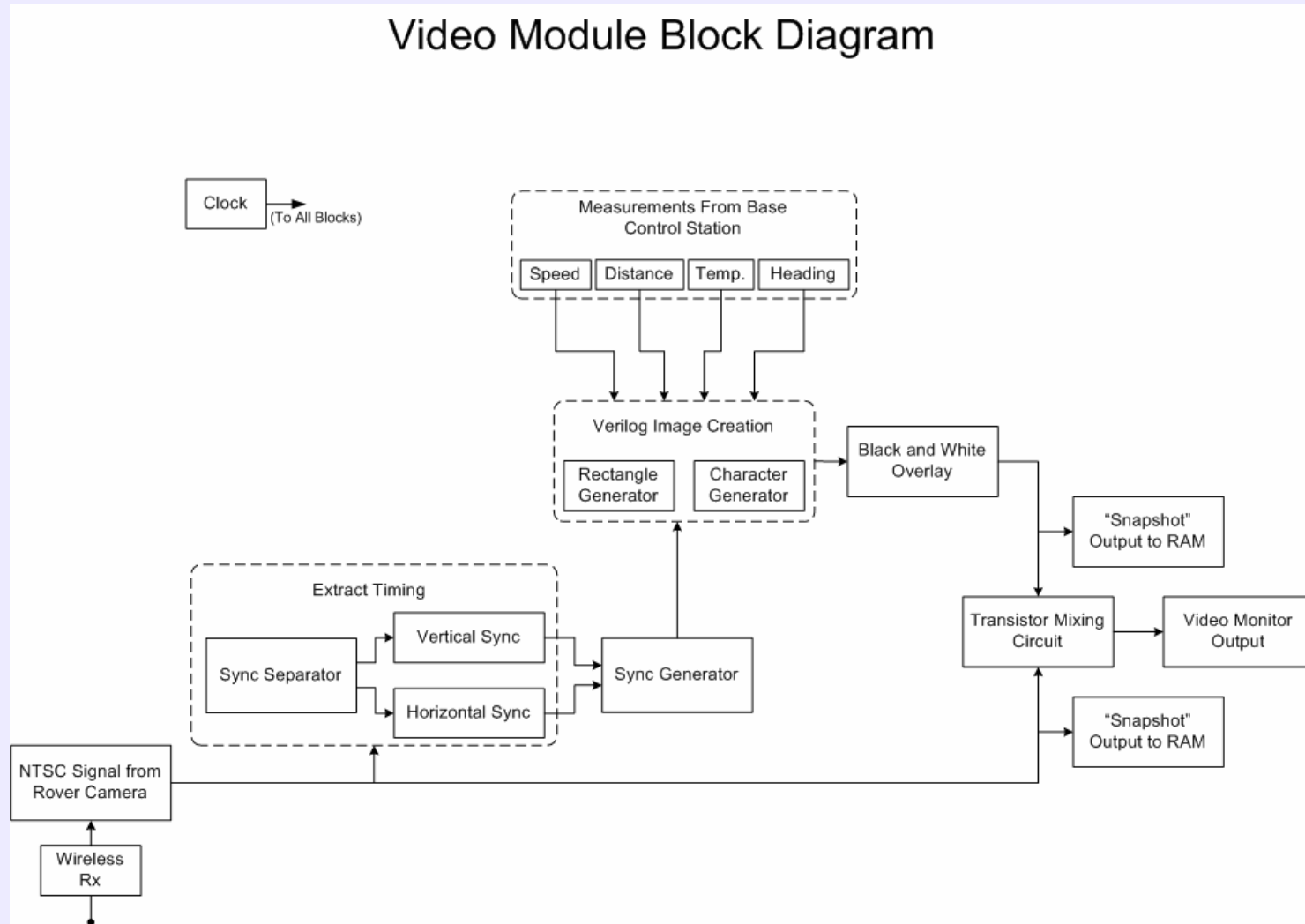
# Display

## Video Composition

- Verilog modules for rectangle and character generation
- Receive measurement data from rover (via control station) to display
- Creates "overlay" frame
- Send output to mixer and RAM
- Mixer combines the signals on the output display

# Display

Video Module Block Diagram



## Q & A