Special pins	Description	"Connects To"
VBAT_6	Vbat mode allows the STM32 to be powered from a backup source. When the STM32 is in Vbat mode, it switches to a low power consumption and reduces functionality. The Wombat does not have a backup power source so it is just tied to the 3V3 line	VCC 3V3
OSC_IN	This is the IN for the external clock (U38). The STM32 will default to a internal clock at 16MHz if this is not setup. The oscillator is setup as a pierce oscillator.	Crystal Oscillator
OSC_OUT	This is the IN for the external clock (U38). The STM32 will default to a internal clock at 16MHz if this is not setup. The oscillator is setup as a pierce oscillator.	Crystal Oscillator
NRST/STM_RESET	This pin resets everything on the STM32, the STM32 also has a "brown out power down" configuration that resets if the power gets too low.	Pi GPIO
VREF+_21	This is the input voltage reference for the Analog to Digital converters.	VCC 3V3
VCAP1	The VCAP is a capacitor used for the internal regulator. The datasheet calls directly for this external capacitor to be connected.	Grounded with Capacitor
VCAP2	The VCAP is a capacitor used for the internal regulator. The datasheet calls directly for this external capacitor to be connected.	Grounded with Capacitor
BOOT0	This pin selects the boot option for the STM32. There are 3 options: boot from flash, boot from system memory, and boot from SRAM. The Boot 1 Pin (PB2) and the BOOT0 is hard set to LOW so that the STM32 always picks "Boot from Flash". This is why flashing the processor with a binary is necessary to load code on. The flash is loaded using the raspberry pi GPIO. See the "wallaby_flash" file on the Wombat /home/pi for more details	PI GPIO
GPIO Pins	Description	"Connects To"
PA0	Measures the back EMF from motor 0, this is the "Highside". The "highside" voltage is subtracted from the "lowside" to get the voltage across the motor. Voltage across a motor is proportional to the angular velocity of the rotor with respect to the stator. The voltage is integrated (discrete sum with constant loop timing) to get total angular displacement. The calculated displacement is stored in a register on the STM32. The backemf circuit scales the motor voltages from 6-7v down to 3.3v range.	BackEMF Circuit
PA1	Measures the back EMF from motor 0, this is the "Lowside". The "highside" voltage is subtracted from the "lowside" to get the voltage across the motor. Voltage across a motor is proportional to the angular velocity of the rotor with respect to the stator. The voltage is integrated (discrete sum with constant loop timing) to get total angular displacement. The calculated displacement is stored in a register on the STM32. The backemf circuit scales the motor voltages from 6-7v down to 3.3v range.	BackEMF Circuit
PA2	Measures the back EMF from motor 1, this is the "Highside". The "highside" voltage is subtracted from the "lowside" to get the voltage across the motor. Voltage across a motor is proportional to the angular velocity of the rotor with respect to the stator. The voltage is integrated (discrete sum with constant loop timing) to get total angular displacement. The calculated displacement is stored in a register on the STM32. The backemf circuit scales the motor voltages from 6-7v down to 3.3v range.	BackEMF Circuit
PA3	Measures the back EMF from motor 1, this is the "Lowside". The "highside" voltage is subtracted from the "lowside" to get the voltage across the motor. Voltage across a motor is proportional to the angular velocity of the rotor with respect to the stator. The voltage is integrated (discrete sum with constant loop timing) to get total angular displacement. The calculated displacement is stored in a register on the STM32. The backemf circuit scales the motor voltages from 6-7v down to 3.3v range.	BackEMF Circuit
PA4	Measures the back EMF from motor 2, this is the "Highside". The "highside" voltage is subtracted from the "lowside" to get the voltage across the motor. Voltage across a motor is proportional to the angular velocity of the rotor with respect to the stator. The voltage is integrated (discrete sum with constant loop timing) to get total angular displacement. The calculated displacement is stored in a register on the STM32. The backemf circuit scales the motor voltages from 6-7v down to 3.3v range.	BackEMF Circuit
PA5	Measures the back EMF from motor 2, this is the "Lowside". The "highside" voltage is subtracted from the "lowside" to get the voltage across the motor. Voltage across a motor is proportional to the angular velocity of the rotor with respect to the stator. The voltage is integrated (discrete sum with constant loop timing) to get total angular displacement. The calculated displacement is stored in a register on the STM32. The backemf circuit scales the motor voltages from 6-7v down to 3.3v range.	BackEMF Circuit
PA6	Measures the back EMF from motor 3, this is the "Highside". The "highside" voltage is subtracted from the "lowside" to get the voltage across the motor. Voltage across a motor is proportional to the angular velocity of the rotor with respect to the stator. The voltage is integrated (discrete sum with constant loop timing) to get total angular displacement. The calculated displacement is stored in a register on the STM32. The backemf circuit scales the motor voltages from 6-7v down to 3.3v range.	BackEMF Circuit
PA7	Measures the back EMF from motor 3, this is the "Lowside". The "highside" voltage is subtracted from the "lowside" to get the voltage across the motor. Voltage across a motor is proportional to the angular velocity of the rotor with respect to the stator. The voltage is integrated (discrete sum with constant loop timing) to get total angular displacement. The calculated displacement is stored in a register on the STM32. The backemf circuit scales the motor voltages from 6-7v down to 3.3v range.	BackEMF Circuit
PA8	Sends a PWM signal to the Motor driver for motor 0, this controls the "target speed" of the motor (simplified explanation, see motor driver sheet)	Motor Driver
PA9	Sends a PWM signal to the Motor driver for motor 1, this controls the "target speed" of the motor (simplified explanation, see motor driver sheet)	Motor Driver
PA10	Sends a PWM signal to the Motor driver for motor 2, this controls the "target speed" of the motor (simplified explanation, see motor driver sheet)	Motor Driver
PA11	Not Connected	
PA12	Not Connected	
PA13	JTAG_TMS/TCK/TDI/TDO is just a connector that allows for easy probing of the board (DNP in production)	JTAG
PA14	JTAG_TMS/TCK/TDI/TDO is just a connector that allows for easy probing of the board (DNP in production)	JTAG
PA15	JTAG_TMS/TCK/TDI/TDO is just a connector that allows for easy probing of the board (DNP in production)	JTAG
PB0	This takes the physical button input, it is also connected to GPIO 17 on the Pi. The Modern libwallaby pulls from the Pi GPIO, unless it is not available.	
PB1	Takes the Analog 0 sensor input. The analog sensor acts as a voltage divider/potentiometer and gives a voltage as an output the the STM32 to process	Analog 0
PB2	BOOT1 is the second bit for selecting boot settings. This is pulled to zero along with BOOT0 so that the STM32 will "Boot from flash"	GND
PB3	JTAG_TMS/TCK/TDI/TDO is just a connector that allows for easy probing of the board (DNP in production)	
PB4	Not Connected	
PB5	Not Connected	

PB6	Not Connected	
PB7	Not Connected	
PB8	Takes the digital 5 sensor input. This will either be high or low.	Digital 5
PB9	Takes the digital 4 sensor input. This will either be high or low.	Digital 4
PB10	The UART recieve line to communicate with the Raspberrry Pi.	Pi GPIO
PB11	The UART transmit line to communicate with the Raspberrry Pi.	Pi GPIO
PB12	The SPI select line for communication to the Raspberry Pi.	Pi GPIO
PB13	The SPI clock line for communication to the Raspberry Pi	Pi GPIO
PB14	The SPI MISO (Multiple Input Single Output) data line for communication with the Pi	Pi GPIO
PB15	The SPI MOSI (Multiple Output Single Input) data line for communication with the Pi	Pi GPIO
PC0	VCC_BATT_SENSE is the raw battery connected to a voltage divider (100k/10k) to put it at a voltage range that the STM32 can measure	Voltage Divider/Raw Battery
PC1	Takes the Analog 1 sensor input. The analog sensor acts as a voltage divider/potentiometer and gives a voltage as an output the the STM32 to process	Analog 1
PC2	Takes the Analog 2 sensor input. The analog sensor acts as a voltage divider/potentiometer and gives a voltage as an output the the STM32 to process	Analog 2
PC3	Takes the Analog 3 sensor input. The analog sensor acts as a voltage divider/potentiometer and gives a voltage as an output the the STM32 to process	Analog 3
PC4	Takes the Analog 4 sensor input. The analog sensor acts as a voltage divider/potentiometer and gives a voltage as an output the the STM32 to process	Analog 4
PC5	Takes the Analog 5 sensor input. The analog sensor acts as a voltage divider/potentiometer and gives a voltage as an output the the STM32 to process	Analog 5
PC6	Sends a PWM signal to the Motor driver for motor 3, this controls the "target speed" of the motor (simplified explanation, see motor driver sheet)	Motor Driver
PC7	The PWM signal for Servo 1, the 3V3 from the STM32 isn't enough for the PWM of the servo, so it gets sent through a voltage translator to 5V0 (U56)	Voltage Translator/Servo 1
PC8	The PWM signal for Servo 0, the 3V3 from the STM32 isn't enough for the PWM of the servo, so it gets sent through a voltage translator to 5V0 (U56)	Voltage Translator/Servo 0
PC9	Takes the digital 6 sensor input. This will either be high or low.	Digital 6
PC10	The clock signal for SPI communication with the IMU (Accelerometer/Gyrometer/Magnetometer)	IMU
PC11	The MISO signal for SPI communication with the IMU (Accelerometer/Gyrometer/Magnetometer)	IMU
PC12	The MOSI signal for SPI communication with the IMU (Accelerometer/Gyrometer/Magnetometer)	IMU
PC13	MOT1_D1 is the 2nd bit for controlling the commands of the motor driver of motor 1. See chart in datasheet for motor driver for specifics	Motor Driver
PC14	MOT2_D0 is the 1st bit for controlling the commands of the motor driver of motor 2. See chart in datasheet for motor driver for specifics	Motor Driver
PC15	MOT2_D1 is the 2nd bit for controlling the commands of the motor driver of motor 2. See chart in datasheet for motor driver for specifics	Motor Driver
PD0	Not Connected	
PD1	MOT0_D0 is the 1st bit for controlling the commands of the motor driver of motor 0. See chart in datasheet for motor driver for specifics	Motor Driver
PD2	Not Connected	
PD3	Not Connected	
PD4	Not Connected	
PD5	Not Connected	
PD6	Not Connected	
PD7	MOT0_D1 is the 2nd bit for controlling the commands of the motor driver of motor 0. See chart in datasheet for motor driver for specifics	Motor Driver
PD8	Not Connected	
PD9	Not Connected	
PD10	MOT3_D0 is the 1st bit for controlling the commands of the motor driver of motor 3. See chart in datasheet for motor driver for specifics	Motor Driver
PD11	MOT3_D1 is the 2nd bit for controlling the commands of the motor driver of motor 3. See chart in datasheet for motor driver for specifics	Motor Driver
PD12	Takes the digital 0 sensor input. This will either be high or low.	Digital 0
PD13	Takes the digital 1 sensor input. This will either be high or low.	Digital 1
PD14	Takes the digital 2 sensor input. This will either be high or low.	Digital 2
PD15	Takes the digital 3 sensor input. This will either be high or low.	Digital 3
PE0	Takes the digital 7 sensor input. This will either be high or low.	Digital 7
PE1	Takes the digital 8 sensor input. This will either be high or low.	Digital 8
PE2	The CS0 (Select) line for SPI communication with the IMU (Accelerometer/Gyrometer/Magnetometer)	IMU
PE3	The CS1 (Select) line for SPI communication with the IMU (Accelerometer/Gyrometer/Magnetometer)	IMU
PE4	Takes the digital 9 sensor input. This will either be high or low.	Digital 9
PE5	The PWM signal for Servo 3, the 3V3 from the STM32 isn't enough for the PWM of the servo, so it gets sent through a voltage translator to 5V0 (U56)	Voltage Translator/Servo 3
PE6	The PWM signal for Servo 2, the 3V3 from the STM32 isn't enough for the PWM of the servo, so it gets sent through a voltage translator to 5V0 (U56)	Voltage Translator/Servo 2

PE7	Not Connected, This used to be the left button of the Wallaby but that was removed.	
PE8	Not Connected	
PE9	Default High (for yellow LED off), this will pull low to turn ON the LED. This allows the STM32 to turn the Yellow LED on and off.	Yellow LED
PE10	This is the Enable line for the 6V regulator. The 100k Resistor that ties it high makes the regulator turn on automatically.	6V regulator
PE11	Not Connected	
PE12	Not Connected	
PE13	Not Connected	
PE14	Not Connected	
PE15	MOT1_D0 is the 1st bit for controlling the commands of the motor driver of motor 1. See chart in datasheet for motor driver for specifics	Motor Driver
Power Pins	Description	"Connects To"
VSS_10	All VSS and VDD pins are to be connected via a capacitor according to the datasheet. They are also all connected to ground on the VSS side. All VDD pins connect to VCC 3V3.	
VDD_11	All VSS and VDD pins are to be connected via a capacitor according to the datasheet. They are also all connected to ground on the VSS side. All VDD pins connect to VCC 3V3.	
VDD_19	All VSS and VDD pins are to be connected via a capacitor according to the datasheet. They are also all connected to ground on the VSS side. All VDD pins connect to VCC 3V3.	
VSSA_20	All VSS and VDD pins are to be connected via a capacitor according to the datasheet. They are also all connected to ground on the VSS side. All VDD pins connect to VCC 3V3.	
VDDA_22	All VSS and VDD pins are to be connected via a capacitor according to the datasheet. They are also all connected to ground on the VSS side. All VDD pins connect to VCC 3V3.	
VSS_27	All VSS and VDD pins are to be connected via a capacitor according to the datasheet. They are also all connected to ground on the VSS side. All VDD pins connect to VCC 3V3.	
VDD_28	All VSS and VDD pins are to be connected via a capacitor according to the datasheet. They are also all connected to ground on the VSS side. All VDD pins connect to VCC 3V3.	
VDD_50	The schematic file does not represent this, but this is electrically connected to VCC 3.3.	
VSS_74	All VSS and VDD pins are to be connected via a capacitor according to the datasheet. They are also all connected to ground on the VSS side. All VDD pins connect to VCC 3V3.	
VDD_75	All VSS and VDD pins are to be connected via a capacitor according to the datasheet. They are also all connected to ground on the VSS side. All VDD pins connect to VCC 3V3.	
VSS_99	All VSS and VDD pins are to be connected via a capacitor according to the datasheet. They are also all connected to ground on the VSS side. All VDD pins connect to VCC 3V3.	
VDD_100	All VSS and VDD pins are to be connected via a capacitor according to the datasheet. They are also all connected to ground on the VSS side. All VDD pins connect to VCC 3V3.	