ID	Component Name	Chip Number/ID	Side	Description
U$8	I2C Micro Touch Screen Controller	TSC2007IPWR	TOP	While U1 controlls the display of the touchscreen, U$8 tracks the input from the LCD by connecting directly to the ribbon cable connector. The chip then sends the data to both the STM32 processor and the Raspberry Pi (GPIO). The chip runs off of the 3.3V line.
U1	DVI/HDMI Converter	TFP401	BOTTOM	Converts the HDMI output of the raspberry pi to the LCD input of the screen
U2	I2 C Serial EEPROM	24LC02BT-I/OT	TOP	Read-only memory that is connected to the pi through the raspberry pi. Probably used in the conversion from HDMI/DVI to LCD. The Write-Protect is pulled to GND by default so the data inside is never intented to be overwritten.
U3	XT60 Connector	N/A	TOP	The battery connector. In the schematic, this component is just the soldering pads.
U4	Serial LED Driver	FAN5333BSX	TOP	Powers the backlight of the screen. It boosts the 5.0V line into a 24V line (using an internal op-amp) that powers the backlight. It also uses PWM to "flicker" the screen (faster than humans can see) in order to conserve power.
U5	9 DoF IMU	MPU-9250	TOP	This is the chip that measures the Accelerometer, Gyroscope, and Magnetometer values. The 9250 package has a built in Analog to Digital converter so that we don't neet to make the conversion ourselves. The chip also contains a pedometer function and a way to program gestures that cause interupts to run code.
U7	Step-Down DC/DC Buck Converter	LM3671	TOP	This chip acts as a 3.3V regulator that "creates" the 3.3V line. This also charges the coin cell. U8 is necessary for operation.
U8	2.2uH Inductor	CDRH2D14NP-2R2NC	TOP	This is an inductor that charges during the ON state of U7 and discharges during the OFF state. This component is vital for the buck converter to operate.
U30	Servo Header (Male)	CONN-HEADER-5-103414-1	BOTTOM	This is the servo 0 connector.
U31	Mounting Hole	N/A	N/A	This is the top-left hole for attaching the board to the case.
U32	Mounting Hole	N/A	N/A	This is the top-right hole for attaching the board to the case.
U33	Mounting Hole	N/A	N/A	This is the bottom-right hole for attaching the board to the case.
U34	Mounting Hole	N/A	N/A	This is the bottom-left hole for attaching the board to the case.
U35	Through-hole Switch	N/A	TOP	This is the power switch. The switch controls Q1 and Q2 which are power MOSFETs.
U37	STM-32 Processor	STM32F427VIT6	TOP	This is the secondary processor for the Wombat (and the main processor for the Wallaby). It is a 32-bit ARM architecture. On the Wombat, the chip essentially acts as a input/output manager rather than actually running programs as it did before. When an instruction that requires a board component is called, the pi sends the request to STM-32 and STM-32 gathers and sends the data. The chip reads in sensors such as the IMU, Analog ports, etc. and sends it back to the Pi via it's GPIO pins. When controlling something such as motors, the request is sent by the Pi via GPIO pins and the STM-32 controls the component requested such as motors (motor controllers), servos (servo controllers), or LEDs. The STM-32 processor doesn't functionally make decisions as it did on the Wallaby, it simply acts out the requests of the programs loaded on the Pi
U38	24 MHz Crystal Oscillator	TSX-3225 24.0000MF20G-AC3	TOP	This is a Crystal Oscillator for the STM-32 Processor. On reset the 16 MHz internal RC oscillator is selected as the default CPU clock. The application can then select as system clock either the RC oscillator or an external 4-26 MHz clock source. This external Oscillator is how we are setting the clock for the STM-32 to 24 MHz. Please note that the Oscillator chip comes in a variety of forms and the datasheet doesn't tell you which one. The Bill of Materials for the Wombat is the only reference to the specific variant of Oscillator there is.
U39	2x4 Male Header Pins	CORTEX_JTAG	TOP	These pins are used for factory debugging. These pins connect directly to the processor (3 of them are grounded and one is left open). Pin 10 can reset the STM32 processor and the other 4 are used for debug purposes. These pins allow for direct access to the processor without external equipment and without halting the processor. Read the U37 datasheet and find pins PA13-PA15 for more information on usage.
U41	Servo Header (Male)	N/A	BOTTOM	This is the servo 1 connector.
U42	Coin Cell Holder	COINCELL_6P8MM	TOP	This is the battery connector for the coincell RTC battery. The battery powers a I2C "Real Time Clock" Chip which tracks the exact time. The Battery is to maintain time when powered off.
U43	I2C RTC with Trickle Charger	DS1340U	TOP	This is a I2C Real Time Clock that can hold a battery and keep it charged. It is battery powered by U42 in order to maintain timekeeping when the board is powered off. The chip also has some special functions that are described in the datasheet but for our use it is a simple clock. U43 requires the oscillator to produce a signal between 0 and 100 KHz in "Standard Mode". The Battery is to maintain time when powered off. The Raspberry Pi is connected directly to U67 and U43 in order to configure time.
U44	32.768 KHz Crystal Oscillator	ECX-31B SMD CRYSTAL	TOP	U43 Uses this crystal oscillator in order to keep track of time. U43 requires the oscillator to produce a signal between 0 and 100 KHz in "Standard Mode".
U45	PCM Class D Amplifier	MAX98357	BOTTOM	THIS CHIP WAS REMOVED BEFORE PRODUCTION (DNP). This chip is an amplifier that would have been used to power an external speaker like the one on the Wallaby. It is unsure why it was removed last minute; but the fact that the pins leading to the Raspberry Pi are the wrong pins for running an external speaker via GPIO is a likely cause.
U56	Voltage Level Translator	TXS0104	BOTTOM	U56 converts the 3.3V PWM signals sent by the STM32 Processor into 5.0V PWM signals for the servos. This is a similar chip used on the Wallaby servos (U22/U2/TXS0102). The only difference is that the Wombat converts all the servo signals with a single chip (notice the chip number change from 2 to 4).
U61	Driver IC for Dual DC motor	TB6612FNG	TOP	This chip is essentially a motor controller for motors 0 and 1. It is not a technical "motor controller" because real motor controllers can control much more than just percentage power.The chip receives a PWM signal from the STM32 processor and controls the current that is delivered to the motors (not voltage or pulse width) to control the speed of the motors. The output signal of the chip is still a square wave, but a constant one. The direction is chosen by pins D0 and D1 and the speed is set via a PWM wave from the STM32 processor.
U62	Green and Red LED	APB3025ESGC-F01	BOTTOM	This is a Green LED that turns on when the motor 1 is spinning "forward/Clockwise" according to U61/Botui and a Red LED that turns on when the motor 1 is spinning "backward/Counter-Clockwise" according to U61/Botui.
U63	Green and Red LED	APB3025ESGC-F01	BOTTOM	This is a Green LED that turns on when the motor 0 is spinning "forward/Clockwise" according to U61/Botui and a Red LED that turns on when the motor 0 is spinning "backward/Counter-Clockwise" according to U61/Botui.
U64	Driver IC for Dual DC motor	TB6612FNG	TOP	This chip is essentially a motor controller for motors 2 and 3. It is not a technical "motor controller" because real motor controllers can control much more than just percentage power. The chip receives a PWM signal from the STM32 processor and controls the current that is delivered to the motors (not voltage or pulse width) to control the speed of the motors. The output signal of the chip is still a square wave, but a constant one. The direction is chosen by pins D0 and D1 and the speed is set via a PWM wave from the STM32 processor.
U65	Green and Red LED	APB3025ESGC-F01	BOTTOM	This is a Green LED that turns on when the motor 3 is spinning "forward/Clockwise" according to U61/Botui and a Red LED that turns on when the motor 3 is spinning "backward/Counter-Clockwise" according to U61/Botui.
U66	Green and Red LED	APB3025ESGC-F01	BOTTOM	This is a Green LED that turns on when the motor 2 is spinning "forward/Clockwise" according to U61/Botui and a Red LED that turns on when the motor 2 is spinning "backward/Counter-Clockwise" according to U61/Botui.
U67	I2C-Compatible Serial EEPROM	AT24CS01-STUM-T	TOP	This is an EEPROM (A form of memory storage) that is used to store the current time as set by U43 and/or the Raspberry Pi.
U68	1.0A(hold)/1.8A(trip) Resetable Fuse	FUSE-RESET-0603L100SLYR	TOP	This is a fuse that prevents servo 0 from being fried.
U69	1.0A(hold)/1.8A(trip) Resetable Fuse	FUSE-RESET-0603L100SLYR	TOP	This is a fuse that prevents servo 1 from being fried.
U70	1.0A(hold)/1.8A(trip) Resetable Fuse	FUSE-RESET-0603L100SLYR	TOP	This is a fuse that prevents servo 2 from being fried.
U71	1.0A(hold)/1.8A(trip) Resetable Fuse	FUSE-RESET-0603L100SLYR	TOP	This is a fuse that prevents servo 3 from being fried.
U72	DC/DC Buck Converter	AP65502	TOP	This chip acts as a 6.0V regulator that "creates" the 6.0V line. L2 is necessary for operation.
U73	DC/DC Buck Converter	AP65502	TOP	This chip acts as a 3.3V regulator that "creates" the 3.3V line. L4 is necessary for operation.
U74	10A(trip)/5A(hold) Resetable Fuse	2920L500-16MR	TOP	This is the main fuse for the entire Battery_Fuse line. It powers things like the motor controllers.
U75	Pushbutton	N/A	BOTTOM	This is the push button for the Wombat. The Wallaby previously had two pushbuttons so in software this button is registered as a right_button call. (push_button())
U76	Servo Header (Male)	N/A	BOTTOM	This is the servo 2 connector.

U77	Servo Header (Male)	N/A	BOTTOM	This is the servo 3 connector.
D4	Red LED	N/A	BOTTOM	This LED is the red "Power LED" and it turns on when the 3.3V line is "turned on" (should indicate the entire board is turned on).
D5	Yellow LED	N/A	BOTTOM	This LED is controlled by the STM32 processor. Flashing yellow can indicate that it must be updated or that there is a short somewhere on the board.
J1	2x10 Female Pin Header	N/A	BOTTOM	These are the Power and Ground pins for the digital ports.
J2	2x20 Female Pin Header	N/A	BOTTOM	This is the place where the board interfaces with the Raspberry Pi GPIO pins. The only other form of communication with the Raspberry Pi is through the HDMI (which is technically a seperate circuit)
J3	1x10 Female Pin Header	N/A	BOTTOM	These are the signal pins for the digital sensor ports.
J4	1x2 Pin Header/Holes	N/A	BOTTOM	(DNP) This is the connection point for the speaker circuit that was scrapped (U45). A speaker would have been soldered/plugged in here.
J7	1x6 Female Pin Header	N/A	BOTTOM	These are the signal pins for the analog sensor ports.
J8	2x3 Female Pin Header	N/A	BOTTOM	These are the motor 0 and 1 ports.
J9	LCD Connector	40PINFPCM4-1734839-0	TOP	This is the port that the LCD touchscreen plugs into. It connects into U1 to receive/transmit it's signal.
J10	2x3 Female Pin Header	N/A	BOTTOM	These are the motor 2 and 3 ports.
J15	2x6 Female Pin Header	N/A	BOTTOM	These are the power and ground pins for the analog ports.
Q1	Signal Level MOSFET	BSP170P	BOTTOM	This is a MOSFET that allows current from the battery to pass when the power switch is on. Q1 controlls the BATT_NO_FUSE line which powers the 5v,6v, and 3.3v regulators and other things.
Q2	Signal Level MOSFET	BSP170P	BOTTOM	This is a MOSFET that allows current from the battery to pass when the power switch is on. Q2 controlls the BATT_PRE_FUSE line which is essentially the BATT_FUSE line. BATT_FUSE powers things such as the motor controllers.
X1	HDMI Connector	N/A	TOP	This is the board's HDMI connector that is used to take HDMI input from the Raspberry Pi.
R1	10k Resistor	N/A	TOP	This resistor pulls the HDMI "Hotplug" to HIGH. The HDMI hotplug is essentailly how HDMI detects whether a device is connected on the other end. The resistor is so that we aren't just shorting +5V to ground.
R2	10k Resistor	N/A	TOP	This resistor pulls pin 3 on U1 high to set the output drive strength to high. The drive strength is essentially how much current is passing through the data line but there are more complicated effects this has than can be put in this description. See datasheet U1 for more information. Key Terms: Drive Strength, Slew Rate
R3	10k Resistor	N/A	TOP	This is a pullup resistor that make the SDA pin on the LCD default to High. SDA is the data line that syncs according the the clock on SCL.
R4	10k Resistor	N/A	TOP	This is a pullup resistor that makes the SCL pin on the LCD default to High. SCL is used as a clock for serial communication.
R5	10k Resistor	N/A	TOP	This is a pulldown resistor that makes the OCK_INV (pin 100) on U1 hold low. This is necessary for the output to the LCD. This is to set the HSYNC, VSYNC, DE,and CTL signals to register on the falling edge of the clock signal. The jumper SJ1 is placed in case pulling pin 100 high is necessary.
R7	47k Resistor	N/A	TOP	This is a pullup resistor that pulls the Raspberry Pi's GPIO25 high. This sets the default value that the pin goes to so that U$8 can override it.
R8	10k Resistor	N/A	TOP	This is a pulldown resistor for the ACTIVE line (pin 8 on U1). When U4 is not overriding this pulldown, it defaults pin 8 (SCDT) to low.
R9	1k Resistor	N/A	TOP	This is a pullup resistor that when the push button is PRESSED the state of BUTTON is pulled high. R58 keeps the BUTTON line pulled low when the button is unpressed.
R10	1k Resistor	N/A	TOP	This resistor controlls the current that passes through D4 (red power LED)
R11	10k Resistor	N/A	TOP	This is a pullup resistor that keeps the default value of FT/OUT (pin 7) of U43 held high. This essentially makes the default value a 1 rather than a 0 or flunctuating value.
R12	1k Resistor	N/A	TOP	R12 is a current limiting resistor for the LEDs that identify the direction of motor 0 (U63).
R13	1k Resistor	N/A	TOP	R13 is a current limiting resistor for the LEDs that identify the direction of motor 1 (U62).
R14	470 Ohm Resistor	N/A	TOP	This Resistor is used to divide the voltage for the motor 0 back emf circuit. It pairs with R17 to produce a 1.85V source (3.3V / 2).
R15	12 Ohm Resistor	N/A	TOP	This resistor holds pin FB to a default low value but has a jumper (default connected) in between the pin and the restistor before it pulls it to ground.
R16	12 Ohm Resistor	N/A	TOP	Pull down resistor that holds pin FB to a default low value.
R17	470 Ohm Resistor	N/A	TOP	This Resistor is used to divide the voltage for the motor 0 back emf circuit. It pairs with R13 to produce a 1.85V source (3.3V / 2).
R18	470 Ohm Resistor	N/A	TOP	This Resistor is used to divide the voltage for the motor 1 back emf circuit. It pairs with R19 to produce a 1.85V source (3.3V / 2).
R19	470 Ohm Resistor	N/A	TOP	This Resistor is used to divide the voltage for the motor 1 back emf circuit. It pairs with R18 to produce a 1.85V source (3.3V / 2).
R20	2k2 Resistor	N/A	TOP	R20 and R22 are between the highside of motor 1 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R21	2k2 Resistor	N/A	TOP	R21 and R23 are between the lowside of motor 1 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R22	6k8 Resistor	N/A	TOP	R20 and R22 are between the highside of motor 1 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R23	6k8 Resistor	N/A	TOP	R21 and R23 are between the lowside of motor 1 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R24	2k2 Resistor	N/A	TOP	R24 and R26 are between the highside of motor 0 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R25	2k2 Resistor	N/A	TOP	R25 and R27 are between the lowside of motor 0 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R26	6k8 Resistor	N/A	TOP	R24 and R26 are between the highside of motor 0 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R27	6k8 Resistor	N/A	TOP	R25 and R27 are between the lowside of motor 0 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R28	1k Resistor	N/A	TOP	R28 is a current limiting resistor for the LEDs that identify the direction of motor 2 (U66).
R29	240 Ohm Resistor	N/A	TOP	This resistor is used to connect the clock output of U38 to the STM32 processor. This acts as the feedback resistor for the Pierce Oscillator
R30	1k Resistor	N/A	TOP	This resistor is a current limiting restistor for the Yellow LED.
R31	1k Resistor	N/A	TOP	R31 is a current limiting resistor for the LEDs that identify the direction of motor 3 (U65).
R32	10k Resistor	N/A	TOP	Ties the boot1 pin (pin 37) of the STM32 processor to ground. The boot 1 pin is the most significant bit in the boot selector. Forcing it to ground means the only options are boot mode 0 (00) and boot mode 1 (01). These modes are "Boot from User Flash" and "Boot from system memory" respectively. Boot 0 is pin 94 and is controlled by the Raspberry Pi's GPIO #17
R33	470 Ohm Resistor	N/A	TOP	This Resistor is used to divide the voltage for the motor 2 back emf circuit. It pairs with R34 to produce a 1.85V source (3.3V / 2).
R34	470 Ohm Resistor	N/A	TOP	This Resistor is used to divide the voltage for the motor 2 back emf circuit. It pairs with R33 to produce a 1.85V source (3.3V / 2).
R35	470 Ohm Resistor	N/A	TOP	This Resistor is used to divide the voltage for the motor 3 back emf circuit. It pairs with R36 to produce a 1.85V source (3.3V / 2).
R36	470 Ohm Resistor	N/A	TOP	This Resistor is used to divide the voltage for the motor 3 back emf circuit. It pairs with R35 to produce a 1.85V source (3.3V / 2).
R37	3k3 Resistor	N/A	BOTTOM	When the switch is "off" the VCC_BATT_RAW is pulled to ground so as not to activate Q1 and Q2. R37 is placed so that it's not just a short circuit. This paired with R38 causes a current to be drawn when the device is turned off. The current can be calculated (assuming 7V battery) to be 68uA which would drain the battery in ~3.4 years.

R38	100k Resistor	N/A	BOTTOM	When the switch is turned "on" the resistor acts as a current limiter and controlls the gates of the two MOSFETS Q1 and Q2. When the switch is in the "off" position the battery is just shorted with R38 and R37 so that all the current diverts from the gates of the MOSFETS. The R38 Resistor has a large enough resistance that the current draw while the battery is plugged in and the device is turned off is only ~68uA. This means it would take ~3.4 years for the battery to discharge completely.
R39	2k2 Resistor	N/A	TOP	R39 and R41 are between the highside of motor 3 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R40	2k2 Resistor	N/A	TOP	R40 and R42 are between the lowside of motor 3 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R41	6k8 Resistor	N/A	TOP	R39 and R41 are between the highside of motor 3 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R42	6k8 Resistor	N/A	TOP	R40 and R42 are between the lowside of motor 3 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R43	2k2 Resistor	N/A	TOP	R43 and R46 are between the highside of motor 2 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R44	2k2 Resistor	N/A	TOP	R44 and R47 are between the lowside of motor 2 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R45	10k Resistor	N/A	BOTTOM	This resistor makes the default boot mode into boot mode 00 "Boot from User Flash". The line is also connected to the Pi's GPIO #17 so that the Pi can override this default to put the boot mode to 01 "Boot from System Memory".
R46	6k8 Resistor	N/A	TOP	R43 and R46 are between the highside of motor 2 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R47	6k8 Resistor	N/A	TOP	R44 and R47 are between the lowside of motor 2 and 1.85v. They act as a voltage divider to scale the voltage to the 3.3v range the STM32 can read.
R48	0 Ohm Resistor	N/A	BOTTOM	This resistor connects the Pi's GPIO #23 to STM_RESET which when pulsed/set HIGH causes the STM32 Processor to "reboot". This process will also redo steps such as selecting the clock speed.
R49	10.5k Resistor	N/A	TOP	This resistor was placed because the U72 Chip contains a circuit that was described in the "typical application circuits" section of the datasheet. The datasheet for U72 calls for this resistor for a compensation factor.
R50	10k Resistor	N/A	TOP	This resistor divides the current coming out of U72's "FB" pin before it leaves as VCC_6V0. This resistor pairs with R51. The resistor was placed as a direct copy of a circuit from the U72 datasheet. This may be placed in order to keep FB from being an open circuit as essentially all of the current is directed down the 6.0V line.
R51	64k9 Resistor	N/A	TOP	This resistor divides the current coming out of U72's "FB" pin before it leaves as VCC_6V0. This resistor pairs with R50. The resistor was placed as a direct copy of a circuit from the U72 datasheet. This may be placed in order to keep FB from being an open circuit as essentially all of the current is directed down the 6.0V line.
R52	100k Resistor	N/A	TOP	This resistor appears to be a current limiting resistor to activate the enable line on U72. The resistance is very high because it's turning a powerline into a dataline.
R53	10.5k Resistor	N/A	TOP	This resistor was placed because the U73 Chip contains a circuit that was described in the "typical application circuits" section of the datasheet. The datasheet for U73 calls for this resistor for a compensation factor.
R54	10k Resistor	N/A	TOP	This resistor divides the current coming out of U73's "FB" pin before it leaves as VCC_5V0. This resistor pairs with R55. The resistor was placed as a direct copy of a circuit from the U73 datasheet. This may be placed in order to keep FB from being an open circuit as essentially all of the current is directed down the 5.0V line.
R55	64k9 Resistor	N/A	TOP	This resistor divides the current coming out of U73's "FB" pin before it leaves as VCC_5V0. This resistor pairs with R54. The resistor was placed as a direct copy of a circuit from the U73 datasheet. This may be placed in order to keep FB from being an open circuit as essentially all of the current is directed down the 5.0V line.
R56	100k Resistor	N/A	TOP	This resistor appears to be a current limiting resistor to activate the enable line on U73. The resistance is very high because it's turning a powerline into a dataline.
R57	1k Resistor	N/A	BOTTOM	This resistor connects the Push Button to the Raspberry Pi's GPIO pins.
R58	10k Resistor	N/A	TOP	This resistor keeps the value pulls the BUTTON line low when the push button is unpressed.
R59	DNP	N/A	TOP	THIS RESISTOR IS DNP. This is an open pad such that you can place a resistor to test the button. Placing a resistor here will force the button to report HIGH (ON/Pressed). Low value resistors will heat up faster and bridging the pad (a 0 ohm resistor) will lead to a short circuit that (might) cause magic smoke effects.
R60	DNP	N/A	TOP	THIS RESISTOR IS DNP. Placing a resistor here can pull the HIGH line to ground causing it to avoid the BUTTON line entirely. This can be used to make sure the button circuit always reports LOW.
R61	1M Resistor (DNP)	N/A	BOTTOM	THIS RESISTOR IS DNP. This was part of a amplifier circuit that was scrapped (see U45).
R62	DNP	N/A	BOTTOM	THIS RESISTOR IS DNP. This was part of a amplifier circuit that was scrapped (see U45).
R63	DNP	N/A	BOTTOM	THIS RESISTOR IS DNP. This was part of a amplifier circuit that was scrapped (see U45).
R64	100k Resistor	N/A	TOP	This resistor divides the voltage paired with R65 in order to bring it down low enough for the PC0 pin on the STM32 Processor. This is used so that the STM32 can detect the presence of a battery.
R65	10k Resistor	N/A	TOP	This resistor divides the voltage paired with R64 in order to bring it down low enough for the PC0 pin on the STM32 Processor. This is used so that the STM32 can detect the presence of a battery.
R66	0 Ohm Resitor	N/A	TOP	This resistor connects PE10 on the STM32 processor to the 6V enable line on the 6.0V buck converter (U72). This is probably used to detect that the 6.0V Buck is enabled.
R67	DNP	N/A	N/A	This resistor is for factory debug purposes on the U$8 chip
R68	DNP	N/A	N/A	This resistor is for debugging the I2C SDA line for the Pi.
R69	DNP	N/A	N/A	This resistor is for debugging the I2C SCL line for the Pi.
R70	DNP	N/A	N/A	This resistor is for factory debug purposes on the U$8 chip. R70 and R71 are used to set the A0 and A1 pins high. R72 and R73 are used to pull them low. This is for debugging by changing the values of the A0,A1 pins.
R71	DNP	N/A	N/A	This resistor is for factory debug purposes on the U$8 chip. R70 and R71 are used to set the A0 and A1 pins high. R72 and R73 are used to pull them low. This is for debugging by changing the values of the A0,A1 pins.
R72	DNP	N/A	N/A	This resistor is for factory debug purposes on the U$8 chip. R70 and R71 are used to set the A0 and A1 pins high. R72 and R73 are used to pull them low. This is for debugging by changing the values of the A0,A1 pins.
R73	DNP	N/A	N/A	This resistor is for factory debug purposes on the U$8 chip. R70 and R71 are used to set the A0 and A1 pins high. R72 and R73 are used to pull them low. This is for debugging by changing the values of the A0,A1 pins.
C1	10uF Capacitor	N/A	TOP	U7's datahsheet calls for this capacitor as one of the example circuits for usage. This is essentially just another component of U7. The fact that it's placed next to a large capacitor shows that its probably used for filtering. Large Capacitor acts as a resevoir and small capacitor can react quickly.
C2,C3,C5-C11	0.1uF Capacitors	N/A	TOP	These capacitors are used to smooth out the signal of the video lines coming out of the Raspberry Pi.
C4	0.1uF Capacitor	N/A	BOTTOM	This capacitor smooths out the current flowing to the U$8 chip power line. The large capcitor (C12) is placed next to the small capacitor (C4) so that the small capacitor can respond more quickly to voltage spikes but the large capacitor can provide a large resevoir to aid in controlling the voltage spikes.
C12	2.2uF Capacitor	N/A	BOTTOM	This capacitor smooths out the current flowing to the U$8 chip power line. The large capcitor (C12) is placed next to the small capacitor (C4) so that the small capacitor can respond more quickly to voltage spikes but the large capacitor can provide a large resevoir to aid in controlling the voltage spikes.
C14	10uF Capacitor (DNP)	N/A	BOTTOM	THIS CAPACITOR IS DNP. This capacitor would have been paired with C15 to prevent voltage spikes on the U45 VDD pin.
C15	0.1uF Capacitor (DNP)	N/A	BOTTOM	THIS CAPACITOR IS DNP. This capacitor would have been paired with C14 to prevent voltage spikes on the U45 VDD pin.
C16	10uF Capacitor	N/A	TOP	Smooths voltage spikes for the input of U4
C17	1uF Capacitor	N/A	TOP	This is a capacitor that is called for in the datasheet of U4. This is essentially just a part of U4.
C18	1uF Capacitor	N/A	TOP	This is a capacitor that is called for in the datasheet of U4. This is essentially just a part of U4.

C19	0.1uF Capacitor	N/A	TOP	This is a capacitor that is called for in the datasheet of U4. This is essentially just a part of U4.
C20	22pF Capacitor	N/A	TOP	This capacitor is required by the crystal oscillator for accuracy. The capacitor simply improves it's accuracy. On EE forums, it would appear 22pF is a VERY common capacitor for this purpose.
C21	22pF Capacitor	N/A	TOP	This capacitor is required by the crystal oscillator for accuracy. The capacitor simply improves it's accuracy. On EE forums, it would appear 22pF is a VERY common capacitor for this purpose.
C22	0.1uF Capacitor	N/A	TOP	Used to prevent voltage spikes on U43.
C23	22pF Capacitor	N/A	BOTTOM	THIS CAPACITOR IS DNP. This capacitor would have been paired with C15 to prevent voltage spikes on the speaker.
C24	4.7uF Capacitor	N/A	TOP	Prevents voltage spikes on the Voltage input of U7
C25	330uF Capacitor	N/A	TOP	U7's datahsheet calls for this capacitor as one of the example circuits for usage. This is essentially just another component of U7. The fact that it's placed next to a small capacitor shows that its probably used for filtering. Large Capacitor acts as a resevoir and small capacitor can react quickly.
C26	0.1uF Capacitor	N/A	TOP	Used to prevent voltage spikes on the VCC lines of U56 (servo controller)
C27	0.1uF Capacitor	N/A	TOP	Used to prevent voltage spikes on the VCC lines of U56 (servo controller)
C28	0.1uF Capacitor	N/A	BOTTOM	C28 and C29 pair together to prevent voltage spikes on the "motor voltage" pin of the motor controller. C28 is a small capacitor that can react quickly to spikes and C29 acts as a large resevoir to store the energy.
C29	10uF Capacitor	N/A	BOTTOM	C28 and C29 pair together to prevent voltage spikes on the "motor voltage" pin of the motor controller. C28 is a small capacitor that can react quickly to spikes and C29 acts as a large resevoir to store the energy.
C30	0.1uF Capacitor	N/A	BOTTOM	U30 and U31 pair together to prevent voltage spikes on U61. The small capacitor C30 can react quickly because it has a low internal resistance while the large capacitor C31 reacts more slowly but stores more energy like a resevoir.
C31	10uF Capacitor	N/A	BOTTOM	U30 and U31 pair together to prevent voltage spikes on U61. The small capacitor C30 can react quickly because it has a low internal resistance while the large capacitor C31 reacts more slowly but stores more energy like a resevoir.
C32	0.1uF Capacitor	N/A	TOP	C32 and C33 pair together to protect pins 21 and 22 of the STM 32 processor from voltage spikes. C32 acts quickly to changes in voltage but C33 holds more energy.
C33	1uF Capacitor	N/A	TOP	C32 and C33 pair together to protect pins 21 and 22 of the STM 32 processor from voltage spikes. C32 acts quickly to changes in voltage but C33 holds more energy.
C34	0.1uF Capacitor	N/A	BOTTOM	Holds the STM32 reset line to a default low. The capacitor is probably to prevent voltage spikes from causing unintended resets.
C35	22pF Capacitor	N/A	BOTTOM	This filters out high frequency noise from the motor 1 voltage measurements. Capacitors act as open circuits at high frequency.
C36	1uF Capacitor	N/A	TOP	C36 and C46 pair together to protect pin 22 of the STM32 processor from voltage spikes (C32 and C33 also double protect this pin). C36 acts as a resevoir to store the energy and C46 acts more quickly to spikes.
C37	2.2uF Capacitor	N/A	BOTTOM	Protects Pin 49 of the STM32 processor from voltage spikes.
C38	2.2uF Capacitor	N/A	TOP	Protects pin 73 of the STM32 processor from voltage spikes.
C39	4.7uF Capacitor	N/A	BOTTOM	C39 and C41 protect Pin 10 and 11 (VSS_10 and VDD_11) from voltage spikes. C39 acts as a resevoir to store energy and C41 can react more quickly to changes. VSS is the ground pin for supplying the chip and the VDD pin is the positive voltage for supplying power to the chip.
C40	0.1Uf Capacitor	N/A	BOTTOM	This connects the positive supply voltage VDD_100 to the ground VSS_99. The capacitor prevents voltage spikes on these terminals for powering the chip.
C41	0.1uF Capacitor	N/A	TOP	C39 and C41 protect Pin 10 and 11 (VSS_10 and VDD_11) from voltage spikes. This keeps the power for the chip from having spikes. C39 acts as a resevoir to store energy and C41 can react more quickly to changes. VSS is the ground pin for supplying the chip and the VDD pin is the positive voltage for supplying power to the chip.
C42	0.1uF Capacitor	N/A	BOTTOM	This connects the positive supply voltage VDD_75 to the ground VSS_74. The capacitor prevents voltage spikes on these terminals for powering the chip.
C43	0.1uF Capacitor	N/A	TOP	This connects the positive supply voltage VDD_28 to the ground VSS_27. The capacitor prevents voltage spikes on these terminals for powering the chip.
C44	0.1uF Capacitor	N/A	TOP	This capcitor protects VDD_19 on the STM32 processor from voltage spikes.
C45	0.1uF Capacitor	N/A	TOP	This protects VDD_50 on the STM32 processor from voltage spikes.
C46	0.1uF Capacitor	N/A	TOP	C36 and C46 pair together to protect pin 22 of the STM32 processor from voltage spikes (C32 and C33 also double protect this pin). C36 acts as a resevoir to store the energy and C46 acts more quickly to spikes.
C47	22pF Capacitor	N/A	BOTTOM	This filters out high frequency noise from the motor 0 voltage measurements. Capacitors act as open circuits at high frequency.
C48	0.1uF Capacitor	N/A	BOTTOM	C48 and C49 work together to protect U64's VM pins (13,14, and 24) from voltage spikes. The VM pins are the supply that the motor controller uses to power the motors. C48 acts quickly to the spikes while C49 can store more energy.
C49	10uF Capacitor	N/A	BOTTOM	C48 and C49 work together to protect U64's VM pins (13,14, and 24) from voltage spikes. The VM pins are the supply that the motor controller uses to power the motors. C48 acts quickly to the spikes while C49 can store more energy.
C50	10uF Capacitor	N/A	BOTTOM	C50 and C51 work together to protect the logic power of U64 from voltage spikes. C50 acts as a resevoir to store the energy and C51 can react quickly to the spikes.
C51	0.1uF Capacitor	N/A	TOP	C50 and C51 work together to protect the logic power of U64 from voltage spikes. C50 acts as a resevoir to store the energy and C51 can react quickly to the spikes.
C52	22pF Capacitor	N/A	BOTTOM	This filters out high frequency noise from the motor 3 voltage measurements. Capacitors act as open circuits at high frequency.
C53	22pf Capacitor	N/A	BOTTOM	This filters out high frequency noise from the motor 2 voltage measurements. Capacitors act as open circuits at high frequency.
C54	0.1uF Capacitor	N/A	TOP	This protects the power line of U67 from voltage spikes.
C55	22uF Capacitor	N/A	TOP	C55 and C56 pair together to protect the raw input line of U72 (6.0V buck converter) from voltage spikes. This circuit is taken directly from the datasheet of U72.
C56	22uF Capacitor	N/A	TOP	C55 and C56 pair together to protect the raw input line of U72 (6.0V buck converter) from voltage spikes. This circuit is taken directly from the datasheet of U72.
C57	22uF Capacitor	N/A	TOP	C57 and C58 work together to clean the 6.0V output line of voltage spikes. C58 can store more energy and C57 can react quickly.
C58	47uF Capacitor	N/A	TOP	C57 and C58 work together to clean the 6.0V output line of voltage spikes. C58 can store more energy and C57 can react quickly.
C59	6.8nF Capacitor	N/A	TOP	This is taken directly from U72's datasheet. COMP needs to be pulled to ground and C59 is probably to keep voltage spikes from pulling it high.
C60	0.1uF Capcitor	N/A	TOP	This is taken directly from U72's datasheet. The capcitor pulls the SS pin on U72 to ground as the Wombat doesn't use the function of SS pulled high. The capacitor is probably for circuit protection.
C61	10nF Capacitor	N/A	BOTTOM	This is taken directly from U72's datasheet. The capacitor makes the BS and SW pins the same value (essentially).
C62	22uF Capacitor	N/A	TOP	C62 and C63 pair together to protect the raw input line of U73 (5.0V buck converter) from voltage spikes. This circuit is taken directly from the datasheet of U73.
C63	22uF Capacitor	N/A	TOP	C62 and C63 pair together to protect the raw input line of U73 (5.0V buck converter) from voltage spikes. This circuit is taken directly from the datasheet of U73.
C64	22uF Capacitor	N/A	TOP	C64 and C65 work together to clean the 5.0V output line of voltage spikes. C65 can store more energy and C64 can react quickly.
C65	47uF Capacitor	N/A	TOP	C64 and C65 work together to clean the 5.0V output line of voltage spikes. C65 can store more energy and C64 can react quickly.
C66	6.8nF Capacitor	N/A	TOP	This is taken from U73's datasheet. The capacitor pulls the COMP pin of U73 low.

C67	0.1uF Capacitor	N/A	BOTTOM	This is taken directly from U73's datasheet. The capcitor pulls the SS pin on U73 to ground as the Wombat doesn't use the function of SS pulled high. The capacitor is probably for circuit protection.
C68	10nF Capacitor	N/A	TOP	This is taken directly from U73's datasheet. The capacitor makes the BS and SW pins the same value (essentially).
C69	0.1uF Capacitor	N/A	BOTTOM	C69 and C71 pair together to protect the power supply of the MPU IMU sensor from voltage spikes. C69 can react more quickly while C71 has a higher capacitance and can hold more energy
C70	0.1uF Capacitor	N/A	TOP	C70 protects the REGOUT pin from voltage spikes and also pulls it to ground.
C71	10pF Capacitor	N/A	TOP	C69 and C71 pair together to protect the power supply of the MPU IMU sensor from voltage spikes. C69 can react more quickly while C71 has a higher capacitance and can hold more energy
C72	22pF Capacitor	N/A	BOTTOM	THIS COMPONENT IS DNP. This capcitor would have protected the speaker from voltage spikes but the speaker circuit was removed.
C73	2.2uF Capacitor	N/A	TOP	THIS COMPONENT IS DNP. C73 and C74 protect the Voltage Reference Pin of U$8 from voltage spikes and also hold it to ground. When R6 is placed the capacitors are overriden due to their internal resistances and the voltage reference is changed to 3.3V.
C74	0.1uF Capacitor	N/A	TOP	THIS COMPONENT IS DNP. C73 and C74 protect the Voltage Reference Pin of U$8 from voltage spikes and also hold it to ground. When R6 is placed the capacitors are overriden due to their internal resistances and the voltage reference is changed to 3.3V.
				If you need more detail on a specific component, ask me (Zach) and I will update the spreadsheet to be less ambiguous.