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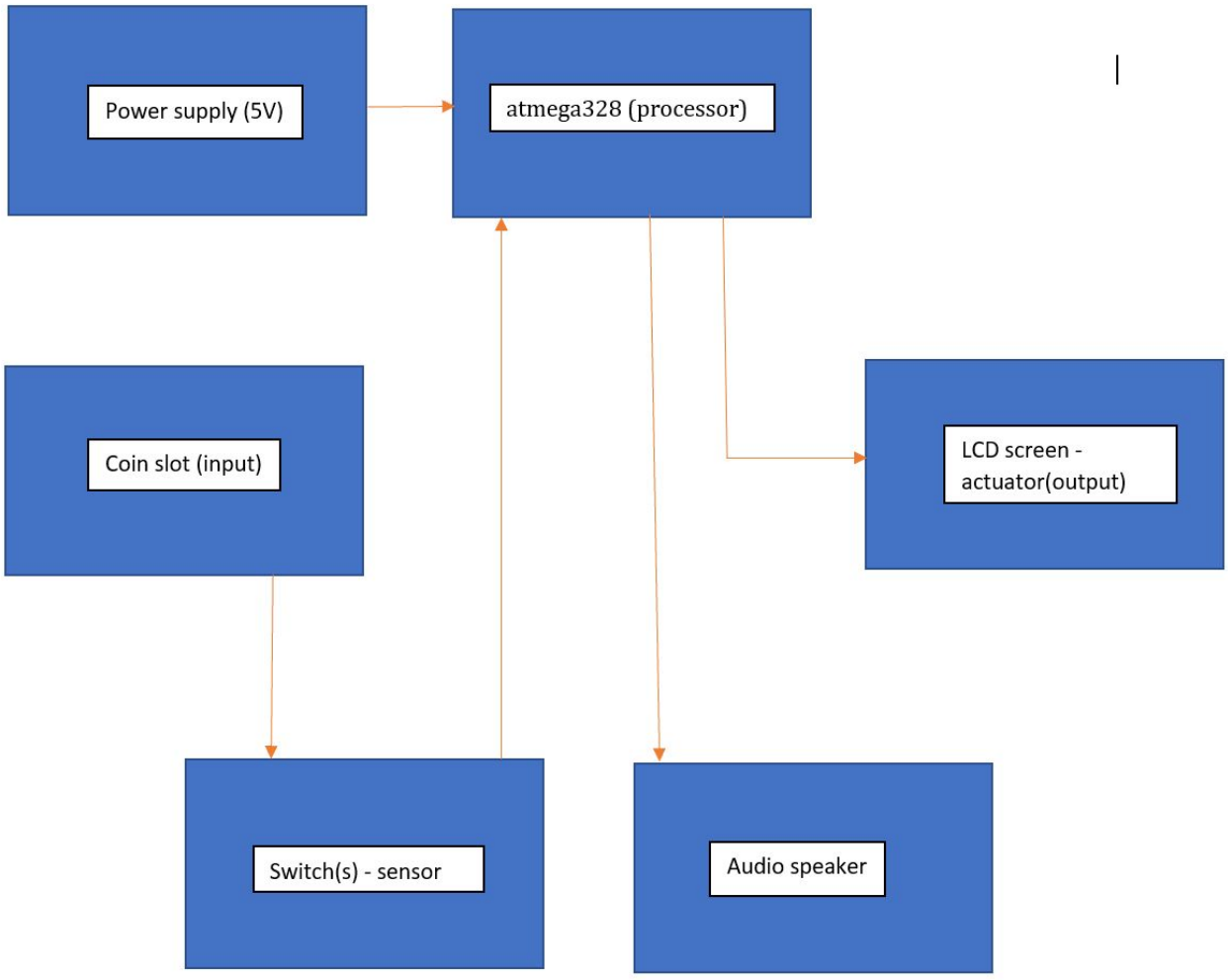
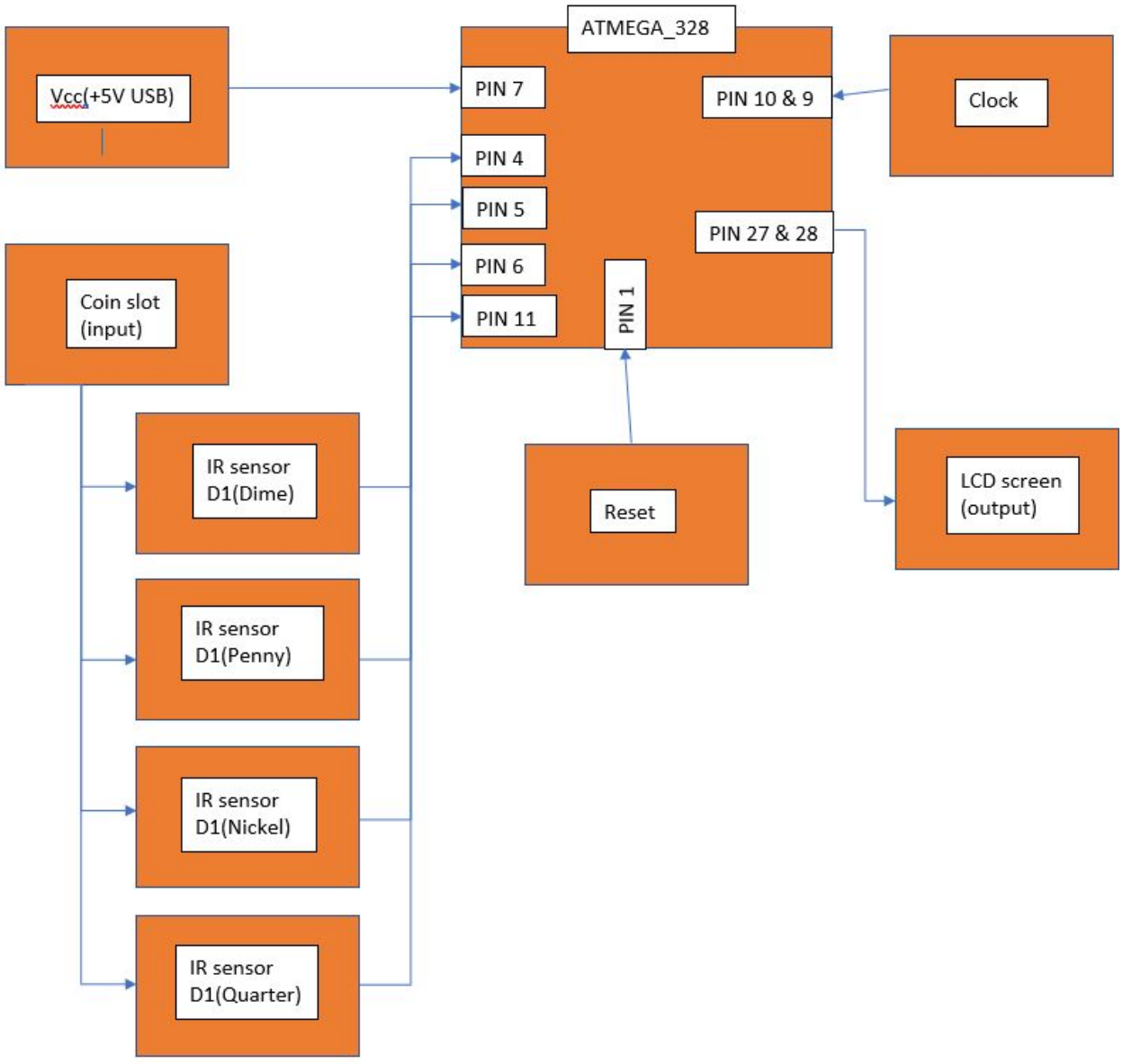
Functional Decompposition

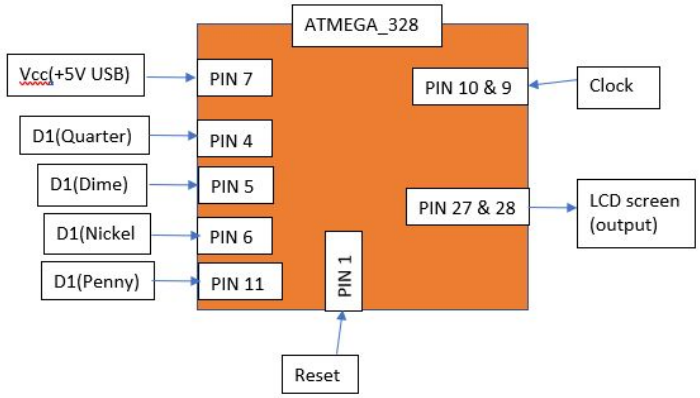
High Level Block Diagram



Next Level Block Diagram

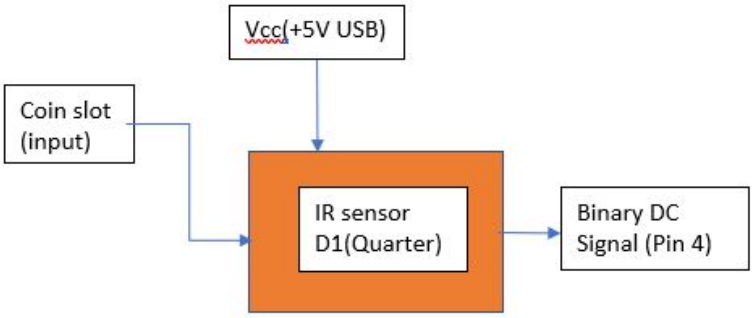


Microcontroller: Level 1



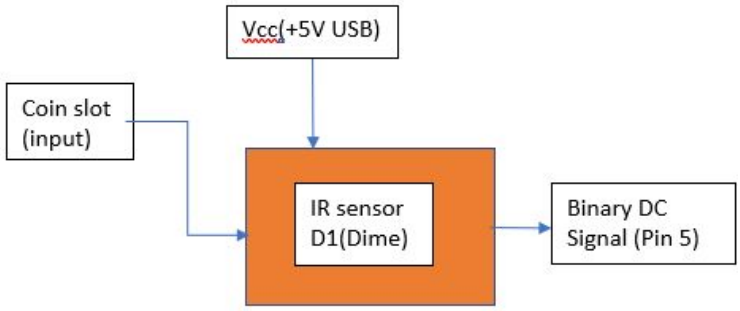
Module	Atmega328p
Inputs	1. 5 Volt USB power supply (pin 7) 2. (4) IR Sensors detecting coin drop for quarter dime nickel penny (pins 4, 5, 6, 11 respectively) 3. Clock driving the atmega328p(pin 10, 9) 4. Reset Button
Outputs	1. LCD Screen to communicate the data connected to the SCL and SDA of microcontroller. (pin 27 and 28)
Functionality	The brain of our device. Reads the input voltage from the sensor pins and depending on if they are high or low will add the corresponding value of currency associated with each pin to the total which will be displayed on the LCD screen.

IR Sensor Quarter: Level 1



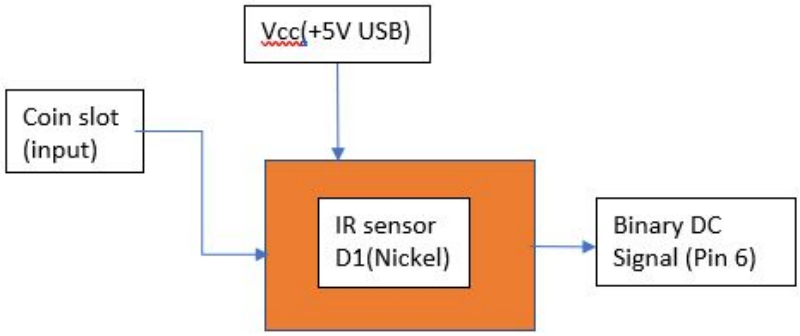
Module	IR Sensor D1 (Quarter)
Inputs	1. 5 Volts USB power supply 2. Quarter Coin slot
Outputs	1. IR sensor sends out a high or low voltage depending on the reading to pin 4 on the microcontroller.
Functionality	The sensors provide the data to the microcontroller. If a coin passes the sensor it sends out a logic high voltage value of 3 volts. Otherwise it stays constant at 0 Volts

IR Sensor Dime: Level 1



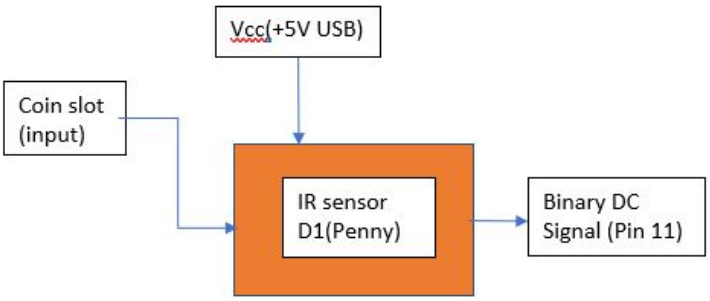
Module	IR Sensor D1 (Dime)
Inputs	1. 5 Volts USB power supply 2. Dime Coin slot
Outputs	1. IR sensor sends out a high or low voltage depending on the reading to pin 5 on the microcontroller.
Functionality	The sensors provide the data to the microcontroller. If a coin passes the sensor it sends out a logic high voltage value of 3 volts. Otherwise it stays constant at 0 Volts

IR Sensor Nickel: Level 1



Module	IR Sensor D1 (Nickel)
Inputs	1. 5 Volts USB power supply 2. Nickel Coin slot
Outputs	1. IR sensor sends out a high or low voltage depending on the reading to pin 6 on the microcontroller.
Functionality	The sensors provide the data to the microcontroller. If a coin passes the sensor it sends out a logic high voltage value of 3 volts. Otherwise it stays constant at 0 Volts

IR Sensor Penny: Level 1

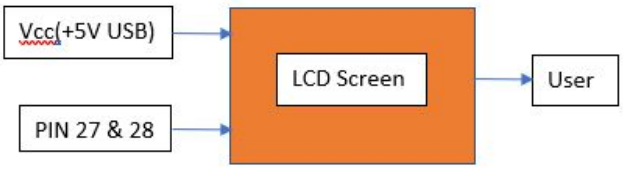


Module	IR Sensor D1 (Penny)
Inputs	1. 5 Volts USB power supply 2. Penny Coin slot
Outputs	1. IR sensor sends out a high or low voltage depending on the reading to pin 11 on the microcontroller.
Functionality	The sensors provide the data to the microcontroller. If a coin passes the sensor it sends out a logic high voltage value of 3 volts. Otherwise it stays constant at 0 Volts

Clock: Level 1

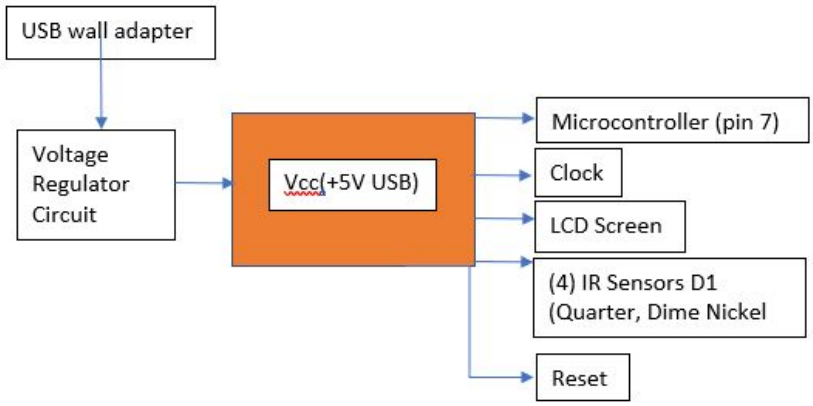
Module	Clock (16 MHz Crystal)
Inputs	1. 5 Volts USB power supply
Outputs	1. 16 MHz clock signal goes on pins 10 and 9
Functionality	The 16 MHz crystal drives the microcontroller functioning as the clock signal.

LCD Screen: Level 1



Module	LCD Screen
Inputs	1. 5 Volts USB power supply 2. The SDA and SCL (pins 10 and 9) of the atmega328p
Outputs	1. LCD screen displays the visuals read by the user.
Functionality	The LCD screen will display the goal savings amount as well as the current amount in the bank. Every time a coin is inserted the corresponding value will be added to the savings variable and that savings variable will be displayed on LCD.

Power Supply: Level 1



Module	Vcc(+5V USB)
Inputs	1. USB wall adapter (5 Volt 2 Amp power supply)
Outputs	1. IR Sensors D1 (Quarter, Dime, Nickel, Penny) 2. Microcontroller (pin 7) 3. LCD Screen 4. Clock 5. Reset Circuit
Functionality	Using just a simple wall adapter and USB cable as the input a simple voltage regulator circuit is used to set the +5V source. This 5 Volts source is then distributed across 8 devices in total. (4) identical IR Sensors, (1) microcontrontoller, (1) LCD Screen and the clock, (1) Reset Circuit and (1) Clock circuit.

Reset Circuit: Level 1

Module	Reset Switch
Inputs	1. Gnd connection on one side of switch
Outputs	1. Pin 1 on the microcontroller
Functionality	The reset function of the microcontroller is active low. So we tie the input of the reset pin (pin 1) to one end of the switch and to VCC. This way when the switch is pressed reset pin will go to 0 and the device will be reset.