

Digital Combination Lock

Lab Project as part of the course
EP 30 Microcontroller Lab

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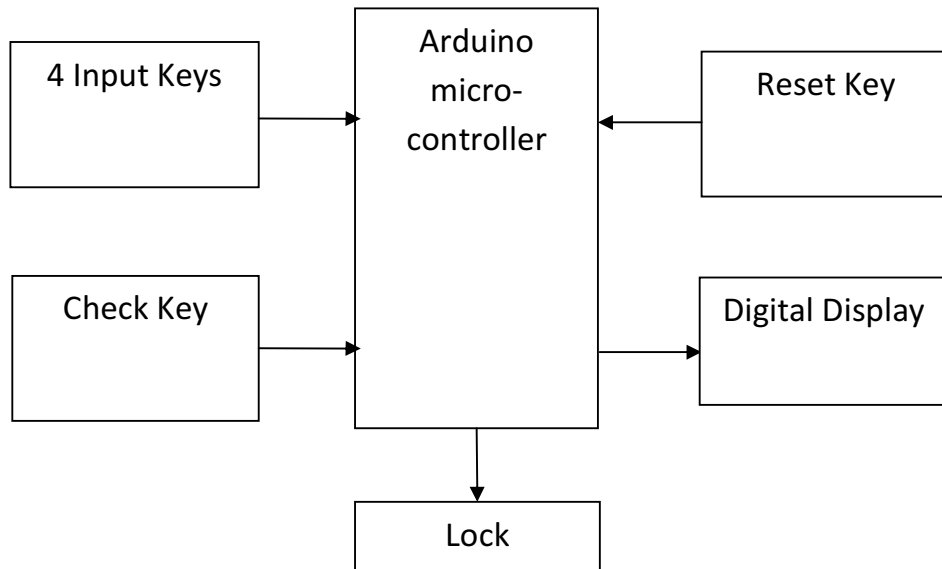
Indian Institute of Technology, Bombay

Description:

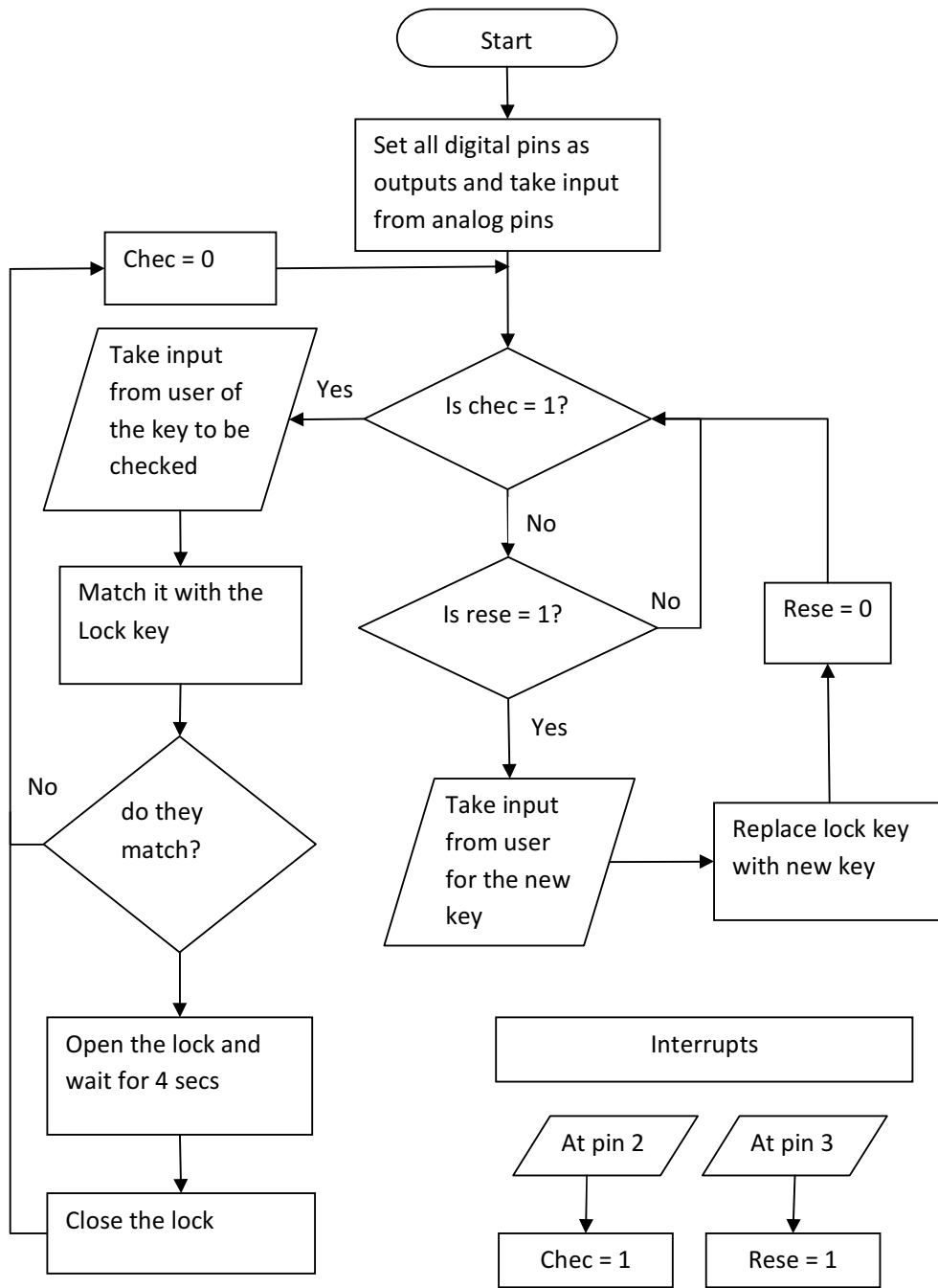
We have developed a digital combination lock which requests the user to enter a code to unlock the lock. also displays the number entered by the user as the number is entered. the two jobs done by the lock are checking the entered key and resetting the key.

Block Diagram:

The Block Diagram for Digital Combination Lock is as follows:



Flow Chart:



Working:

Four digit key entered by the user using the 4 digit number pad interface with 0,1,2,3 as inputs. This number is stored and verified in the code with the number stored. Reset function also included which helps the user reset the code. The analog pins of the Arduino are used as digital input pins.

The digital pins are divided as follows:

pin 2: Interrupt to call check

pin 3: Interrupt to call reset

pins 4-11: output to the digital display

pins 12-13: For the lock mechanism

Code Description:

There are 3 user defined functions, 2 interrupt functions, 3 arrays and 2 indicator variables.

dis() - Displays the entered number.

disnum() -Displays the lock code.

getnum() -used to take input from the analog pins.

Check() -interrupt to set chec to 1.

Reset() -to set rese to 1.

Arrays num[4] and ent[4] store the lock code and entered code.

dig[8] stores the binary value to be sent to display sent to display value.

Indicators chec and rese to indicate whether to enter the checking or resetting part of the code in loop().

When the Check or Reset interrupt is activated the program sets the chec or rese value to be 1 after this in the next run of loop(). The program enters that part and takes input of one digit at a time by a delay of 3 secs. It also at the same time displays the number that is being entered for the user to know if he is entering the correct key

If in checking part then the function has to check if it matches the existing code. If they match then the lock is opened. At the end of the each part the respective indicators are again set back to zero.

Lock mechanism:

First we tried a lock using solenoid but it needed 220V AC to be triggered by a 5V output from arduino. So we then used a simple motor which rotates by an angle of 90 degrees when the lock is opened, It takes 1.5 sec to rotate by 90 degrees and remains in open state for 4 sec and then reverses back to lock.

Work Distribution:-

- Coding done by Prashant Suralkar and Akhilesh Khope.
- Hardware and Lock mechanism done by Vikash Choudhary.