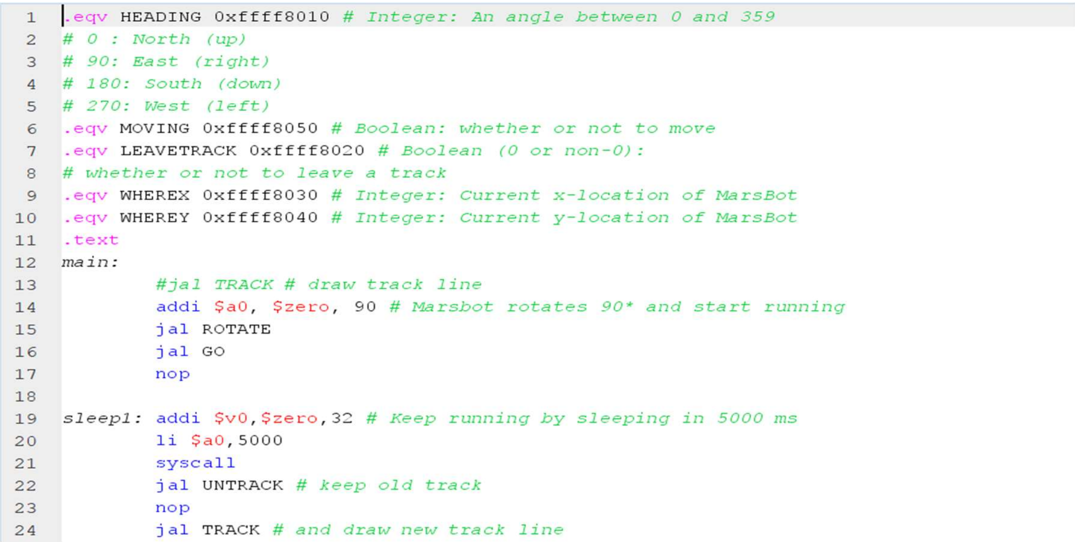
Laboratory Exercise 10

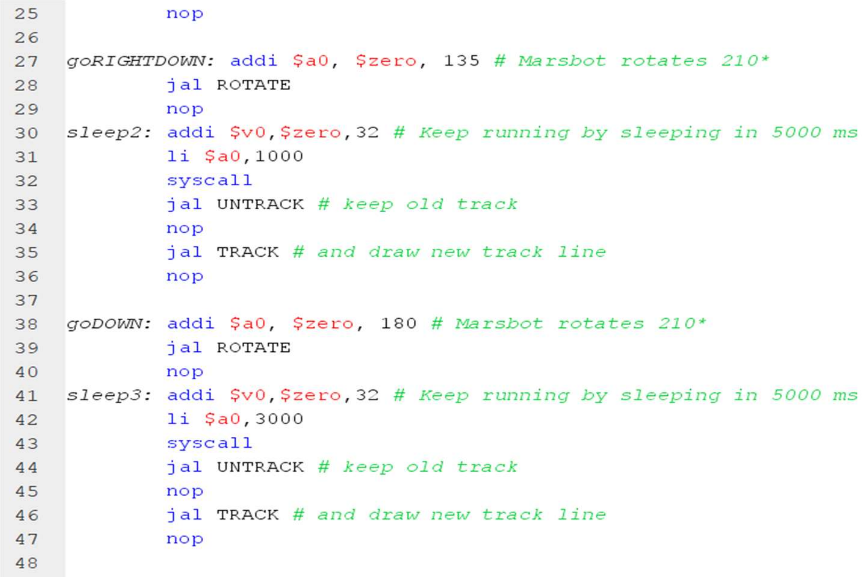
Đỗ Hải Dương – 20194528

Assignment 3

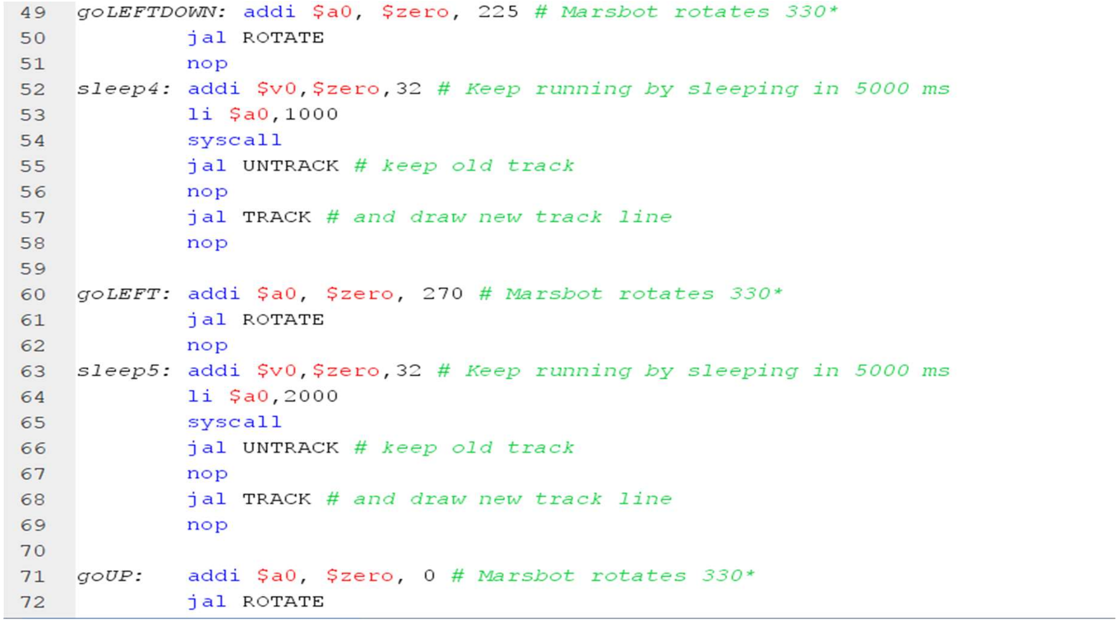
Code:



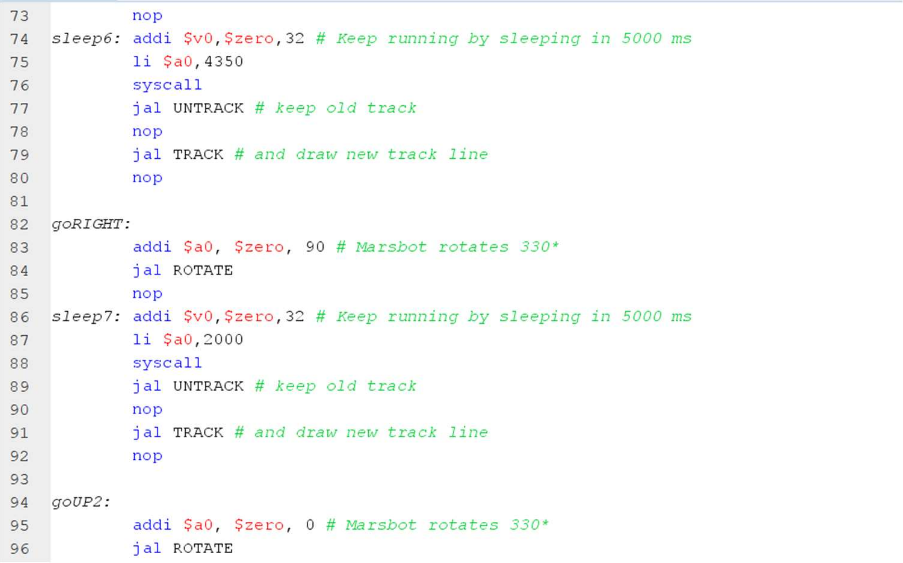
```
.eqv HEADING 0xffff8010 # Integer: An angle between 0 and 359
# 0 : North (up)
# 90: East (right)
# 180: South (down)
# 270: West (left)
.eqv MOVING 0xffff8050 # Boolean: whether or not to move
.eqv LEAVETRACK 0xffff8020 # Boolean (0 or non-0):
# whether or not to leave a track
.eqv WHEREX 0xffff8030 # Integer: Current x-location of MarsBot
.eqv WHEREY 0xffff8040 # Integer: Current y-location of MarsBot
.text
main:
        #jal TRACK # draw track line
        addi $a0, $zero, 90 # Marsbot rotates 90* and start running
        jal ROTATE
        jal GO
        nop

sleep1: addi $v0,$zero,32 # Keep running by sleeping in 5000 ms
        li $a0,5000
        syscall
        jal UNTRACK # keep old track
        nop
        jal TRACK # and draw new track line
```



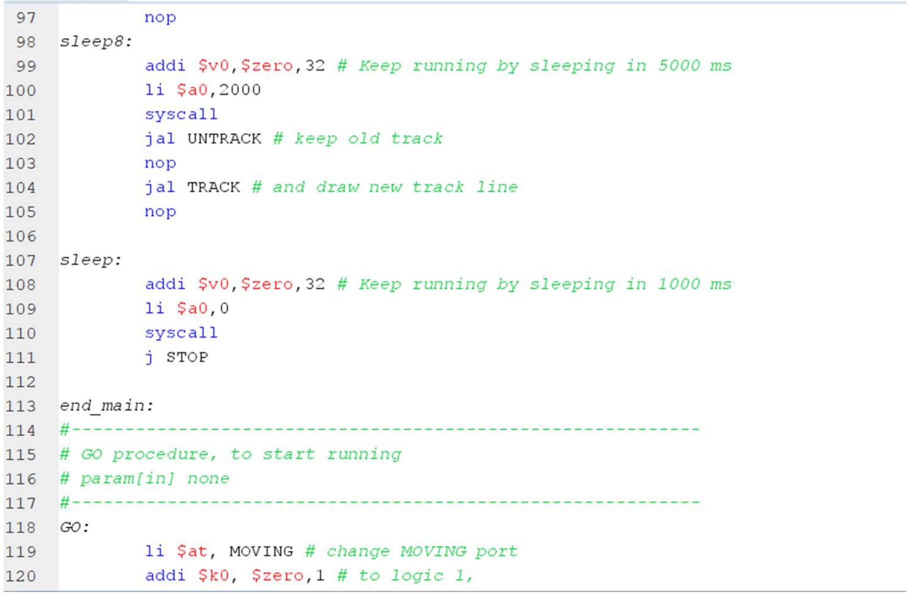
```
        nop

goRIGHTDOWN: addi $a0, $zero, 135 # Marsbot rotates 210*
        jal ROTATE
        nop
sleep2: addi $v0,$zero,32 # Keep running by sleeping in 5000 ms
        li $a0,1000
        syscall
        jal UNTRACK # keep old track
        nop
        jal TRACK # and draw new track line
        nop

goDOWN: addi $a0, $zero, 180 # Marsbot rotates 210*
        jal ROTATE
        nop
sleep3: addi $v0,$zero,32 # Keep running by sleeping in 5000 ms
        li $a0,3000
        syscall
        jal UNTRACK # keep old track
        nop
        jal TRACK # and draw new track line
        nop

```



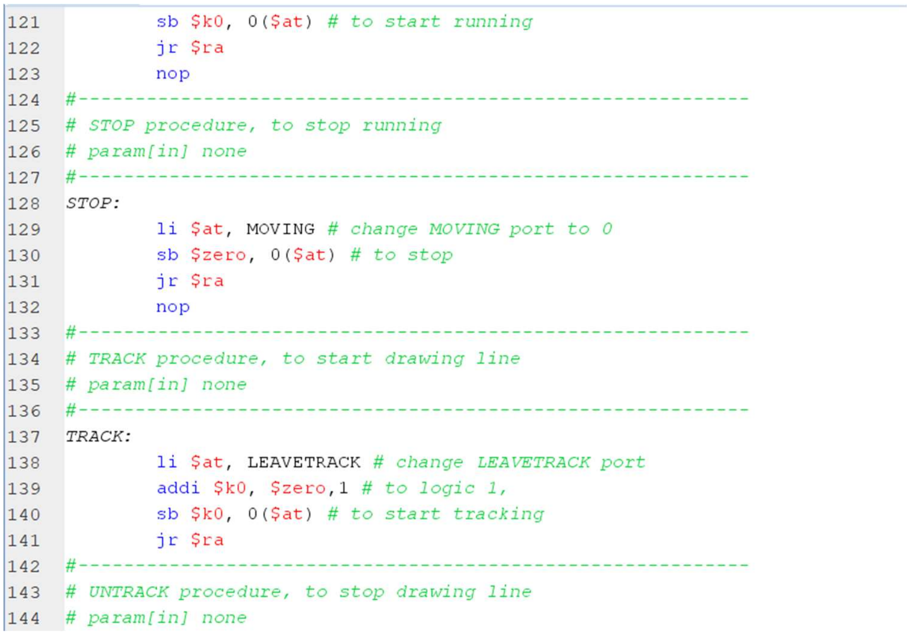
```
goLEFTDOWN: addi $a0, $zero, 225 # Marsbot rotates 330*
        jal ROTATE
        nop
sleep4: addi $v0,$zero,32 # Keep running by sleeping in 5000 ms
        li $a0,1000
        syscall
        jal UNTRACK # keep old track
        nop
        jal TRACK # and draw new track line
        nop

goLEFT: addi $a0, $zero, 270 # Marsbot rotates 330*
        jal ROTATE
        nop
sleep5: addi $v0,$zero,32 # Keep running by sleeping in 5000 ms
        li $a0,2000
        syscall
        jal UNTRACK # keep old track
        nop
        jal TRACK # and draw new track line
        nop

goUP:   addi $a0, $zero, 0 # Marsbot rotates 330*
        jal ROTATE
```



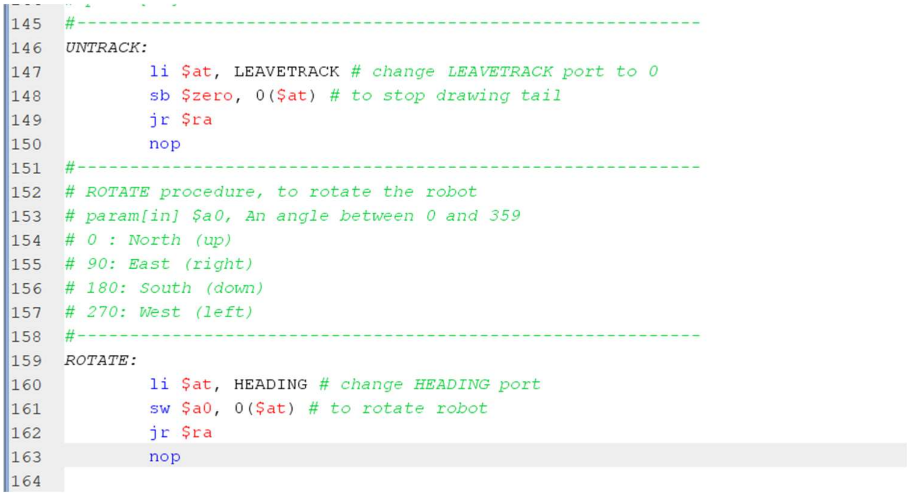
```
        nop
sleep6: addi $v0,$zero,32 # Keep running by sleeping in 5000 ms
        li $a0,4350
        syscall
        jal UNTRACK # keep old track
        nop
        jal TRACK # and draw new track line
        nop

goRIGHT:
        addi $a0, $zero, 90 # Marsbot rotates 330*
        jal ROTATE
        nop
sleep7: addi $v0,$zero,32 # Keep running by sleeping in 5000 ms
        li $a0,2000
        syscall
        jal UNTRACK # keep old track
        nop
        jal TRACK # and draw new track line
        nop

goUP2:
        addi $a0, $zero, 0 # Marsbot rotates 330*
        jal ROTATE
```



```
        nop
sleep8:
        addi $v0,$zero,32 # Keep running by sleeping in 5000 ms
        li $a0,2000
        syscall
        jal UNTRACK # keep old track
        nop
        jal TRACK # and draw new track line
        nop

sleep:
        addi $v0,$zero,32 # Keep running by sleeping in 1000 ms
        li $a0,0
        syscall
        j STOP

end_main:
#-----------------------------------------------------------
# GO procedure, to start running
# param[in] none
#-----------------------------------------------------------
GO:
        li $at, MOVING # change MOVING port
        addi $k0, $zero,1 # to logic 1,
```

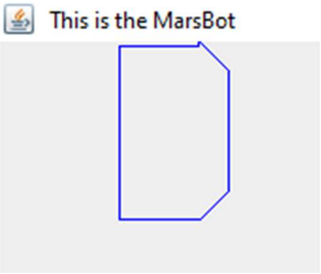


```
        sb $k0, 0($at) # to start running
        jr $ra
        nop
#-----------------------------------------------------------
# STOP procedure, to stop running
# param[in] none
#-----------------------------------------------------------
STOP:
        li $at, MOVING # change MOVING port to 0
        sb $zero, 0($at) # to stop
        jr $ra
        nop
#-----------------------------------------------------------
# TRACK procedure, to start drawing line
# param[in] none
#-----------------------------------------------------------
TRACK:
        li $at, LEAVETRACK # change LEAVETRACK port
        addi $k0, $zero,1 # to logic 1,
        sb $k0, 0($at) # to start tracking
        jr $ra
#-----------------------------------------------------------
# UNTRACK procedure, to stop drawing line
# param[in] none
```



```
#-----------------------------------------------------------
UNTRACK:
        li $at, LEAVETRACK # change LEAVETRACK port to 0
        sb $zero, 0($at) # to stop drawing tail
        jr $ra
        nop
#-----------------------------------------------------------
# ROTATE procedure, to rotate the robot
# param[in] $a0, An angle between 0 and 359
# 0 : North (up)
# 90: East (right)
# 180: South (down)
# 270: West (left)
#-----------------------------------------------------------
ROTATE:
        li $at, HEADING # change HEADING port
        sw $a0, 0($at) # to rotate robot
        jr $ra
        nop

```

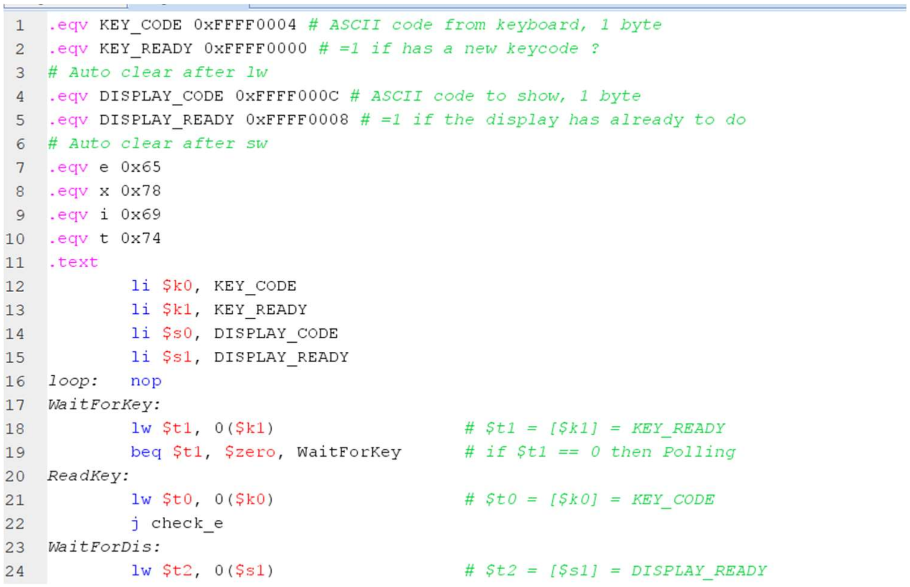
Kết quả:



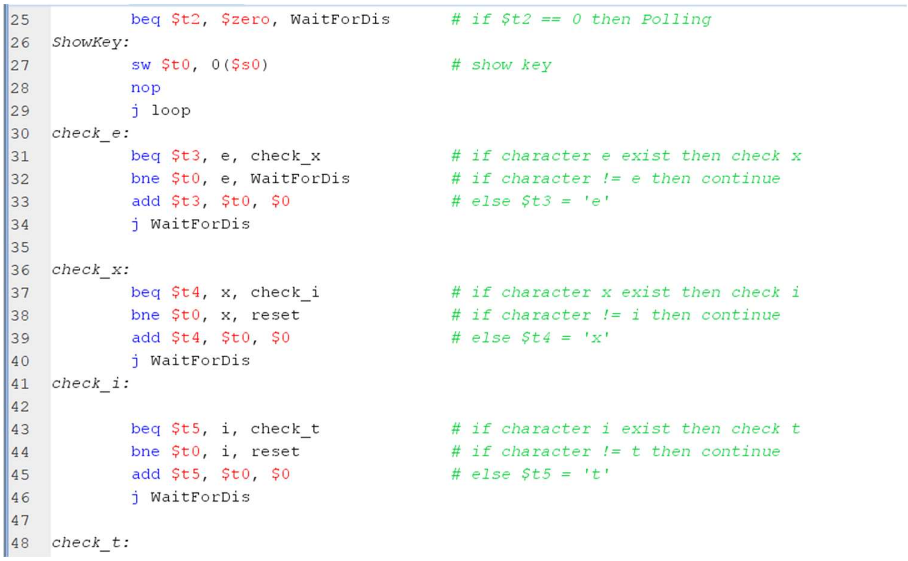
Chữ D (tên Dương)

Assignment 4

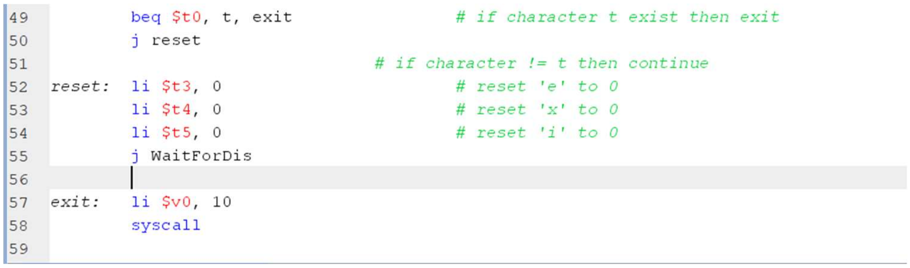
Code:



```
.eqv KEY_CODE 0xFFFF0004 # ASCII code from keyboard, 1 byte
.eqv KEY_READY 0xFFFF0000 # =1 if has a new keycode ?
# Auto clear after lw
.eqv DISPLAY_CODE 0xFFFF000C # ASCII code to show, 1 byte
.eqv DISPLAY_READY 0xFFFF0008 # =1 if the display has already to do
# Auto clear after sw
.eqv e 0x65
.eqv x 0x78
.eqv i 0x69
.eqv t 0x74
.text
        li $k0, KEY_CODE
        li $k1, KEY_READY
        li $s0, DISPLAY_CODE
        li $s1, DISPLAY_READY
loop:   nop
WaitForKey:
        lw $t1, 0($k1)                  # $t1 = [$k1] = KEY_READY
        beq $t1, $zero, WaitForKey      # if $t1 == 0 then Polling
ReadKey:
        lw $t0, 0($k0)                  # $t0 = [$k0] = KEY_CODE
        j check_e
WaitForDis:
        lw $t2, 0($s1)                  # $t2 = [$s1] = DISPLAY_READY
```

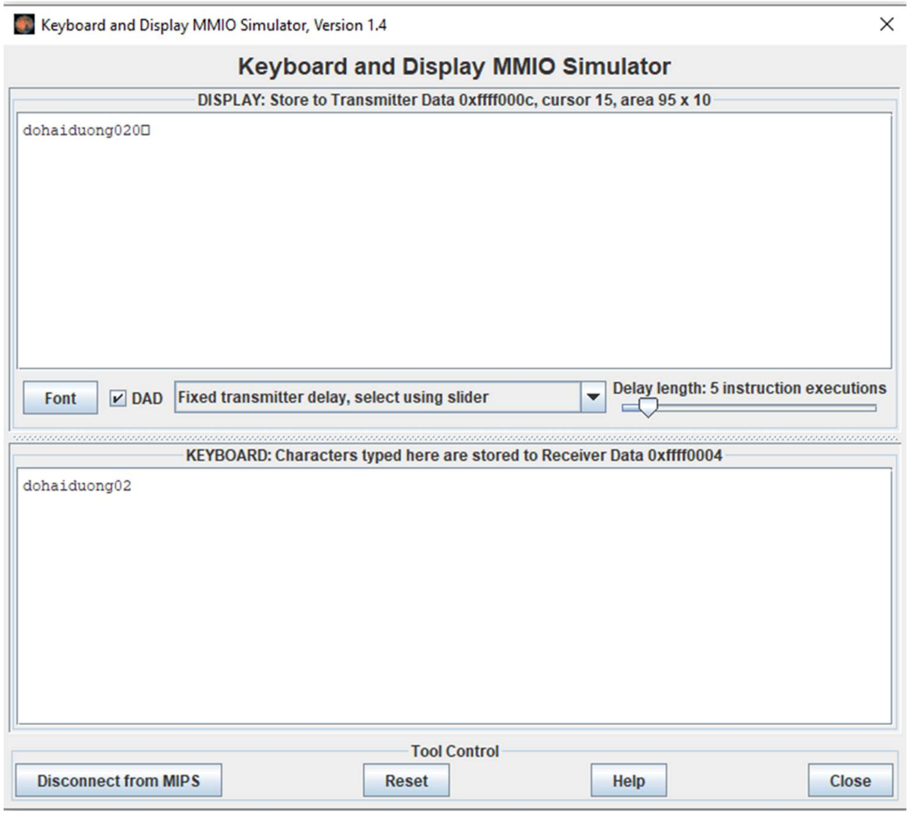


```
        beq $t2, $zero, WaitForDis     # if $t2 == 0 then Polling
ShowKey:
        sw $t0, 0($s0)                 # show key
        nop
        j loop
check_e:
        beq $t3, e, check_x            # if character e exist then check x
        bne $t0, e, WaitForDis         # if character != e then continue
        add $t3, $t0, $0               # else $t3 = 'e'
        j WaitForDis

check_x:
        beq $t4, x, check_i            # if character x exist then check i
        bne $t0, x, reset              # if character != i then continue
        add $t4, $t0, $0               # else $t4 = 'x'
        j WaitForDis
check_i:

        beq $t5, i, check_t            # if character i exist then check t
        bne $t0, i, reset              # if character != t then continue
        add $t5, $t0, $0               # else $t5 = 't'
        j WaitForDis

check_t:
```



```
        beq $t0, t, exit                # if character t exist then exit
        j reset
                                # if character != t then continue
reset:  li $t3, 0                       # reset 'e' to 0
        li $t4, 0                       # reset 'x' to 0
        li $t5, 0                       # reset 'i' to 0
        j WaitForDis

exit:   li $v0, 10
        syscall

```

Kết quả:



Keyboard and Display MMIO Simulator, Version 1.4

Keyboard and Display MMIO Simulator

DISPLAY: Store to Transmitter Data 0xffff000c, cursor 15, area 95 x 10

```
dohaiduong020□
```

☑ DAD

Fixed transmitter delay, select using slider

Delay length: 5 instruction executions

KEYBOARD: Characters typed here are stored to Receiver Data 0xffff0004

```
dohaiduong02
```