BÀI THỰC HÀNH TUẦN 10
KIẾN TRÚC MÁY TÍNH (Phần 2)

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MSSV: 20215020

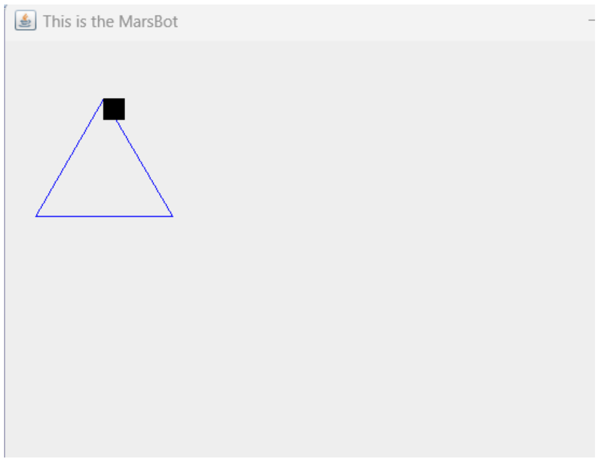
Bài 1:

Hình tam giác:

```
.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:
	addi $a0, $zero, 120 # Marsbot rotates 120* and start running
	jal ROTATE
	nop
	jal GO
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 5000 ms
	li $a0,5000
	syscall
first_side:	
	jal TRACK # draw track line
	nop
	addi $a0, $zero, 150 # Marsbot rotates 150* and start running
	jal ROTATE
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 6000 ms
	li $a0,6000
	syscall
	nop
	jal UNTRACK
	nop
second_side:
	jal TRACK
	nop
	addi $a0, $zero, 270 # Marsbot rotates 270* and start running
	jal ROTATE
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 6000 ms
	li $a0,6000
	syscall
	jal  UNTRACK
	nop
third_side:
	jal TRACK
	nop
	addi $a0, $zero, 30 # Marsbot rotates 30* and start running
	jal ROTATE
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 6000 ms
	li $a0,6000
	syscall
	jal  UNTRACK
	nop
done: 
	jal STOP
	nop
	li  $v0,10
	syscall
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
	nop
	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
        nop
        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
        nop
        jr $ra
        nop
#-----------------------------------------------------------
# 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
        nop
        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
     nop
     jr $ra
     nop
```

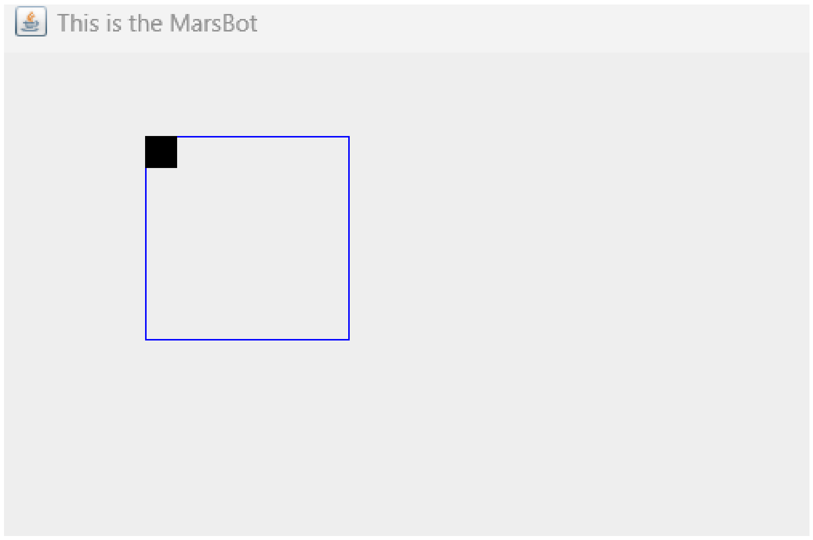


Hình vuông:

```
.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:
	addi $a0, $zero, 120 # Marsbot rotates 120* and start running
	jal ROTATE
	nop
	jal GO
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 5000 ms
	li $a0,5000
	syscall
first_side:
	jal TRACK # draw track line
	nop
	addi $a0, $zero, 90 # Marsbot rotates 150* and start running
	jal ROTATE
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 6000 ms
	li $a0,6000
	syscall
	nop
	jal UNTRACK
	nop
second_side:
	jal TRACK
	nop
	addi $a0, $zero, 180 # Marsbot rotates 270* and start running
	jal ROTATE
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 6000 ms
	li $a0,6000
	syscall
	jal  UNTRACK
	nop
third_side:
	jal TRACK
	nop
	addi $a0, $zero, 270 # Marsbot rotates 30* and start running
	jal ROTATE
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 6000 ms
	li $a0,6000
	syscall
	jal  UNTRACK
	nop
```

```
fourth_side:
	jal TRACK
	nop
	addi $a0, $zero, 0 # Marsbot rotates 30* and start running
	jal ROTATE
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 6000 ms
	li $a0,6000
	syscall
	jal  UNTRACK
	nop
done: 
	jal STOP
	nop
	li  $v0,10
	syscall
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
	nop
	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
      nop
      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
      nop
      jr $ra
      nop
#------------------------------------------------------------
# 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
      nop
      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
      nop
      jr $ra
      nop
```

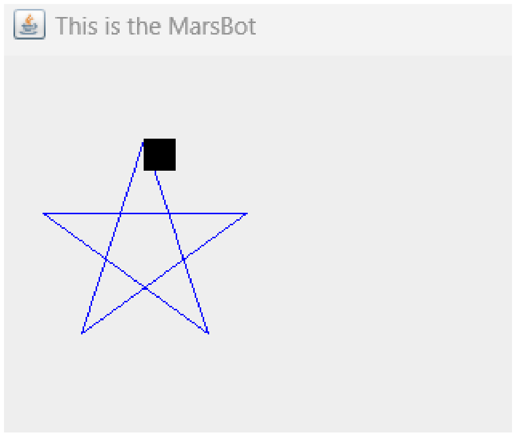


Hình sao:

```
.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:
	addi $a0, $zero, 120 # Marsbot rotates 120* and start running
	jal ROTATE
	nop
	jal GO
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 5000 ms
	li $a0,5000
	syscall
first_side:
	jal TRACK # draw track line
	nop
	addi $a0, $zero, 162 # Marsbot rotates 150* and start running
	jal ROTATE
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 6000 ms
	li $a0,6000
	syscall
	nop
	jal UNTRACK
	nop
second_side:
	jal TRACK
	nop
	addi $a0, $zero, 306 # Marsbot rotates 270* and start running
	jal ROTATE
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 6000 ms
	li $a0,6000
	syscall
	jal  UNTRACK
	nop
third_side:
	jal TRACK
	nop
	addi $a0, $zero, 90 # Marsbot rotates 30* and start running
	jal ROTATE
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 6000 ms
	li $a0,6000
	syscall
	jal  UNTRACK
	nop
```

```
fourth_side:
	jal TRACK
	nop
	addi $a0, $zero, 234 # Marsbot rotates 30* and start running
	jal ROTATE
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 6000 ms
	li $a0,6000
	syscall
	jal  UNTRACK
	nop
fifth_side:
	jal TRACK
	nop
	addi $a0, $zero, 18 # Marsbot rotates 30* and start running
	jal ROTATE
	nop
	addi $v0,$zero,32 # Keep running by sleeping in 6000 ms
	li $a0,6000
	syscall
	jal  UNTRACK
	nop
done: 
	jal STOP
	nop
	li  $v0,10
	syscall
end_main:
```

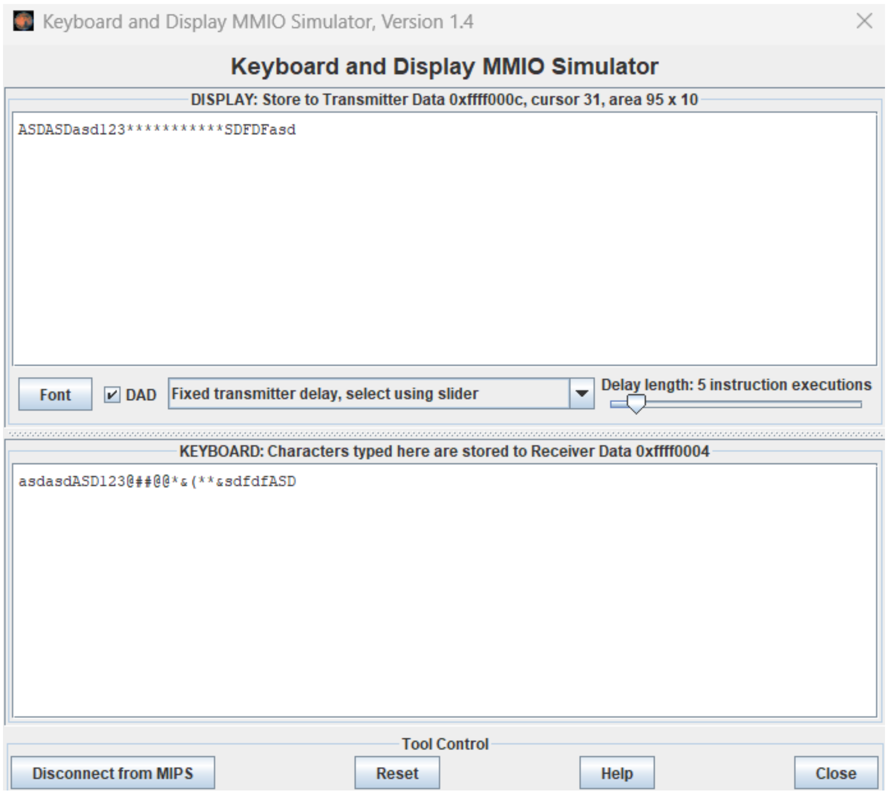
```
#-----------------------------------------------------------
# GO procedure, to start running
# param[in] none
#-----------------------------------------------------------
GO:
        li $at, MOVING # change MOVING port
        addi $k0, $zero,1 # to logic 1,
        sb $k0, 0($at) # to start running
        nop
        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
        nop
        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
        nop
        jr $ra
        nop
#-------------------------------------------------------------
# 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
        nop
        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
        nop
        jr $ra
        nop
```



Bài 2:

```
.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
.text
     li $k0, KEY_CODE
     li $k1, KEY_READY
     li $s0, DISPLAY_CODE
     li $s1, DISPLAY_READY
     li   $s5,1      # mask so it can only be 0/1
     li   $t8,122         # $t8 = z
     li   $t9,90          # $t9 = Z
     addi  $s2,$0,0x30
     addi  $s3,$0,0x39
loop:
     nop
WaitForKey:
	lw $t1, 0($k1) # $t1 = [$k1] = KEY_READY
	nop
	beq $t1, $zero, WaitForKey # if $t1 == 0 then Polling
	nop
#-------------------------------------------------------
ReadKey:
	lw $t0, 0($k0) # $t0 = [$k0] = KEY_CODE
	nop
#-------------------------------------------------------
WaitForDis:
	lw $t2, 0($s1) # $t2 = [$s1] = DISPLAY_READY
	nop
	beq $t2, $zero, WaitForDis # if $t2 == 0 then Polling
	nop
#-------------------------------------------------------
Encrypt:
	slti  $t1,$t0,97 # check str[i] < a
	sgt   $t2,$t0,$t8	# check str[i] > z
	slti  $t3,$t0,65 # check str[i] < A
	sgt   $t4,$t0,$t9	# check str[i] > Z
	nor   $t5,$t1,$t2	# (str[i] < a) NOR (str[i] > z) = a   <=
str[i]  <= z
	and   $t5,$s5,$t5
	nor   $t6,$t3,$t4	# (str[i] < A) NOR (str[i] > Z) = A   <=
str[i]  <= Z
	and   $t6,$s5,$t6
	or    $t7,$t5,$t6
	beq   $t7,$0,skip2
	beq   $t5,$s5,upper	# if a< str[i] <z, go to upper
```

```
     beq  $t6,$s5,lower   # if A< str[i] <Z, go to lower
skip:
     j    ShowKey
#-------------------------------------------
# Procedure: Upper
upper:
     addi $t0,$t0,-32     # Upper(str[i])
     j    skip
#-------------------------------------------
# Procedure: Lower
lower:
     addi $t0,$t0,32 # Lower(str[i])
     j    skip
#-------------------------------------------
skip2:
     slt  $t1,$t0,$s2     # check str[i] < 0
     sgt  $t2,$t0,$s3     # check str[i] > 9
     nor  $t3,$t1,$t2
     and  $t3,$s5,$t3
     beq  $t3,$s5,skip
     addi $t0,$0,0x2a
     j    skip
#------------------------------------------------------
ShowKey:
     sw $t0, 0($s0) # show key
     nop
     j loop
     nop
```


Keyboard and Display MMIO Simulator, Version 1.4
Keyboard and Display MMIO Simulator

DISPLAY: Store to Transmitter Data 0xffff000c, cursor 31, area 95 x 10

```
ASDASDasd123***********SDFDFasd
```

[✓] DAD

Fixed transmitter delay, select using slider

Delay length: 5 instruction executions

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

```
asdasdASD123@##@@*&(**&sdfdfASD
```

Tool Control
Disconnect from MIPS
Reset
Help
Close