Arduino TITO and Player Tracking Project
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HARDWARE REQUIRED

Arduino Mega 2560 R3
https://www.amazon.com/gp/product/B01H4ZLZLQ/

RFID RC 522
https://www.amazon.com/gp/product/B07KGBJ9VG/

W5100 Ethernet Shield
https://www.amazon.com/gp/product/B00AXVX5D0/

MAX3232 Serial port (or compatible)
https://www.amazon.com/gp/product/B083L99CGZ

6' USB Cable
https://www.amazon.com/ dp/B00NH11KIK

6' M-F 9-pin straight-through serial cable
https://www.amazon.com/dp/B006W3XVZK

Compatible vacuum fluorescent display or LCD; if using an LCD then hardware and software modifications will be required. My player tracking bracket has an IEE Vacuum Fluorescent Display 03601-95A-40 – like this one: https://www.ebay.com/itm/192851573499

Dupont M-F jumper wires required (23)

CAT5 cable long enough to reach from your network jack to the top box (or use a WiFi-RJ45 dongle)

5-pin Dupont to Male DB9 Serial pigtail (I reused the one from the BETTORSlots TITO board; I have not found a source for these yet – see Figure 1)

Micro-SD memory card

At least 2 RFID cards

Compatible slot machine (Tested on IGT S2000/GameKing machines; will probably work on others based on the SAS 6.x protocol; will need a compatible cable to connect to the serial port on the machine)

Player tracking bracket with an existing card reader and VF (or LCD) display

3D Printed bumper case for Arduino (or something to protect Arduino from shorting-out on metal in upper cabinet) https://www.thingiverse.com/thing:30270

WIRING

- The Ethernet Shield attaches to the Arduino Mega via the built-in pin headers
- The VFD pins 1-10 should go to data pins 22-31 respectively; VFD Pin 11 to 5V, and Pin 12 to Ground (Assumes IEE Vacuum Fluorescent Display 03601-95A-40)
- The Serial board needs to be wired into 5V, Ground and pins 18 & 19 for Rx and Tx respectively; You will need to find a place to mount the serial board – it can be hot-glued to the Ethernet Shield as long as no components are touching
- The RFID board needs to be wired into data pins 49-53 as follows
  - SDA=53
  - SCK=52
  - MOSI=51
  - MISO=50
  - GND=Ground
  - RST = 49
  - 3.3V = 3.3V

You will need to power the Arduino board from the Accessory Outlet in the base of the slot machine using a USB power brick. A 6' USB cable is recommended to reach the top cabinet. It may be possible to get power from the top-cabinet but that is beyond the scope of this document.

- Do not power the board from any built-in USB port on the game – it may not provide enough power.

You will also need to run a CAT5 cable into the top box for the network or use a WiFi-RJ45 dongle – which will require separate power.

Compatible WiFi dongle: https://www.amazon.com//dp/B07QXNWRWJ

INITIAL SETUP

- Assumes you have the Arduino IDE setup and all dependent libraries installed, including
  - IniFile
  - IeeFlipNoFrills; You will need to update the IeeFlipNoFrills.h library with the one included with this package
  - SPI
  - MFRC522
  - Ethernet
  - SD
- Format the MicroSD Card as Fat32
- Edit the included config.txt file with your settings and preferences; then copy it and the index.htm file to the SD card
  - The scrolling text options have a max length of 255 characters
  - Other text options have a limit of 30 characters (with exception of Casino Name – which should not exceed max width of your display)
  - Other options are Boolean or Integers
- Insert the SD card into the slot on the Ethernet Shield
- Connect the board to your computer and load the ArduinoTITOPlayerTrackingV2 Sketch

- Open the Serial Monitor
- Download the software to the Arduino
- Wait for the app to finish initializing
- Place your first card over the RFID reader – it will create a default player tracking file on the SD Card. Note the cardID in the Serial Monitor. This will be your first player card
- Remove the card from the reader and place a different card on the reader. This will create a second player file which you can edit into the System Bonus card. Note the cardID in the Serial Monitor
- Unplug the Arduino; remove the SD Card and insert it into your PC/Laptop. Edit the player tracking files accordingly. Details on the file formats are in the 'Arduino TITO and Player Tracking Project - File Formats.txt' file
- After editing the files replace the SD card in the Arduino
- Mount the hardware into the slot machine's top box. Your specific player tracking bracket and options may vary – use your best judgement on how to mount the hardware. I removed the existing card reader electronics (leaving the slot) and mounted the RFID reader on top of the slot so it can read the cards when inserted. The mounting of your VF (or LCD) display depends on the type of display and the player tracking bracket
- Run the USB power wire down through the cabinet and route it to the accessory outlet
- Run the CAT5 Ethernet cable down through the cabinet and out to your network outlet
- Run the Serial Port cable down through the cabinet and connect it to the serial pigtail (if you are replacing a BETTORSlots TITO board; otherwise an adapter will need to be created) Running this cable may be a tight fit – you may need to remove the grommet in the cabinet pass-through or shave down the cable-end to make it fit
- Power the machine and test (Assumes you are replacing an existing TITO board or have already setup your machine per the instructions later in this document)
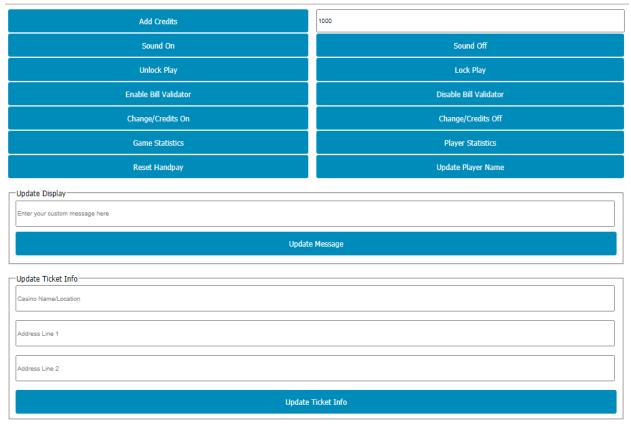
CARD SERVER (OPTIONAL)

- Included in the package is a self-contained web server (APTS.EXE) designed to host and serve the card data to multiple slot machines. It can be run on any Windows 10 PC with the .NET Core framework
  - o If you have multiple machines (each with one of these boards) you can also designate one of the machines to host the card data and then set the other machines to be clients by setting their localStorage option to 0 and populating the serverIPAddress with the IP of the machine to act as host. That machine (or more specifically the board) will need to be powered for it to serve card data to the other machines.
- Place the EXE in a folder on your PC. Cards will be created in this folder
- You will need to disable Windows Firewall or add a rule to allow connections to port 80
- The app must be run as an Administrator
- If you have configured your machines to use the card server and it is not running then player tracking will be unavailable
- In each config.txt file set the localStorage option to 0 and set serverIPAddress to the IP Address of the computer running the Card Server.

REMOTE ACCESS

- This version includes a web interface for controlling various aspects of the game as well as the player tracking display
- It is compatible with the BETTORSlots IOS/Android apps (except tournament mode)

Arduino TITO and Player Tracking

Game Name: **GameKing**   IP Address: **192.168.1.249**
Current player: **No Card Inserted**

Add Credits	1000
Sound On	Sound Off
Unlock Play	Lock Play
Enable Bill Validator	Disable Bill Validator
Change/Credits On	Change/Credits Off
Game Statistics	Player Statistics
Reset Handpay	Update Player Name

Update Display

Enter your custom message here

Update Message

Update Ticket Info

Casino Name/Location

Address Line 1

Address Line 2

Update Ticket Info

This device is compatible with the BETTORSlots Android/IOS apps for remote control.

Most functions are self-explanatory; The Change/Credits feature allows you to enable adding credits by pressing the Change (or Service) button. The number of credits added on each press is set in the config.txt file.

The Update Message option allows you to change the default scrolling text message; it resets to the value in the config.txt when the board is reset.

The Update Ticket Info option allows you to change the information printed on the cash-out ticket.

CONFIGURING YOUR IGT MACHINE (S2000/GameKing)

Before getting started with setting up your IGT machine for TITO please ensure your Bill Validator is working correctly and your Ticket Printer can print clear and legible tickets. You will also need a Keychip appropriate for your type of machine. These instructions assume familiarity with the Keychip process. Note – keychips and menu option locations vary from model-to-model. Please consult your IGT user manual or me if you have questions.

1. Clear any credits off your machine
2. Keychip your machine
3. Once in the Keychip Menu, ensure your Denomination, Devices, Limits and Game settings are as you want them
4. Setup the Comm Options as follows
   a. IGT SAS Primary Channel = Channel 3
   b. SAS Secondary = Off
   c. Bally Miser = Off
   d. Progressive Link = 7
   e. WAMM 1.0 = Off
5. Setup the Validation/Redemption Options as follows
   a. Validation = System Validation
   b. Redemption = SAS Redemption
6. Setup the IGT SAS Options as follows
   a. System Bonusing = SAS Legacy
7. Setup the SAS Channel (Primary Channel) Options as follows
   a. Address = 1
   b. Legacy Bonus = Enabled (X)
   c. Validation = Enabled (X)
8. Setup the Machine Terminal Options as follows
   a. Voucher Limit Follows = Credit Limit
9. Save all options and make any other changes you wish before pressing Return to Game to exit the keychip menu

Test the game by inserting money and then pressing Cash Out to generate a ticket. The ticket serial number should match the number of credits you inserted. Insert the ticket into the machine, it should accept it for the same number of credits.

CONFIGURING YOUR IGT MACHINE (AVP)

Please see this video for how to configure your AVP Game:
https://www.youtube.com/watch?v=JKjyeFQPltA

NOTES

- If using an LCD instead of the IEE VFD then software changes will be required – including adding the LCD library and modifying the code; see inline comments for changes
- This project uses specific hardware and libraries. It may be possible to switch out the Ethernet Shield for another. I DO NOT RECOMMEND using a WiFi Shield – had nothing but problems during testing
- If you do not have a display or card slot (or only wish to use this as a TITO solution) you can set the option 'onlyTITO' to 1 in the config.txt
- Not all machines support the Audio Mute or the Remote Handpay Resets – in those cases the commands will be ignored by the machine

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PHOTOS

FIGURE 1